

1 DOES REAL EFFECTIVE EXCHANGE RATE MATTERS FOR 2 AGRICULTURAL OUTPUT IN NIGERIA? A COINTEGRATION APPROACH

6 Abstract

8 The paper empirically investigated the Real Effective Exchange Rate and agricultural
9 productivity in Nigeria. The cointegration technique with its implied ECM was applied to
10 estimate the data which covered the period between 1980 and 2011. The result shows that
11 the Real Effective Exchange Rate has significant impact on the level of agricultural
12 output in Nigeria. The result shows that the prices of exports and real agricultural exports
13 have positive and significant impact on agricultural output. The result also showed a
14 satisfactory speed of adjustment. The result thus recommends policy to stabilize the Real
15 Effective Exchange Rate to facilitate improvement in agricultural output.

17 **Key words:** Agricultural output, Real Effective Exchange Rate, Real Agricultural
18 exports, export prices, cointegration

20 1. Introduction

21 One of the most significant events in Nigeria over the past decade was the devaluation of
22 the Nigerian currency with inception of the Structural Adjustment Programme (SAP) in
23 1986. The major aim for SAP is to reorganize the pattern of productivity with particular
24 focus on boosting agricultural exports. The foreign exchange reforms that facilitated
25 depreciation of the value of the currency was expected to increase the domestic prices of
26 agricultural exports and therefore boost domestic production.

27 The relative prices of imports and exports between Nigeria and other trading partners
28 (Real Effective Exchange Rate) has significant impact on the level of agricultural output.
29 The Real Exchange Rate also has impact on agricultural incentives that could overwhelm
30 those from sectoral policies (Fuzhi and David, 2005). The attempt by government to
31 increase the external competitiveness has made the Real Effective Exchange Rate
32 (REER) policies, a critical determinant of the performance of the economy in general and
33 agricultural productivity in particular. The real exchange rate's level, relative to an

34 equilibrium real exchange rate level, and its stability have been shown to importantly
 35 influence export growth, consumption, resource allocation, employment and private
 36 investments (Takaendesa, Isheole and Aziakpono, 2005). Because of this important role
 37 the REER plays in the economy, emerging economies, in particular, are encouraged to
 38 conduct their policies so as to get this macroeconomic relative price right. The ‘right’
 39 REER is one that does not stray too far from its equilibrium value. Since independence
 40 Nigeria has experienced poor economic performance attributed to external as well as
 41 domestic factors, mostly due to policy failures. A major focus of the liberalization of the
 42 exchange rate was as an engine for agricultural development. This is because changes in
 43 the REER throw all commodity market, including agricultural sector out of equilibrium.
 44 This could lead to changes in domestics agricultural production, consumption, exports,
 45 imports as well as the supply and demand of foreign exchange.
 46 The liberalization policy, including that of exchange rate seems to have stimulated
 47 economic growth, but this has also put pressure on the agricultural sector in Nigeria.
 48 Thus, Nigerian farmers are finding it difficult to compete with farmers from other parts of
 49 the world. In the last few years, the agricultural sector has not performed up to
 50 expectations, due to several years of low level of international competitiveness measured
 51 by the REER. This low level of international competitiveness provided little room for
 52 agricultural sector in Nigeria to compete internationally with foreign agricultural
 53 produce. The appreciation of the REER was responsible for this. Thus, low agricultural
 54 productivity implies reduced income and unemployment since the agricultural sector
 55 generates most of the country’s employment. This low level of agricultural productivity
 56 in Nigeria is one of the reasons why Nigeria still hosts one of the highest poverty rate in

the world. This instability of the REER has been responsible for the low level of agricultural output. The objective of this study is thus to empirically assess the implications of changes in the REER on agricultural output in Nigeria. This is significant since the agricultural sector plays a vital role in the economic development of Nigeria. The agricultural sector contributes to the Gross Domestic Product and employs about 86 percent of the rural householders in the country (CBN, 2010 and Akpan, 2012). This paper thus explores possible impact of REER on agricultural output in Nigeria. Other than this introductory section, the paper is divided into the following section, the rest of the paper is divided into three sections. The second section is on the literature review while the third section is on the statistical procedure. The fourth section is on results and findings and the fifth section concludes this paper.

2. Literature Review

There is increasing literature on the response of agricultural output to exchange rate. In the last few years, agricultural producers are observed to be more sensitive and interested in the role of exchange rate in commodity prices (Kristinek and Anderson, 2002). The issue of whether exchange rate movements have effects on agricultural productivity has attracted significant attention in the literature. The issue was brought into international focus by the introduction of the SAP in Nigeria with the liberalization of the exchange rate.

Economists have long recognized the significance of exchange rates influence on trade (Jennifer and David, 2002). Rapidly expanding global economy and constantly changing international trade laws and technology has increased the relevance of REER in the valuing of farm products and agricultural equipment. The seminal work of Schuh in 1974

80 argued that the overvalued dollar caused the decline in US agricultural exports due to
 81 their relative expense in other vcountries. This overvaluation depressed prices and
 82 reduced the profits of farms resulting in undervaluation of agricultural produce. Shuh
 83 argued that unlike other variable,s the exchange rate plays a key role in all aspects of
 84 agriculture. The shift to a market determined exchange rates was of great importance
 85 because of the emergence of a well-intregrated capital markets (Jennifer and David,
 86 2002). Changes in monetary policy induced international capital flows which in turn
 87 resulted to changes in the value of the US currency. These changes in the value of the US
 88 dollar had an impact on the level of imports and exports of agricultural products.
 89 Agriculture, thus bear the result of the changes in monetary and fiscal policies. Orden
 90 (2000) was of the opinionj that Schuh's article overstated the macroeconomic argument.
 91 He noted that the process of reviving price support policy to accommodate a strong US
 92 dollar occurred about the time that the dollar depreciated. This devaluation as noted by
 93 Orden (2000) restored U.S exports, decreased excess shocks and contributed to allowing
 94 the easing of acreage supply controls, which was good for agriculture. Exchange rate
 95 changes create a difference in foreign and domestic prices of a single good and monetary
 96 shocks have non-neutral effects that explain some of the differences in agricultural prices.
 97 Macroeconomic conditions often play a large role in domestic agricultural policies and
 98 therefore a role in world market competitiveness and trade relations. Orden noted that
 99 such structural policy implications of exchange rate movements coupled with their direct
 100 effects on markets are likely why exchange rates are important to agriculture.
 101 Babula, Ruppel and Bessler (1995) investigated the role of exchange rate in the United
 102 States corn exports. Using the cointegration technique, they found no long run

relationship among exchange rate, price, sales and export of United States Corn. The impact of exchange rate movements and tariff rate reduction on disaggregated import prices was the focus of Oyinlola (2008) empirical investigation. Using the Error Correction Mechanism (ECM), the study showed that in the short run, exchange rate exhibits positive and more than complete pass-through to significant import prices of consumer and capital goods. Kiptui (2008) studied the impact of Real Exchange Rate on the demand for Kenya's exports. Bounds testing and the Autoregressive Distributed Lag (ARDL) approaches as well as the ECM were used. The result showed that the RER has positive effects on Kenya's exports in the short run. However, the effects were insignificant. Aliyu (2008) empirically studied exchange rate volatility and export trade in Nigeria. He used the cointegration technique with data covering the period between 1970 and 2007. the result showed a stable long run equilibrium relationship among the fundamental variables. Azaria, Omar and Ali (2010) investigated the impact of exchange rate reforms on Sudan's economy. Their study revealed that depreciation of exchange rate improved the Gross Domestic Product, due to improvement in the balance of trade, regardless of deterioration in total absorption level and also that agricultural exports benefit more from depreciation than the industrial sector. They also found that appreciation resulted in deterioration of Gross Domestic Product and improvement of private consumption. Abiodun and Sheu (2010) assessed agricultural response to prices and exchange rate in Nigeria. They applied the cointegration and Vector Error Correction (VEC) methodology. The result showed that food and export prices as well as the RER jointly explained 57 percent of the variation in agricultural output in the short run and 87 percent variation in the long run. The study further showed that food crop prices and

exchange rate are passed on immediately to agricultural output. Sunday, Vincent, Glory and Daniel (2012) investigated agricultural productivity and macroeconomic variable fluctuation in Nigeria. Using cointegration technique and ECM, the result showed that industry capacity utilization rate and nominal exchange rate have positive impact on agricultural productivity in both the short run and long run. Lots of studies have been carried out on the impact of exchange rate on trade and only few on the impact of exchange rate on agricultural productivity in Nigeria. However, no study have been carried out on the impact of the REER on agricultural productivity in Nigeria. This is the gap this study intends to fill. This study also employed modern econometric technique and covered a wider scope which covers the behaviour of REER and agricultural productivity in the Pre-SAP, SAP and post-SAP periods.

3. Statistical procedures

The conventional approach to time-series econometrics is based on the implicit assumption of stationarity of time-series data. A recent development in time-series econometrics has cast serious doubt on the conventional time-series assumptions. There is substantial evidence in the recent literature to suggest that many macroeconomic time series may possess unit roots. That is, they are non-stationary processes. A time-series integrated of order zero $I(0)$, is level stationary, while a time-series integrated of order one, $I(1)$, is stationary in first difference. Most commonly, series are found to be integrated of order one, or $I(1)$. The implication of some systematic movements of integrated variables in the estimation process may yield spurious results. In the case of a small sample study, the risk of spurious regression is extremely high. In the presence of

149 I(1) or higher order integrated variables, the conventional t-test of the regression
150 coefficients generated by conventional OLS procedure is highly misleading (Granger and
151 Newbold, 1977).

152 Resolving these problems requires transforming an integrated series into a
153 stationary series by successive differencing of the series depending on the order of
154 integration (Box and Jenkins, 1970). However, Sargan (1964), Hendry and Mizon (1978)
155 and Davidson, Hendry, Sbra and Yeo (1978) have argued that the differencing process
156 loses valuable long run information in data, especially in the specification of dynamic
157 models. If some, or all, of the variables of a model are of the same order of integration,
158 following the Engle-Granger theorem, the series are cointegrated and the appropriate
159 procedure to estimate the model will be an error correction specification. Hendry (1986)
160 supported this view, arguing that error correction formulation minimizes the possibilities
161 of spurious relationships being estimated as it retains level information in a non-
162 integrated form (Hendry, 1986). Davidson, Hendry, Sbra and Yeo. (1978) proposed a
163 general autoregressive distributed lag model with a lagged dependent variable, which is
164 known as the 'error-correction' term. Davidision, Hendry, Sbra and Yeo (1978) also
165 advocated the process of adding lagged dependent and independent variables up to the
166 point where residual whiteness is ensured in a dynamic specification. Therefore, error
167 correction models avoid the spurious regression relationships.

168 To guard against the possibility of estimating spurious relationships in the
169 presence of some nonstationary variables, estimation is performed using a general-to-
170 specific Hendry-type error correction modelling (ECM) procedure. This procedure
171 begins with an over-parameterised autoregressive distributed lag (ADL) specification of

an appropriate lag. The consideration of the available degrees of freedom and type of data determine the decision on lag length. With annual data, one or two lags would be long enough, while with quarterly data a maximum lag of four can be taken. Under this ECM procedure, the long run relationship is embedded within the dynamic specification.

Based on this theoretical background and on data availability, this study estimates the following relationship:

$$AGDP = b_0 + b_1 REER + b_2 RAEXP + b_3 PEXP + U_t$$

Where:

AGDP = Agricultural Gross Domestic Product

REER = Real Effective Exchange Rate which is the Nominal Effective Exchange Rate deflated by price level differentials

RAEXP = Real Agricultural export, which is the nominal value of agricultural exports deflated by Gross Domestic Product

PEXP = Price of exports denominated in foreign currency. Export prices are equivalent to producer prices paid top producers and quoted by the Central Bank of Nigeria Annual Reports

Data Sources

Annual data from 1980 to 2011 were used for this study. Data on exports, Agricultural Gross Domestic Product and REER were obtained from the Central Bank of Nigeria Statistical Bulletin, Economic and Financial Review, Annual Reports and Statement of Accounts and various issues of the World Bank indicators for Nigeria. Authors also computed some of the data.

4. Results and Findings

The result of the Augmented Dickey Fuller (ADF) and Philip Perron (PP) unit root test results are shown in table 1 below:

Table 1: Summary of ADF and PP unit root tests results

Variables	`ADF			PP		
	Level data	1 st diff	Order of Integration	Level data	1 st diff	Order
AGDP	2.20	5.71*	I(1)	1.54	4.23*	I(1)
REER	-2.24	-3.95*	I(1)	-2.39	-3.81	I(1)
RAEXP	-5.72*	-2.60	I(0)	-5.70*	-14.76	I(0)
PEXP	-0.39	-3.82*	I(1)	-0.38	-4.56*	I(1)

NB: * indicates statistical significance at the 1 percent level

The result of both the ADF and PP unit root test suggests that all the variables except the real agricultural exports were non-stationary. They however became stationary after the first difference was taken. The real agricultural exports was stationary at levels probably because it is a ratio variable. Following Harris (1995) and Gujaratti (2003), both I(1) and I(0) variables were therefore carried forward to test for cointegration. The result of the Johansen cointegration test which has the advantage amongst others of allowing for more than one cointegrating equation is shown in table 2 below:

Table 2: Summary of Johansen cointegration test result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.760589	63.10945	47.21	54.46
At most 1	0.409801	21.65184	29.68	35.65
At most 2	0.193460	6.360256	15.41	20.04
At most 3	0.004308	0.125216	3.76	6.65
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.760589	41.45761	27.07	32.24
At most 1	0.409801	15.29159	20.97	25.52
At most 2	0.193460	6.235039	14.07	18.63
At most 3	0.004308	0.125216	3.76	6.65

The result of both the trace statistic and Max-eigen statistic shows one cointegrating equation. The existence of at least one cointegrating equation permits us to estimate the overparameterize and parsimonious ECM models. The result of the overparameterize ECM is shown in table 3 below:

Table 3: Summary of overparameterize ECM result: Modeling DLAGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLPEXP	0.158418	0.154658	1.024311	0.3193
DLPEXP(-1)	-0.146612	0.166456	-0.880786	0.3900
DLPEXP(-2)	-0.165692	0.160770	-1.030614	0.3164
DLREER	-0.022412	0.183033	-0.122448	0.9039
DLREER(-1)	0.005771	0.168026	0.034346	0.9730
DLREER(-2)	0.234094	0.172862	1.354228	0.1924
RAEXP	-0.008571	0.047196	-0.181607	0.8579
RAEXP(-1)	0.087904	0.048041	1.829789	0.0839
RAEXP(-2)	-0.022925	0.054087	-0.423849	0.6767
ECM(-1)	-0.061915	0.630022	-0.098274	0.9228
C	0.074062	0.131263	0.564222	0.5796

$R^2 = 0.65$, F statistic = 4.21, AIC = 0.33, SC = 0.84, DW = 2.23

The result of the overparameterize ECM in table 3 include two lags of each variable. The parsimonious ECM model was obtained by deleting the insignificant variables from the parsimonious ECM model. The result of the parsimonious or preferred ECM model is shown in table 2 below:

Table 4: Summary of parsimonious ECM result. Modeling DLAGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLPEXP(-1)	-0.194500	0.156143	-1.245652	0.2254
DLREER	0.021443	0.166097	0.129100	0.8984
DLREER(-2)	0.193324	0.165002	1.171646	0.2533
RAEXP	-0.024411	0.047683	-0.511936	0.6136
ECM(-1)	-0.177191	0.613911	-0.288627	0.7755
C	0.128385	0.078789	1.629481	0.1168

$R^2 = 0.72$, F statistic = 42.31, AIC = -0.41, SC = -0.61, DW = 2.12

The result of the preferred ECM indicates that the REER has significantly influenced the level of agricultural productivity in Nigeria. The relatively high elasticity which is almost unity in lag 2 provides an indication that the international

competitiveness of the Nigerian economy has some significant influence on the level of agricultural productivity in Nigeria. The result shows that an expansion of real agricultural export in Nigeria by a unit increased the level of agricultural output by 0.65 units. The prices of exports in Nigeria also significantly influenced the level of agricultural productivity in Nigeria. The result shows that an increase in the prices of exports by 1 percent increased the volume of agricultural output by 45 percent. The negatively signed and significant ECM is an indication of a satisfactory speed of adjustment.

The relevant section of the result of the Vector Error (VEC) is shown in table 5 below:

Table 5: VEC Result

Cointegrating Eq:	CointEq1			
LAGDP(-1)	1.000000			
LPEXP(-1)	-0.067110 (0.01502) [-4.46920]			
LREER(-1)	0.025483 (0.03311) [0.76972]			
RAEXP(-1)	-0.358112 (0.04072) [-8.79429]			
C	-9.817252			
Error Correction:	D(LAGDP)	D(LPEXP)	D(LREER)	D(RAEXP)
CointEq1	-0.193981 (0.36136) [-0.53680]	1.111932 (0.48511) [2.29214]	0.150798 (0.44872) [0.33606]	-6.955688 (1.50626) [-4.61785]

The result of the VEC shows that the real agricultural export equation represents the true cointegrating equation. The others were statistically flawed because they were either not significant or have the wrong sign.

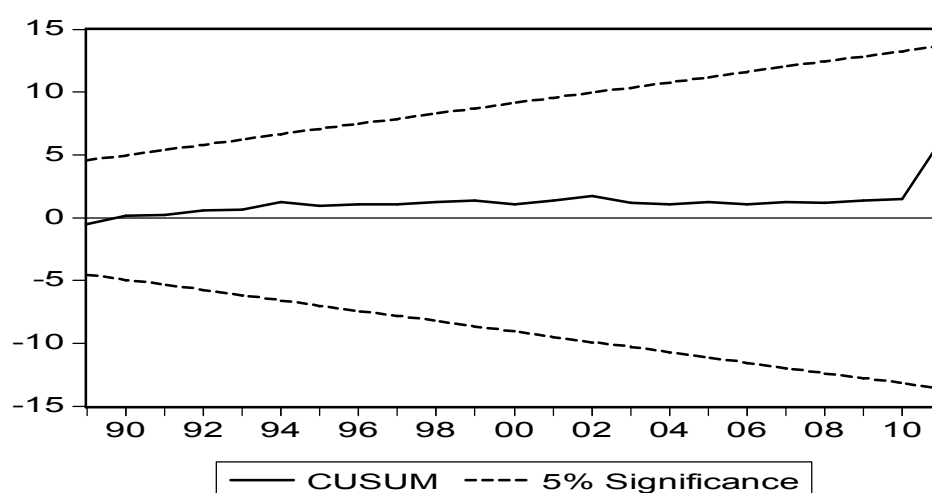
The diagnostic test results comprise those on Jarque-bera normality, Cumulative Sum of Squares (CUSUM) stability test, Breusch Godfrey serial correlation LM test and the white heteroskedasticity test. The results are shown in table6 below:

Table 6: Summary of Diagnostic tests results

Breusch-Godfrey Serial correlation LM test			
F Statistic	0.01	Probability	0.94
White heteroskedasticity			
F Statistic	0.79	Probability	0.64
Jarque-bera normality test			
Jarque-bera	1.33	Probability	0.52

The Breusch Godfrey serial correlation LM test indicates the validation of the null hypothesis that the errors are not serially correlated. The result of the white heteroskedasticity test validated the null hypothesis that the errors are homoskedastic, while the result of the Jarque-bera normality test validated the null hypothesis that the errors are normally distributed. The result of the Cumulative Sum of Squares (CUSUM) stability test is shown in Figure 1 below:

Figure 1: CUSUM Stability test result



253 The result of the CUSUM stability test indicates that the model is stable since the
254 CUSUM line falls in-between the two 5 percent lines.

255 The result of the variance decomposition is shown in table 7 below:

256 **Table 7:** Cholesky variance decomposition

Variance Decomposition of LAGDP:					
Period	S.E.	LAGDP	LPEXP	LREER	RAEXP
1	0.236621	100.0000	0.000000	0.000000	0.000000
2	0.332138	94.61806	3.987268	0.475756	0.918911
3	0.449806	92.02931	5.414584	2.054375	0.501735
4	0.558434	81.30795	8.577545	5.066569	5.047935
5	0.744390	82.81292	6.797904	7.077803	3.311374
6	0.962784	78.92646	8.261191	9.581350	3.231003
7	1.224839	81.81026	6.576580	9.409710	2.203451
8	1.510861	79.58577	6.878642	10.86486	2.670726
9	1.806875	79.62624	6.521362	11.59537	2.257033
10	2.166856	77.83410	6.983099	12.66893	2.513863

Variance Decomposition of LPEXP:					
Period	S.E.	LAGDP	LPEXP	LREER	RAEXP
1	0.317647	6.152757	93.84724	0.000000	0.000000
2	0.541245	12.84100	77.03968	2.683856	7.435463
3	0.646209	9.488464	79.11336	2.059656	9.338516
4	0.787621	6.583622	79.24635	4.408893	9.761140
5	0.912153	12.05758	73.36334	6.052673	8.526407
6	1.107680	19.30018	63.38733	7.804873	9.507617
7	1.337965	30.64069	53.21027	9.183287	6.965752
8	1.604544	33.11052	48.43488	11.08443	7.370167
9	1.896329	40.35906	41.11898	12.00779	6.514171
10	2.285928	43.65300	36.16210	13.84740	6.337499

Variance Decomposition of LREER:					
Period	S.E.	LAGDP	LPEXP	LREER	RAEXP
1	0.293822	4.797572	2.814450	92.38798	0.000000
2	0.512880	7.446204	9.949954	82.04338	0.560460
3	0.930048	46.97310	4.975467	47.87124	0.180199
4	1.319777	61.41371	2.510007	35.90906	0.167226
5	1.732503	68.76871	1.459644	29.65442	0.117228
6	2.069806	68.14525	1.196575	29.84148	0.816697
7	2.505648	68.37303	1.128090	29.64015	0.858722
8	3.028964	68.48277	1.595958	28.85456	1.066706
9	3.699890	71.68910	1.457914	26.00909	0.843898
10	4.415915	72.40742	1.737379	24.86729	0.987918

Variance Decomposition of RAEXP:					
Period	S.E.	LAGDP	LPEXP	LREER	RAEXP
1	0.986298	4.084752	29.24911	2.900279	63.76586
2	1.737860	62.03593	10.27853	1.950558	25.73498
3	2.219232	61.91643	14.47332	5.346966	18.26328

4	2.774547	74.46959	9.328473	4.390877	11.81106
5	3.381829	63.92168	12.66894	10.20489	13.20449
6	3.941796	69.50822	10.60276	10.16603	9.722991
7	4.986300	69.27623	10.84808	11.69225	8.183432
8	5.886118	74.36152	8.529278	11.19329	5.915911
9	7.100615	72.89010	8.847044	13.08649	5.176370
10	8.091030	74.11304	8.116957	13.34878	4.421226
Cholesky Ordering: LAGDP LPEXP LREER RAEXP					

257

258 The result of the variance decomposition indicates that other than shocks to itself
259 which was 100 percent in the first period, shocks to REER explains about 5 percent of
260 changes in agricultural output in the fourth period which increased to 11 percent in the 8th
261 period and 13 percent in the last period. Shocks to real agricultural export explained only
262 5 percent of changes in agricultural output in the 4th period which decreased to about 3
263 percent in the last period. The result shows that shocks to agricultural output explains
264 about 61 percent of the changes in the REER which increased to 72 percent in the 9th
265 period. This result provides some indications of the significant influence of the REER on
266 agricultural output. Similar result was recorded between the real agricultural export and
267 agricultural output and the price of exports and agricultural output in Nigeria.

268

269 4. **Conclusion and Recommendations**

270 This paper has been on the influence of REER on agricultural output in Nigeria.
271 The paper was able to establish that the REER has a positive and significant impact on
272 the agricultural output. A depreciation of the REER by 1 percent increased the
273 agricultural output in Nigeria by about 69 percent. The implication of this is that the
274 international competitiveness of the Nigerian economy matters for improved level of
275 agricultural output in Nigeria. The result further indicates that the real agricultural
276 exports has a positive and significant impact on the level of agricultural output in Nigeria.

The result further indicates that the prices of exports has a positive and significant impact on the level of agricultural output in Nigeria. The implication is that previous level of sales and prices have important bearing on the output decision of Nigerian farmers. Thus, the study established that price efficiency has the tendency of increasing the level of agricultural output in Nigeria. The result thus recommends that the monetary authorities in Nigeria should introduce policy measures to stabilize the REER since it has the tendency of expanding the level of agricultural productivity. This is important since the instability of the REER will reduce the level of agricultural output. To ensure that farmers earn appropriate income from the sales of agricultural products, the government and marketing boards should do more to monitor prices of agricultural exports.

REFERENCES

- Abiodun, E.O. and Sheu, A.S. (2010). "Agricultural response of prices and exchange rate in Nigeria: Application of cointegration and vector error correction model (VECM)". *Journal of Agricultural Science*. 1(2): 73-81.
- Adubi, A.A. (ND) "Price, exchange rate volatility and Nigeria's agricultural trade flows: A dynamic analysis". *National Centre for Economic Management and Administration* (NCEMA)
- Akpan, S.B. (2012). "Analysis of food crop output volatility in agricultural policy programme regimes in Nigeria". *Developing Country Studies*, 2(1)
- Aliyu, S.U. (2008). "Exchange rate volatility and export trade in Nigeria: An empirical investigation" *MPRA paper 13490*.
- Azharia, A.E., Omer, E. E. and Ali, A.A.S. (2010) "Impact of exchange rate reforms on Sudan's economy: Applied general equilibrium analysis". *African Journal of Agricultural Research*, 5(6): 442-448
- Babula, R.A., Ruppel, F.J. and Bessler, D.A. (1995). "United States corn exports". The role of the exchange rate". *Journal of Agricultural Economics*, 13: 75-88

- 311 Box, G.E.P. and G. M. Jenkins, (1970). *Time Series Analysis, Forecasting and Control*,
312 Holden-Day, San Francisco.
- 313
- 314 CBN (2010). Central Bank of Nigeria's Statistical Bulletin. www.cenbank.org
- 315
- 316 CBN (2011). Central Bank of Nigeria's Statistical Bulletin. www.cenbank.org
- 317
- 318 Chechohiades, M. (1990). *International Economics*. New York: McGraw Hill
- 319
- 320 Davidson, J., Hendry, D., Sbra, F. and Yeo, S. (1978). 'Econometric modelling of the
321 aggregate time series relationship between consumers' expenditure and income in
322 the United Kingdom', *Economic Journal*, 88(352): 661 – 92.
- 323
- 324 Fuzhi, C. and David, O. (2005). "Exchnage rate misalignment and its effects on
325 agricultural producer support estimate: Empirical evidence from India and
326 China". *International Food Policy Research Institute*, www.ifpri.org
- 327
- 328 Granger, C.W. and Newbold, P. (1977). "The time series approach to econometric model
329 building", In Obadan, M.I. and Iyoha, M.A. eds. (1996). *Macroeconomic*
330 *Analysis: Tools, techniques and Applications*. NCEMA, Ibadan: Polygraphics
331 Venture Ltd.
- 332
- 333 Gujarati, D. N., (2003). *Basic econometrics* (4e). New York: McGraw-Hill Inc.
- 334
- 335 Harris, R., (1995). *Using cointegration analysis in econometric modelling*. London:
336 Prentice Hall.
- 337
- 338
- 339
- 340 Hendry, D.F. (1986). 'Econometric modelling with cointegrated variables: An
341 overview', *Oxford Bulletin of Economic and Statistics*, 48(3): 201 – 12.
- 342
- 343 Hendry, D.F. and Mizon, G., (1978). 'Serial correlation as a convenient simplification,
344 not a nuisance: A comment on a study of the demand for money of the Bank of
345 England', *Economic Journal*, 88(351): 549 – 63.
- 346
- 347 Jennifer, J.K. and David, P.A. (2002). "Exchange rates and agriculture: A literature
348 review". *Agricultural and Food Policy Center Working Paper*, 02-2
- 349
- 350 Kiptui, M. (2007). "Does the exchange rate matter for Kenya's exports? A bound testing
351 approach" *Prepared for presentation at the African Economic Society 2007*
352 *Conference, Cape Town, July 4th to 6th, 2007.*
- 353
- 354 Kristinete, J.J. (2001). "The impact of exchange rates on beef and cattle trade in North
355 America". Unpublished M.Sc. Thesis, Texas A and M University
- 356

- 357 Onyilola, M.A. (2008). "Exchange rate and disaggregated import prices in Nigeria".
 358 *Journal of Economic and Monetary Integration*.
 359
- 360 Orden, D. (2000). "Exchange rate effects on agricultural trade and trade relations". In
 361 Lyons, R.M.A., Knutson, R.D., Meilke, K. and Yunez-Nande, A. (eds.) *Policy*
 362 *Harmonization and Agricultural and Food Industry*, Winnipeg Manitoba: Texas
 363 A and M University/ University of Guelph/EL Colegio de Mexico: 7-23
 364
 365
- 366 Sargan, J.D., (1964). 'Wages and prices in the UK: A study in econometric
 367 methodology', in P. Hart, G. Mills and J. Whittaker (eds), *Econometric Analysis*
 368 *for National Planning*, London: Butterworth.
 369
- 370 Schuh, U.E. (1974). "The exchange rate and U.S agriculture". *American of Agricultural*
 371 *Economics*, 56: 1-13.
 372
- 373 Sunday, B. Vincent, I., Glory, E. and Daniel, E. (2012). "Agricultural productivity and
 374 macroeconomic variable fluctuation in Nigeria". *International Journal of*
 375 *Economics and Finance*, 4(8)
 376
- 377 Takaendesa, P., Isheole, T. and Aziakpono, M., (2005). "Real exchange rate volatility
 378 and its effect on trade flows: New evidence from South Africa". *A paper*
 379 *presented at the biennial conference of the Economic Society of South Africa*,
 380 Durban, 2005.
 381 [Online]. Available: 138 [http://www.essa.org.za/download/2005Conference/](http://www.essa.org.za/download/2005Conference/Takaendesa.pdf)
 382 *Takaendesa.pdf*
 383