

## **Real Effective Exchange Rate and Non-Oil Exports Performance in Nigeria An Empirical Reflection**

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### **Abstract**

*This study has been on Real Effective Exchange Rate and non oil exports in Nigeria. The main objective of the study is thus to empirically evaluate the impact of the Real Effective Exchange Rate on non oil exports in Nigeria. The study covered the period between 1980 to 2014. The cointegration technique was applied to estimate the data. The result of the ADF unit root test indicates that all the variables are I(1). The result of the Johansen cointegration test suggests a long run relationship among the variables. The parsimonious ECM result indicates that the Real Effective Exchange Rate and the degree of openness have positive and significant impact on non-oil exports in Nigeria. The ARCH/GARCH results indicate that the volatility of the REER has influenced the level of non-oil exports in Nigeria. The result recommends further devaluation of the exchange rate backed by increased domestic production through a diversified production base.*

**Key-Words:** *Non-oil exports, Real Effective Exchange Rate, Cointegration, economic growth.*

### **1. Introduction**

The relationship between the Real Effective Exchange Rate (REER) which represents “relative price of foreign goods in terms of domestic goods” and non-oil exports in Nigeria is important from policy perspectives. This is because the REER serves as a measure of the international competitiveness which could be maximized through export promotion, particularly through non-oil exports which is more growth enhancing than oil exports which is the dominant export commodity in Nigeria. Serven and Solimano (1991) and Aron, Elbadawi and Khan (1997) noted in their various studies that the equilibrium real exchange rate has important influence on export growth. A policy focus of the Structural Adjustment Programme (SAP) introduced in 1986 was the expansion of non-oil exports through the diversification of the economy away from oil exports. The depreciation of the effective exchange rate was aimed at boosting agricultural exports through increased domestic production (Adobi and Okunmadewa, 1999). Although the agricultural exports increased marginally as a result of his depreciation, the instability of the REER has hindered the performance of Nigeria’s non-oil exports. This is because the goal of a stable exchange rate was not achieved despite the devaluation of the naira (Yimka, Olusegun and Anthony, 2014). The failure of the Nigerian exchange rate to achieve export promotion has been also due to the fact that Nigeria basically imports inputs such as machinery used in the production for exports. This makes nonsense of the devaluation policy since the ensuing high cost of domestic production has hindered the expansion of the non-oil exports. The unpredictability of the exchange rate has negatively affected the operation of the non-oil sector in Nigeria.

Although misalignment of the REER can either be undervaluation or overvaluation, the overvaluation of the REER predominates in developing countries, including Nigeria. This has led to a decline in the tradable good sector and hence lowering capital formation in Nigeria. This has detrimental impact on non-oil exports in Nigeria. The impact of the various exchange rate reforms on the non-oil exports has been unascertained. This is because the non-oil exports which is a measure of the international viability and competitiveness has been quite low. Total exports in Nigeria increased tremendously between the periods of 1986 and 2013. This was partly due to a sharp depreciation of the exchange rate and the introduction of the Second Tier Foreign Exchange Market in 1987 and the increase in the oil price in the last decade. Between 1986 and 1987 alone total exports increased by 240 percent (Akinlo and Adejuma, 2014). The surprising features of this high exports performance were the overwhelming dominance of oil exports accounting for about 90 percent of total exports in Nigeria during the study period. For example, the total non-oil exports in 1986 were N552.1m and increased to 169,709.7m in 2007.

In the Pre-Structural Adjustment Programme (Pre-SAP) period, (between 1976 and 1985), agricultural sector contributed about 4.0 percent to the total exports and about 67.0 percent to non-oil exports (Ogun, 2004). In the same period, the manufacturing sector contributed about 1.0 percent to total exports and 12.0 percent to non-oil exports. The main objective of this study is thus to establish the impact of REER on non-oil exports in Nigeria. This is significant because unlike the nominal exchange rate, the REER measures the true international competitiveness of Nigeria's non-oil exports with her major trading partners. The hypothesis is thus that "REER has not significantly influenced the level of non-oil exports in Nigeria. This study is thus expected to suggest policies to promote non-oil exports through proper management of the REER. The international competitiveness of the Nigerian economy will thus be highlighted in the study. Other than this introductory section, the rest of the paper is divided into the following sections. The second section reviews literature while the third section borders on the econometric procedure which includes the methodology, model specification as well as the results and findings. The fifth section concludes this paper.

## **2. Literature Review**

Theoretically, changes in the REER have been an important factor in increasing the level of exports. Hooper and Kohinagen (1978) noted that increased uncertainty of exchange rate affects trade in a negative way, granted that people are risk averse. De Grauwe (1988) stated that so long people are risk averters, exchange rate influence export performance. Dincer and Kandil (2011) noted that an unanticipated exchange rate appreciation will make exports to be more expensive and imports to be cheaper. They also noted that a positive shock to the local currency through sudden appreciation or overvaluation of it leads to lower interest rates as agents will prefer to hold less domestic currency. Through the influence of the money market. Also a favourable perturbation to the local currency has the tendency to lower the local productivity capacity. Imoughele and Ismaila (2015) studied the impact of exchange rate on Nigeria non-oil exports. The study covered the period between 1986 and 2013. The cointegration technique was used. The study showed that effective exchange rate, money supply, credit to the private sector and economic performance have a significant impact on the growth of non-oil exports. Aliyu (2011) investigated the impact of oil price shock and exchange rate volatility on economic growth in Nigeria. The study showed that appreciation of the exchange rate caused an increase in exports and lowers imports.

The focus of the study by Chukuigwe and Abili (2008) was on the impact of monetary and fiscal policies on non-oil exports in Nigeria. The study covered the period between 1974 and 2005. The study showed using, Ordinary Least Squares (OLS), that exchange rate had negative impact on non-oil exports. Omojimito and Akpokoje (2010) investigated the impact of exchange rate volatility on the imports of ECOWAS member countries. The study which covered the period between 1986 and 2007 revealed that exchange rate reforms are not sufficient to diversify the economy. Akinlo and Adejumo (2014) studied exchange rate volatility and non-oil exports in Nigeria. Their study covered 1986 to 2008 period. Using the dynamic short run analysis, the result showed that foreign income has positive impact on non-oil exports. The result showed further that exchange rate volatility has an insignificant impact on non-oil exports. Nyedi and Atogenzoy (2014) examined the impact of exchange rate movement on exports in Ghana. The study which covered the period between 1990 and 2012 used the OLS. The study showed that exchange rate movement has no significant impact on exports of goods and services. Dincer and Kandil (2011). Studied the effects of exchange rate fluctuations on sectoral exports in Turkey. Using data covering 1996 and 2005 for 21 sectors of the economy found that exchange rate has a significant impact on export growth. Erdal, Erdal and Esengu (2012) investigated the impact of exchange rate volatility on trade in Turkish agricultural trade.

The study which covered the period between 1995 and 2007 showed that REER volatility have a positive long run impact on agricultural exports and a negative long run relationship with agricultural imports. Onaforowa and Owoye (2008) on their study on exchange rate volatility between Nigeria and the United States used data covering the period between 1980 and 2011. The study showed a long run relationship among real exports, real foreign income, relative export prices and Real Exchange Rate volatility. The result shows also that Real Exchange Rate (RER) has a negative impact on exports in both short run and long run. Yaqub (2010) examined exchange rate change and output performance in Nigeria using data between 1970 and 2007. The study found that exchange rate has significant and contractionary impact on agricultural and manufacturing output.

### 3. Econometric Procedure

The cointegration technique was used in this study. This commenced with the determination of whether the variables used in the analysis has a unit root. The Augmented Dickey Fuller (ADF) unit root test which has the advantages of correcting for possible serial correlation was used for this purpose. The second stage was to test for the long run relationship among the variables. This was done with the use of the cointegration test. The Johansen methodology which has the advantages amongst others for allowing for more than one cointegrating equation was used for this purpose. The next test will be the estimation of the overparameterize and the parsimonious ECM models. The various diagnostic checks will follow before an estimation of the variance decomposition.

### 4. Results and Findings

The result of the unit root test is shown in the table below:

**Table 1: Summary of ADF Unit root test result**

Variables	Level data	First Difference	1% Critical Value	5% Critical Value	10% Critical Value	Order of Integration
REER	-2.61	-4.82*	-3.66	-2.96	-2.62	I(1)
GDP	1.65	4.95*	-3.66	-2.96	-2.62	I(1)
OPEN	-1.95	4.28*	-3.66	-2.96	-2.62	I(1)
NOEX	2.51	-5.36*	-3.66	-2.96	-2.62	I(1)

**NB:** \* indicates statistical significance at the 1 percent level

The result of the ADF unit root test result indicates that all the variables have a unit root. They however became stationary after the first difference was taken. They are thus I(1). All the variables were stationary at the 1 percent level. The Johansen cointegration test was adopted to test for the long run relationship among the variables. The result of the Johansen cointegration test is shown below:

**Table2: Johansen cointegration test result**

Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
49.36334	47.21	54.46
17.16879	29.68	35.65
6.229140	15.41	20.04
1.035254	3.76	6.65

Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
29.19455	27.07	32.24
10.93965	20.97	25.52
5.193886	14.07	18.63
1.035254	3.76	6.65

The result of the Johansen cointegration test indicates one cointegrating equation by both the Max-Eigen statistic and the trace statistic. This is an indication of the existence of a long run equilibrium relationship among the variables. This led us to the estimation of the overparameterize and the parsimonious ECM models.

The results of the over parameterize ECM is shown below:

**Table 3: Over parameterize ECM MODEL. Dependent Variable: DLNOEXP**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDP	5.024753	2.183062	2.301700	0.0322
DLGDP(-1)	-2.431805	1.924608	-1.263533	0.2209
DLGDP(-2)	0.701078	0.650769	1.077307	0.2942
DLREER	-0.003487	0.001666	-2.093362	0.0493
DLREER(-1)	0.000232	0.001567	0.148099	0.8837
DLREER(-2)	-0.000829	0.001524	-0.543990	0.5925
OPEN	0.513713	0.514831	0.997830	0.3303
OPEN(-1)	0.761909	0.094144	8.093023	0.0000
OPEN(-2)	0.326860	0.668114	0.489228	0.6300
ECM(-1)	-0.483866	0.105696	-4.577960	0.0001
C	-0.140742	0.326502	-0.431060	0.6710

$$R^2 = 0.57, AIC = 1.30, SC = 1.81, DW = 2.21$$

The parsimonious ECM was gotten by deleting the insignificant variables from the over parameterize ECM and the analysis re-conducted. The result of the parsimonious ECM result is shown in the table below:

**Table 4: Parsimonious ECM Result. Dependent Variable: DLNOEX**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDP	0.619668	0.133588	4.638657	0.0001
DLREER	0.459182	0.200251	2.293030	0.0290
OPEN(-1)	0.454316	0.167069	2.989855	0.0053
ECM(-1)	-0.286662	0.097155	-2.950553	0.0062
C	0.295459	0.233820	1.263616	0.2176

$$R^2 = 0.59, AIC = -1.24, SC = -1.47, DW = 2.10$$

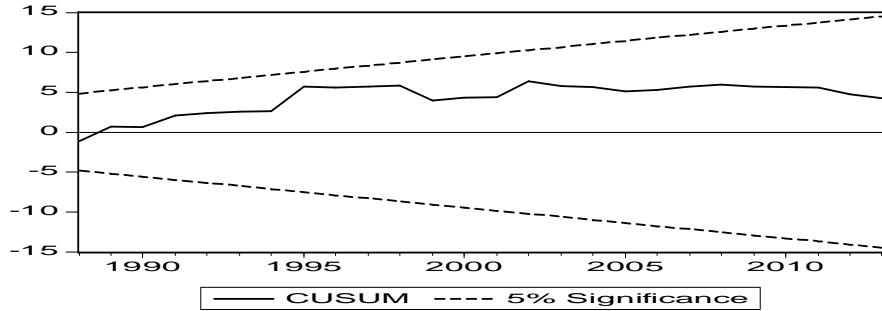
The  $R^2$  shows that 59 [percent of the total variation in non-oil exports have been explained by the level of economic growth, Real Effective Exchange Rate and the openness of the Nigerian economy to the outside world taken together. 41 percent of the variation was explained outside the model. The result shows that the REER has a significant and positive impact on the level of non oil exports in Nigeria. An indication that the depreciation of the REER has improved the level of non oil exports in Nigeria. The result indicates that a depreciation of the REER by 1 percent increased non-oil exports by 0.46 percent. The openness of the Nigerian economy to the outside World has significant and positive impact on non-oil exports. This is an indication that trade liberalization provides an avenue for expansion in non-oil exports. The result indicates also that the level of economic growth has a significant and positive impact on the level of non-oil exports in Nigeria. An increase in economic growth by 1 percent increased non-oil exports by 62 percent. The statistical significance of the ECM provides an indication of a satisfactory speed of adjustment and a further confirmation of the existence of a long run equilibrium relationship among the variables. The results of the diagnostic checks are shown below:

**Table 5: Diagnostic Checks**

White Heteroskedasticity test			
F statistic	1.27	Probability	0.31
Breusch – Godfrey Serial Correlation LM test			
F statistic	0.07	Probability	0.94
Jarque-bera			
Jarque-bera	0.92	Probability	0.63

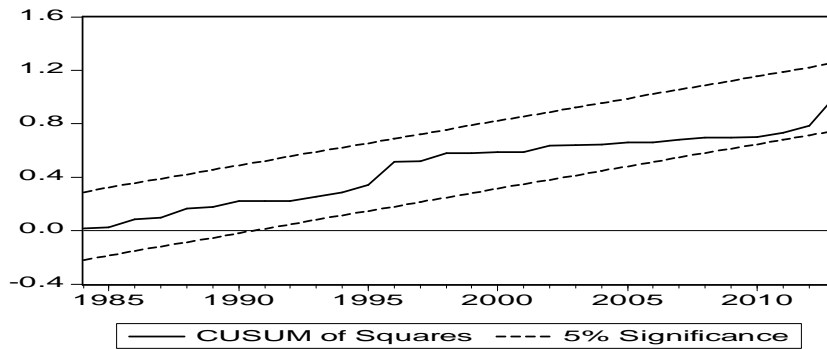
The result of the Jarque bera normality test with a probability of 0.63 indicates a validation of the null hypothesis that the residuals are normally distributed. The result of the Breusch-Godfrey serial correlation LM test indicates that the residuals are not serially correlated. The white heteroskedasticity test with a probability of 0.31 indicates that the residuals are homoskedastic. The results of the Cumulative Sum of Recursive Residuals(CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMQ) stability tests are shown in the figures below:

**Figure 4.1:**CUSUM Stability test



**Figure 4.2** CUSUMQ Stability test

Thee result of the Cholesky variance decomposition is shown below:



Residual stability was shown by both the CUSUM and CUSUMQ stability tests since both the CUSUM and CUSUMQ lines did not cut the 5 percent lines. The results of the diagnostic checks paved the way for the estimation of the variance decomposition which is shown in the table below:

**Table6: Cholesky Variance Decomposition**

Variance Decomposition of LGDP:

Period	S.E.	LGDP	LNOEX	LREER	OPEN
1	0.041455	100.0000	0.000000	0.000000	0.000000
2	0.068206	96.00766	0.020706	3.948483	0.023148
3	0.092277	90.95298	0.011776	7.237490	1.797750
4	0.116304	86.41472	0.007517	6.767429	6.810334
5	0.137801	84.62548	0.102180	5.755956	9.516385
6	0.156324	84.23545	0.205724	5.118592	10.44023
7	0.172129	84.39479	0.237759	4.870522	10.49693
8	0.185969	84.61118	0.228617	4.823253	10.33695
9	0.198415	84.77993	0.215588	4.840181	10.16430
10	0.210062	84.85451	0.207607	4.850247	10.08764

Variance Decomposition of LNOEX:

Period	S.E.	LGDP	LNOEX	LREER	OPEN
1	0.463861	12.04726	87.95274	0.000000	0.000000
2	0.606232	12.30107	86.31685	1.381174	0.000904
3	0.758960	15.35664	82.99440	1.165748	0.483217
4	0.855422	15.92245	82.06418	1.128548	0.884817
5	0.938426	16.28463	81.56475	0.981385	1.169235
6	1.011613	15.50870	81.09856	0.864486	2.528258
7	1.076785	15.15514	81.32473	0.774397	2.745732
8	1.139908	14.78651	81.58285	0.717989	2.912658
9	1.201564	14.75589	81.79920	0.685184	2.759724
10	1.261592	14.71339	81.91183	0.666204	2.708573

Variance Decomposition of LREER:

Period	S.E.	LGDP	LNOEX	LREER	OPEN
1	0.398055	4.682650	35.83736	59.47999	0.000000
2	0.771059	6.481372	49.01985	38.10067	6.398109
3	0.961060	5.202342	54.18670	36.45181	4.159147
4	1.102109	4.092045	55.56186	36.81857	3.527519
5	1.224264	3.341509	55.95680	37.69446	3.007227
6	1.334668	3.006468	56.28544	37.95176	2.756336
7	1.431054	2.951980	56.48791	37.83620	2.723917
8	1.519417	3.023403	56.59126	37.70164	2.683690
9	1.603301	3.018627	56.77469	37.72260	2.484085
10	1.685931	2.959658	56.96616	37.78935	2.284841

Variance Decomposition of OPEN:

Period	S.E.	LGDP	LNOEX	LREER	OPEN
1	0.174147	8.729501	10.71236	2.042643	78.51550
2	0.190626	11.10513	11.40970	4.762191	72.72297
3	0.205491	12.18437	14.09616	5.737296	67.98217
4	0.211501	11.71527	18.20579	5.898738	64.18020
5	0.220622	11.00321	22.75926	5.675226	60.56230
6	0.228306	10.38605	26.06571	5.722412	57.82582
7	0.238324	9.950225	27.68529	5.847769	56.51672
8	0.247038	9.722594	28.87895	6.127022	55.27143
9	0.256356	9.641985	29.79200	6.304691	54.26133
10	0.264202	9.542249	30.98827	6.469236	53.00025

Cholesky Ordering: LGDP LNOEX LREER OPEN

Shocks to non-oil exports explained about 88 percent of changes in itself in the first period.

This was reduced to 82 percent in the last period. Shocks to REER explained 1 percent of changes in non oil exports in the second period. The figure didn't change in most of the period. Shocks to economic growth explained about 12 percent of the changes in the level of non oil exports in the first period. This increased to 15 percent in the last period. Shocks to openness explained about 3 percent of changes in non-oil exports in the sixth period through the tenth period. Shocks to non-oil exports explained about 36 percent of changes in REER in the first period. This increased to 57 percent in the last period.

**Table7: GARCH/ARCH Result**

Variance Equation

C	0.039359	0.032693	1.203905	0.2286
ARCH(1)	-0.143584	0.075482	-1.902214	0.0571
GARCH(1)	0.926405	0.144729	6.400984	0.0000

The result of the Autoregressive Conditional Heteroskedasticity (ARCH) and the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) shows that the volatility of the REER has hindered the performance of non-oil exports in Nigeria.

#### **4. Conclusion and Recommendations**

The study attempts to evaluate the impact of the REER on non-oil exports in Nigeria. This has become necessary given the dwindling level of non oil exports and more importantly since the REER denotes the international competitiveness of the Nigerian economy with her major trading partners. The ADF unit root test indicates that all the variables were I(1). The result of the Johansen cointegration test indicated that a long run relationship exists among the variables. The result of the parsimonious ECM indicates that the depreciation of the REER marginally improved the level of non-oil exports in Nigeria. The ARCH/ GARCH result indicates that volatility of the REER has influenced non oil sector performance in Nigeria. This seems to give some level of credibility to the government's and monetary authority's policy of REER devaluation. The study thus recommends further devaluation of the exchange Rate. This, if backed with increased domestic production of finished goods through diversification of the productive base and previously imported inputs will further increase the level of non-oil exports in Nigeria. Thus, the REER matters for the international competitiveness and the performance of the Non-oil sector in Nigeria.

## References

- Adubi, A. and Okunmadowa, P. (1999). "Price exchange rate volatility and Nigeria's agricultural trade flow: A dynamic analysis. *African Economic Research Consortium (AERC)*, 87.
- Akinlo, A. E. and Adejumo, V. A. (2014). "Exchange rate volatility and non-oil exports in Nigeria: 1986- 2008" *International Business and Management*, 9(2).
- Aliyu, S.R.U. (2011). Impact of oil price shock and exchange rate volatility on economic growth in Nigeria. An empirical investigation". *Research Journal of international Studies*, 11(3).
- Aron, J., Elbadawi, I. A. and Kahn B., (1997). "Determinants of the real exchange rate in South Africa". Oxford: CSAE. [online]. Available: [www.csae.ox.ac.uk/resprogs/smmsae/pdfs/smmsae-2002-13.pdf](http://www.csae.ox.ac.uk/resprogs/smmsae/pdfs/smmsae-2002-13.pdf).
- Chkuigwe, E.C. and Abili, I.D. (2008). An econometric analysis of the impact of monetary and fiscal policies on non-oil exports in Nigeria: 1974-2003. *African Economic and Business Review*, 6(2).
- De-Grauwe, P. (1988). Exchange rate variability and the slowdown in growth of international trade". *International Monetary Fund Staff Paper*, 35.
- Dincer, N. and Kandil, L.M. (2011). "The effects of exchange rate fluctuations on exports. A sectoral analysis of Turkey". *The Journal of International Trade and Economic Development*, 20(6).
- Erdal, N., Erdal, H. and Esengu, K. (2012). "The effects of exchange rate volatility on trade: Evidence from Turkish agricultural trade." *Applied Economics Letter*, 19.
- Hooper, P. and Kohinagen, S.W. (1978). "The effect of exchange rates uncertainty on the prices and volume of international trade". *Journal of International Economics*, 8.
- Imoughele, L. E. and Ismaila, M. (2015). "The impact of exchange rate on Nigeria non-oil exports". *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 5(11).
- Nyeadi, J.O., Attia, O. and Atogenzua, C.A. (2014). "The impact of exchange rate movement on exports Empirical evidence from Ghana". *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(3).
- Ogun, O. (2004). "Real exchange rate behaviour and non-oil export growth in Nigeria". *African Journal Economic Policy*, 11 (1).
- Omojimiti, B.U. and Akpokoje, G. (2010). "The effect of exchange rate volatility on the imports of ECOWAS countries. *Journal of Social Sciences*, 4(2).
- Onaforowa, O.A. and Owoye, O. (2008). "Exchange rate volatility and export growth in Nigeria". *Applied Economics*, 40.
- Serven, L. and Solimano, A., (1991). "An empirical macroeconomic model for policy design: The case of Chile". *Policy Research Working Paper Series 709*. Washington: World Bank.
- Yaqub, J.O. (2010). "Exchange rate change and output performance in Nigeria: A sectoral analysis. *Pakistan Journal of Social Sciences*, 7(5).
- Yimka, A.S., Olusegun, A.A. and Anthony, J.O. (2014). "Foreign exchange rate regimes and non-oil export performance in Nigeria". *International Journal of Business and Behavioural Sciences*, 4(1).