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IMPACT OF EXCHANGE RATE ON COCOA EXPORT IN NIGERIA

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Abstract

The paper examined the impact of exchange rate on coca export in Nigeria. The Augmented Dickey Fuller Unit root, Johansen co-integration, ordinary least square, and diagnostic tests as well as error correction mechanism were adopted to analyzed the secondary time series data, between 1980 and 2013, generated from Food and Agricultural Organization (FAO), World Bank and the Central Bank of Nigeria (CBN). The ADF unit root test results showed that none of the variables was stationary at level I (0), whereas all the variables – cocoa export, agricultural export, exchange rate trade openness and world cocoa price became stationary after first difference or order one I(1). The Johansen co-integration test of the long run relationship revealed that both trace statistics and maximum eigen value had two co-integrating equations at 5% whereas the trace statistics alone had 1 co-integrating equation at 1%; implying the existence of long run relationship between coca export, agricultural export, exchange rate, trade openness and world price of cocoa. The positive sign of the error correction mechanism of 0.07 suggested that deviation from the long run equilibrium is adjusted over the following time period by 7%. The t-test showed direct relationship between cocoa export and Exchange rate cum agricultural export, but inverse relationship with trade openness and world cocoa price. The diagnostic test revealed non existence of heteroskedasticity and serial correlation in the error term. The paper concluded that agricultural export, exchange rate, trade openness and world price of cocoa taken together affected cocoa export in Nigeria. The study recommended free market determination of exchange rate and accessibility of farmers to facilities provided by government to increase cocoa output and hence export.

Keywords: Cocoa, Exchange Rate, Export, Food, Agriculture, Commodity

INTRODUCTION

The Nigerian economy is one that depends largely on foreign trade for growth and is also one which depends majorly on one export commodity at a time. For instance at independent, the major export commodity was cocoa and the leading sector in the economy was agricultural sector, but today the major export commodity is crude oil and the leading sector in the economy is the petroleum sector (Adesoji and Sotubo 2013). The nation used to produce about 15% of world cocoa and was second largest producer of the crop in the world in the 60s (Utomakili and Abolagba 1996). Painfully Nigeria that ranked second to Ghana in cocoa in the world in the 1940s, 1950s and 1960s is now far behind the New World major producers such as cote d Ivoire, Ghana, and Indonesia (Abolagba, Onyekwere, Agbonkpolor and Umar 2010).

Prior to the discovery and extraction of crude oil in Nigeria, especially before the oil boom in 1970, the country was solely dependent on agriculture, especially cocoa crop as the main source of foreign earning. Since the 1970s Nigerian economy has been witnessing a reverse trend in terms of export, foreign exchange earnings and government revenue. One of the main challenges in the management of Nigeria's economy today is how to significantly diversify and expand the nation's export sector which for over three decades now is dominated by the oil sector. Crude oil export account for 90-95% of Nigeria's foreign exchange earnings and around 80% of government revenue (Malchau 2002).

Not withstanding, the cruel neglect of the agricultural sector over the decades, its contribution especially cocoa to non-oil exports before the 1990s was encouraging. This is evident in the work of Aigbokhan (2001) who posited that of non-oil exports cocoa has been dominant, it accounts for over 50 percent in 1970s, for much of the 1980s it account for over 60 percent. However since the 1990s it's share has steadily declined from 49 percent in 1989 to 22 percent in 1998.

Historically Nigerian cocoa products were marketed through monopoly by the Nigerian Marketing Board (NMB) under the direct control of the government, between 1970 and 1977 there was stability in both prices and exchange rate of cocoa export in Nigeria. This was as a result of controlled export prices by the Nigerian Commodity Board (Cadoni 2013, Essien, Akpan and Etim 2011).

The oil shocks of 1973/74 and 1997 in Nigeria led to the inflow of huge hot money into the country as in the case of the Dutch disease with the discovery of natural gas in Northern Holland, which over valued the currency of Netherlands. The implication of this in Nigeria, is cheaper imports, increase food import bill and reduction in Agricultural export especially cocoa, which led to the adoption of the Structural Adjustment Programme (SAP). This position is justified by Imimole and Enoma (2011) who asserted that the exchange rate over-valuation prior

to deregulation led to cheaper imports of competing food items as well as agro-based and industrial raw materials and the result was rapid expansion in the importation of these good to the detriment of local production of similar goods. Equally Talabi (2014) posited that the food import rose from a mere N14, 112.88 million annually, during 1970-74 to N19, 648 million in 1991. Also Abiodun and Solomon (2010) opined that prior to the oil boom, of the early 1970 when the contribution of agricultural export (cocoa, rubber, palm oil, palm kennel, and cotton) etc fell to 35% of the Gross Domestic Product (GDP) from an average of 72% between 1955 and 1969.

Exchange rate variability has untold effect on export, especially agricultural export specifically cocoa. To buttress this Essien et al (2011) opined that between 1978 and 1982, there was an upsurge of exchange rate which was due to the introduction of both managed float and dollar pegged systems of exchange policies in the country. The fluctuation therefore reduced the quantity of cocoa export.

The role of exchange rate and its effects on macroeconomic performance has continued to generate interest among economists. Many economists argue 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 hinders exports growth and generate macroeconomic instability (Mamta, 1999). Exchange rate policy guides investors on the best way they can strike a balance between their trading partners, and investing at home or abroad (Balogun, 2007). Mordi (2006) argued that the exchange rate movements have effects on inflation, prices incentives, fiscal viability, and competitiveness of export, efficiency in resource allocation, international confidence and balance of payments equilibrium. From the above one can adduce that the price of foreign exchange plays a critical role in the ability of the economy of developing countries, including Nigerian to attain optimal levels in production activities.

Between 1970 and 1977, there was stability in both prices and exchange rate of cocoa export in Nigeria. This was as a result of controlled export prices by the Nigeria commodity board. Between 1978 and 1982 there was an upsurge of exchange rate which was due to the introduction of both managed float and dollar pegged systems of exchange rate policies in the country. The fluctuation, therefore, reduced the quantity of cocoa export. Between 1982 and 1985 (pre-SAP era) there was stability in both managed float and dollar pegged systems of exchange rate relative to prices of cocoa. Failure of the Breton Woods system to maintain exchange rate policies affected African countries including Nigeria. The country had since 1986 experienced erratic changes in her exchange rates partly due to fluctuations in the major currencies of developed countries such as dollars, pound sterling and Swiss franc. This has

become a major source of internal economic shock since Nigeria has strong links with developed countries in trade and payments as well as monetary arrangements.

Much literature on exchange rate and its effect on agricultural trade flow remain inconclusive. While a large number of these studies have shown negative impact of exchange rate volatility on trade (exports and imports), some have also reported positive and insignificant consequences Illan (2005). To buttress this, while Obadan (1994) reported that agricultural export responded positively to government's trade policy reforms, Olomola (1998) and many others reported that the response was not appropriate. Aigbohkan (2001) noted that trade deregulation in SAP and post SAP periods boosted producer prices, which in turn led to increase in values of non-oil exports. Similarly Arize, Osang, and Slottje (2000) provide evidence in support of negative relationship between exchange rate and volume of trade while Mikenzie and Brooks (1997) find some evidence for a positive effect of exchange rate on trade flow. On the other hand Wanner and Kreinin (1983) fail to establish or report any firm relationship between export flows and exchange rate.

Most of the empirical work in this area is generally unable to establish a statistically significant link between exchange rate fluctuations and agricultural export. In a developing economy like Nigeria, where export price fluctuates as a result of currency devaluation which is expected to be an incentive for export growth, the primary concern is the nature and magnitude of risk introduced by the price and exchange rate movements on agricultural exports. Many researchers who conducted researches on the effects of price and exchange rate movements on agricultural tradable had inconclusive results, leaving a gap in this area.

Arising from non-consensus evidence and conflicting results from studies as presented above, in addition to lack of specificity in the studies on exchange rate and agricultural export, amounting to dearth of information on exchange rate and cocoa export, and since cocoa is the leading agricultural export in Nigeria, and considering the fact that Nigeria is far behind the leading world exporters of cocoa cote d' ivoire, Ghana and Indonesia, and in the face of the declining crude oil price, calling for the diversification of the economy. It is imperative that more research works are required to fill these gaps by explaining the sources of the conflict and provide relevant information for the much desired policy review. Hence the topic "The impact of exchange rate on cocoa export in Nigeria – an investigation." which will cover a period of 33 years 1980 through 2013 adopting error correction model is of import. The rest of this paper is divided into the following sections. Section 2 is the literature review, section 3 is methodology of the study, section 4 is data analysis and presentation of result and section 5 is summary of findings, conclusion and policy recommendations.

LITERATURE REVIEW

Exchange rate refers to the rate at which one currency exchanges for another (Jhingan 2003). Thus exchange rate is the price of one currency in terms of another currency or other currencies. This rate or price/parity is determined by the market forces, which indicates the trust and confidence in the economic situation of a country. The exchange rate could appreciate or depreciate. It appreciates if the amount of domestic currency required to buy a foreign currency or currencies reduce(s), while it depreciates if the amount of domestic currency required to buy a foreign currency or currencies increase(s).

Due to depreciation of the exchange rates in Nigeria, some reforms were introduced in the foreign exchange market in 1994. These include the formal pegging of the naira exchange rate, the centralization of foreign exchange in the central bank of Nigerian (CBN), the restriction of Bureaux de change to buy foreign exchange as agents of the CBN, the reaffirmation of the illegality of the parallel market and the discontinuation of open accounts and bills for collection as means of payments (CBN 2000)

Base on the economic situation of a country, she could have single or multiple exchange rates; single when there exist one operating exchange rate at a time, and multiple when there exist more than one exchange rates at a time in a country, for instance Mexico and Nigeria adopted multiple exchange rate, three – tier exchange rate system in 1982 and 1986 respectively.

At this juncture, it is imperative to mention that we have the real exchange rate and the nominal exchange rate and accordingly distinguish between them. The Nominal Exchange Rate (NER) is a monetary concept, which measures the relative price of the two moneys or currencies e.g. Naira in relation to U.S dollar. While Real Exchange Rate (RER) is regarded as real concept that measures the relative price of two tradable goods (exports and imports) in relation to non-tradable goods. .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 (Takaendesa, 2006).

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 (Mordi, 2006). Exchange rate fluctuations involve constant shifts of labour and other resources between production for export, such shifts may be costly and disturbing. They tend to create frictional unemployment or at best cause employment to shrink and are obviously wasteful, if the exchange rate market conditions that call for them are temporary.

Many scholars have conducted empirical researches in order to examine the effects of exchange rate on trade, as presented below. According to Mahaganka et al (2009), the impact of real exchange rate volatility on export activities reveals a strong indirect effect for the OECD countries. This implies that volatility negatively affects export activity. The study by Mustafa and Firat (2011) found that while exchange rate volatility affects productivity negatively, having access to foreign or domestic equity, or debt market does not alleviate these effects in Turkey. These results indicate that while export oriented firms are affected less by exchange rate appreciation, they are more sensitive to exchange rate volatility.

The empirical analysis of Cheung and Sengupta (2012) for Indian .non-financial sector firms reveals that, on average, there has been a strong and significant negative impact of currency appreciation as well as currency volatility on Indian firms' export shares. Analyzing base on firm-level data covering exporters from China, Hericourt and Pencot (2012) confirmed a trade deterring effect of real exchange rate volatility; this magnitude depends mainly on the extent of financial constraints. It implies that firms tend to export less and fewer products to destinations with higher exchange rate volatility.

However, the empirical findings of Tang (2011) emphasize a positive and significant impact of exchange rate volatility on region's production networks and exports in South Asia. Equally, Anubha (2013) pointed out that real exchanged rate movement have a significant impact on Indian firms' performance through the cost as well as revenue channel. The impact depends upon the share 'of imports and exports along with the degree of market power.

According to Essien et al (2011) in their study: Effects of price and exchange rate fluctuations on Agricultural exports in Nigeria using the ordinary least square regression, they observed that exchange rate fluctuations and agricultural credits positively affect cocoa exports in Nigeria and that the relative prices of cocoa are insignificantly related to the quantity of export, however it has a negative sign which is in line with the apriori expectation. In the study determinants of Agricultural exports by Abolagba et al (2010) using ordinary least squares regression, the result of their finding revealed that cocoa output, domestic consumption and rainfall significantly influence cocoa export. The positive sign for the cocoa production implies that an increase in production will lead to an increase in export; conversely, a reduction in domestic consumption of cocoa will lead to an increase in the export of cocoa. Kargbo (2006) found that prices, real exchange rates, domestic production capacity, and real incomes have significant impacts on the agricultural export.

Essien et al (2011) observed that studies by IMF (1984) and DeGrauwe (1988) show that exchange rate variability causes fluctuations in export revenue. While Ogun (1986) makes use of simulation techniques to examine the effect of real exchange rate, its movements and

volatility on the growth of non-oil export in Nigeria over the period 1960-1990. The results show that real exchange rate and also both its misalignment and volatility affect non-oil export growth adversely. Oyejide (1986) examined the effects of trade and exchange rate policies on Nigeria's agricultural export using ordinary least square (OLS) over the period 1960-1982 and concluded that appreciation of real exchange rate adversely influence non-oil export especially during the oil boom. Another study that investigated relationship between exchange rate and non-oil goods in Nigeria comes from Yusuf and Edom (2007) by applying Johansen co-integration approach over the period 1970-2003, they revealed that depreciation of official exchange rate promotes export of raw wood and sawn wood in Nigeria.

The influence of trade and exchange rate policies on agricultural export which is the main part of non-oil export of Cameroon is studied by Amin (1996) over the period 1971-1992. The result from Autoregressive Distributed Lag Model (ARDL) revealed that current exchange rate policy especially appreciation of national currency impedes agricultural export. This is in line with the findings of oyejide (1986).

Erdal et al. (2012) conducted an empirical study of the effect of Real Effective Exchange Rate Volatility (REERV) on Agricultural Export (AGX) and Agricultural Import (AGM) in Turkey. The empirical result indicated that there was a positive long-term relationship between REERV and AGX series, while there was a negative long-term relationship between REEV and AGM.

Onakfowora & Owoye (2008) examined the impact of exchange rate volatility on Nigeria's exports to its most important trading-partner-the United States over the quarterly period January 1980 to April 2001. Using co-integration vector error correction (VECM) framework, empirical tests indicated the presence of a unique co-integrating vector linking real exports, real foreign income, relative export prices and real exchange rate volatility in the long-run. A detailed empirical review of this studies taking into consideration the trend characteristics of the time-series appeared to be more clear-cut and most suggest a significant negative effect of exchange rate uncertainty on trade variables. Investigation by Baum et al (2004) showed evidence of a positive relationship between exchange rate volatility and trade using a poison flexible lag structure, while Klaassen (2004) did not find evidence of any significant effect of exchange rate volatility on trade for G7 economies.

Akinlo and Adejumo (2014) examine the impact of exchange rate volatility on non-oil export in Nigeria, 1986 (1) – 2008 (4) the result confirms the existence 'of stable significant relationship between real exports and exchange rate volatility. On the other hand Nyeach and Alogenzoya (2004) in the study of the impact of exchange rate movement on export: Empirical evidence from Ghana, using OLS found that exchange rate has no impact on the export of goods and services in Ghana, contrary to many findings. They recommended that policy should

not concentrate on exchange rate pegging or inflation targeting, since these do not have any impact on export of Ghana. Rather more attention should be how to increase the GDP to enhance export industry. In the study of price, exchange rate volatility and Nigeria agricultural trade. Adubi and Okunmadewa (1999) used the Entranced Vector Autoregressive (EVAR) model and the result of the study showed that exchange rate volatility has negative effect on agricultural exports while price volatility has positive effect on the level of agricultural exports. Thus the more volatile the exchange rate the lower the income earnings of farmers, which subsequently leads to decline in output production and reduction in agricultural exports.

According to literature on this topic, some of the studies find negative effect of exchange rate on agricultural trade (Peree and Steinherr, 1989; Cho et al., 2002; Kandilov, 2008; Doyle, 2001), while some others conclude a non significant effect (Caglayan and Di, 2008) Byrne et al. (2008). Baek and Koo (2000) find that in the long run, while US agricultural exports highly negatively impacted on the exchange rate, US agricultural import are generally not affected. In the short run, on the other hand, the exchange rate is found to have significant effects on both imports and exports. Cater and Pick (1989) suggested that market factors other than exchange rate fluctuations are the primary determinants of US agricultural trade while Doroodian et al. (1999) show that an exchange rate depreciation has a prolonged and significant effect on the US agriculture trade balance. (OECD 2011).

Pick (1990) analyzed the effects of exchange rate risk on U.S. agricultural trade flows. He concludes that exchange rate risk is not a significant factor affecting bilateral agricultural trade from the United State to seven out of eight developed markets, but indicates that exchange rate risk adversely affect US agricultural exports to some developing countries. One is prompted to conclude that the results are justified as the exchange rates of the developed economies fluctuate less while the fluctuation of exchange rate of developing economies are very high.

Langley, et al (2000) reveal that exchange rate volatility is significantly positive in explaining poultry exports in Thailand but not aggregate exports.

In another work, Omojimite and Akpokodje (2010) investigated the effect of exchange rate reforms on Nigeria's trade performance during the period 1986-2007. The study found a minimal positive effect of exchange rate reforms on non-oil exports through the depreciation of the value of the country's currency. It was also found that the structure of imports which is pro-consumer goods remained unchanged even after the adoption of exchange rate reforms. Exchange rate reforms were found not to constrain imports as anticipated. Rather, they stimulate imports, albeit insignificantly. These authors suggest that exchange rate reforms are not sufficient to diversify the economy and change the structure of imports

From the forgoing it is crystal clear that already existing works related to this, are on exchange rate and export growth, exchange rate and non-oil export, exchange rate and Agricultural export, effects of price and exchange rates fluctuations on Agricultural export, as well as exchange rate volatility on Agricultural export on non oil export. Premise on the above, this work "Impact of exchange rate on cocoa export in Nigeria – An investigation" which focuses on 1980 through 2013 has knowledge gap to fill, as it is more specific, concentrating only on one crop (cocoa).

THEORETICAL FRAME WORK

The theoretical frame work of this study anchors on Hooper and Kohlagen(1978) model that shows how exchange rate lead to uncertainty in the prices which exporters ought to pay or receive in future.

Output level of any economic agent remains critical to the quantity that is offered for domestic sales and export. Hence the Cobb-Douglas production function for both output and export, which depends on labour and capital, becomes relevant for this study, and is defined as $Q=F(L,K)$ or $Q=AL^{\alpha} K^{\beta}$ (1). Where A in the function is the total factor productivity which explains the output growth that is accounted for by the growth in factors of production specified. After linearising the function above it transforms to $\ln Q=a_1 \ln L+a_2 \ln K+a_3 \ln e+a_4 \ln P$ (2).

Going by the theoretic analysis of the relationship between exchange rate and export, equation (2) is respecified to be $\ln X=a_1 \ln L+a_2 \ln K+a_3 \ln e+a_4 \ln Q+a_5 \ln P$ (3). X in the equation above represents export goods which can be referred to as tradable, L represents labour, K represents capital and the variable e is the exchange rate policy in place in the economy, whereas Q is the total output produced locally, either for domestic consumption or export, while P is the price of the tradable goods (exports). This implies that P is the world price of the tradable goods.

If the wage rate of the export economic unit is constant, her profit function is $\pi(\bullet)$, which reduces to a function of the real exchange rate and the capital utilized in the process of production, which is specified as $\Pi(K_t, e_t) = B_t K_t^{\Theta 1} e_t^{\Theta 2}$ (4).

The profit of the economic agent is affected by exchange rate via the cost of import/importation and export. The economic unit that engages both import of raw materials and human capital for production of output will have her profit level affected more by exchange rate. In line with Hooper and Kohlagen (1978), the relationship between exchange rate and export should be negative. Also the relationship between exchange rate and domestic sales of the economic agent is negative, if she depends majorly on imported raw materials. In line with this

study on exchange rate and cocoa export, the imported materials are fertilizers and chemicals for pest and weed control.

METHODOLOGY

To investigate the impact of exchange rate on cocoa export, the study performed some regression analyses using the Augmented Dickey Fuller (ADF) unit root, the Johansen co-integration, ordinary least square and diagnostic tests as well as error correction mechanism.

Model Specification

The research was designed to examine the impacts of exchange rate on cocoa export in Nigeria from 1980 to 2013.An ex post facto research design was used for the thirty three years study period thus qualifying it as a times series study. Asika (2005) underscored the importance of ex post facto research by pointing out that such research provides a systematic and empirical solution to research problems, by using data which are already in existence. Again, though the data are not subject to control or manipulation, since they already exist, yet the researcher can contrive or create a situation that will generate the requisite data for analysis. Most importantly the outcome of the analysis can provide considerable insight into future outcomes.

The variables used in the study and the model specification were based on established theoretical relationships, their use in previous studies and the availability of useable data. The multi-linear relationship specified below was used to shed light on impact of exchange rate on cocoa in Nigeria.

According to Koutsoyiannis (2003), model specification involves the determination of the dependent and explanatory variables which will be included in the model, as well as the theoretical expectations about the sign and the size of the parameters of the function. To examine the impact of exchange rate on cocoa export in Nigeria, key determinants of agricultural exports were identified and modeled in multiple linear regression form and specified in the symbolic form as:

Cex = *f* (agx, exr, top,wpc,) ----------(1)

Where, Cex = Nigeria's export quantity of cocoa (tonnes)

agx = Volume of Agricultural Export

exr = Exchange rate (#/$)

top = Trade openness

wpc = world price of cocoa

e_t = stochastic error term

t = Time Period

Furthermore, the static form of model is

$Cex = \beta_o + \beta_1 agx_t + \beta_2 exr_t + \beta_3 top_t + \beta_4 wpc_t + e_t$ ---------- (2)

For econometric computation equation 1 turns into equation 2

Again, for the purpose of numerical accuracy, equation 2 was linearised to obtain the model in log form.

$InCex = \beta_0 + \beta_1 Inagx_t + \beta_2 Inexr_t + \beta_3 Intop_t + \beta_4 Inwpc_t + e_t$------ (3)

The study, assumed that all variables are well behaved that is stationary at their level form. Nevertheless, literature has shown that most macroeconomic variables are not mean reversing as a result of their time sensitiveness (Granger and Newbold, 1974, Dickey and Fuller 1981, Pindyek and Rubinfeld, 1998) hence they are not stationary at their level form that is not integrated of order zero.

Therefore, they shall be subjected to unit root stationary test using Augmented Dickey – Fuller (ADF) test.

Following this test, equation 3 transforms to

$\Delta InCex_t = \beta_0 + \beta_1 \Delta In Cex_{t-1} + \sum_{i=1}^{n} \beta_i \Delta Inx_{t-1} + e_t$ ---------- (4)

Where:

Δ = first difference operator

Bo = intercept

B_1, βi = parameter to be estimated

X_{t-1} = other explanatory variable

e_t = error term

If there is presence of unit root and evidence of co-integration our equation 4 will be transformed into error correction model (ECM) as specified below.

$\Delta InCex_t = \beta_0 + \beta_1 (\Delta Inagx_{t-1}) + \beta_2 (\Delta Inexr_{t-1}) + \beta_3 (\Delta Intop_{t-1}) + \beta_4 (\Delta Inwpc_{t-1}) + \beta_5 (\Delta InCex_{t-1}) + ECM_{t-1} + e_t$ ----------(5)

Where, ECM is the error correction mechanism and indicates the speed of adjustment to equilibrium.

Data Sources

The data used in the analyses were obtained from Food and Agricultural Organization (FAOSTAT), World Bank and Central Bank of Nigeria (CBN).

ANALYSIS AND FINDINGS

Unit Root

Time series data are often assumed to be non stationary and thus, it is necessary to perform unit root test to ensure that there is stationarity of data. The test is required to avoid the problem of spurious regression. The summary of the unit root test result is presented in table 1 below:

Table 1. Summary of Augmented Dickey Fuller Unit Root Test Result

Variable	At Levels	1st Diff	1% critical value	5% critical value	10% critical value	Status	Prob*
CEX	-3.29	-9.98	-3.65	-2.96	-2.62	1(1)	0.00
AGX	-3.07	-5.22	-3.65	-2.96	-2.62	1(1)	0.00
EXR	0.45	-5.26	-3.65	-2.96	-2.62	1(1)	0.00
TOP	-3.38	-4.88	-3.66	-2.96	-2.62	1(1)	0.00
WPC	-1.35	-7.74	-3.65	-2.96	-2.62	1(1)	0.00

Table 1 shows that the Augmented Dickey Fuller test result for all the variables - cocoa export, agricultural export, exchange rate, trade openness and world price of cocoa have unit root in their level I (0), since their ADF statistics values were lesser than the test critical values in absolute term. Consequently the null hypothesis of unit root at level was not rejected. However, the results of the unit root test at first difference I(1), showed that all the variables were stationary, since the ADF statistics values in absolute term, exceeded the test critical values at 1%, 5% and 10%, with the probability value of less than 5%. Therefore the null hypothesis of unit root at first difference was rejected meaning that the variables are stationary at first difference 1(1).

Having ascertained the stationarity properties of the variables, it is necessary to proceed to determine the long run relationship between the variables , as shown in table 2.

Johansen Cointegration Test

Table 2. Johansen Cointegration Result

Sample (adjusted): 1982 2013 Series: AGX CEX WPC

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	eigenvalue	Trace statistic	5percent critical value	1 percent critical value
None**	0.53	40.70	29.68	35.65
At most 1*	0.38	16.66	15.41	20.04

At most 2	0.43	1.40	3.76	6.65	Table 2...

*(**) denotes rejection of the hypothesis at the 5% (1%) level

Trace test indicates 2 cointegrating eguation(s) at the 5% level

Trace test indicates 1 cointegrating eguation(s) at the 1% level

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen statistic	5 percent critical value	1 percent critical value
None*	0.53	24.04	20.97	25.52
At most 1*	0.38	15.26	14.07	18.63
At most 2	0.43	1.40	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5% (1%) level

Max-Eigenvalue test indicates 2 cointegrating eguation(s) at the 5% level

Max-Eigenvalue test indicates no cointegrating eguation(s) at the 1% level

The above table is the summary of the Johansen Maximum likelihood co-integration test. The test relations were estimated with intercept and logged deterministic trend. The results, based on both the trace and maximum Eigen value tests indicated that the series had two co-integrating equations at 5%, whereas the trace test alone showed the existence of one co-intergrating equation at 1%. Thus the rejection of the null hypothesis (there is no co-integration r=0). Since the trace statistics and maximum eigen value exceeded the critical values at 5%(1%) level, there is unique long run relationship between the variables – InCEX, InAGX, InEXR, InTOP and InWPC. This shows that Johansen's technique is capable of detecting multiple co-integrating relationship among the variables Asafu-Adjaye (2000) and Pradhan (2010), reported by (Abogan, Akinola and Baruwu 2013). The maximum Eigen value are consistent in suggesting that there are two co-integrating series among the variables. This implies that the explanatory variables are co-integrated and have short run and long run relationships with the dependent variable (Obayelu and Salau 2010). The existence of co-integration among the dependent variable and the fundamentals (the controlled and intervening variables) necessitate proceeding to estimate the overparameterize and the parsimonious ECM models.

Overparameterized / Parsimonious ECM Test

The error correction mechanism is the speed of Adjustment which means the rate at which the dependent variable adjusts to changes in the independent variable. Since a log run equilibrium relationship has been established, the next step is to test for the speed of adjustment using the short run dynamic (parsimonious ECM).

Table 3. Summary of Overparameterized ECM Result

Dependent variable: CEX

Method: Least Squares

Sample (adjusted) 1983 2013

Variable	Coefficient	Std.Error	t-Statistic	prob.
AGX	-201.83	234.74	-0.859	0.41
AGX(-1)	-452.18	304.14	-1.49	0.16
AGX(-2)	-616.90	330.23	-1.87	0.08
AGX(-3)	374.93	231.12	1.62	0.12
TOP	10928.94	4540.26	2.41	0.03
TOP(-1)	-12373.33	4390.60	-2.82	0.01
TOP(-2)	-304.12	4387.59	-0.07	0.95
TOP(-3)	-6196.60	4494.61	-1.38	0.19
WPC	-0.20	0.15	-1.31	0.21
WPC(-1)	0.16	0.15	1.08	0.30
WPC(-2)	0.11	0.14	0.80	0.44
WPC(-3)	-0.02	0.15	-0.08	0.93
EXR	1173.59	338.00	3.47	0.00
EXR(-1)	-1197.00	440.03	-2.72	0.01
EXR(-2)	188.56	494.26	0.38	0.70
EXR(-3)	544.61	311.06	1.75	0.10
ECM(-1)	0.16	0.144	1.14	0.28
C	263744.1	52965. 02	4.98	0.00

R-squared	0.92	Prob(F-statistic)	0.00
Adjusted R-squared	0.82	Durbin- Watson stat	2.40
F-statistic	8.94		

The overparameterized ECM result is made up of three lags of the independent variables as shown in the table above. The parsimonious ECM was gotten by deleting the in significant variables from the overparameterized ECM result. As a tradition the overparameterized model was reduced to achieve a parsimonious model which is data admissible, theory consistent and interpretable. parsimony maximizes the goodness of fit of the model with minimum numbers of explanatory variables. The reduction process is mostly guided by statistical consideration, economic theory and interpretability of the estimate (Adams, 1992). The Akaike information criterion, Schwarz criterion and Lag likelihood ratio were used to select the appropriate lag length. The summary of the parsimony ECM result is shown in table 4.

Table 4. Summary of Parsimonious ECM Result

Dependent variable: CEX				
Method: Least Squares				
Sample (adjusted) 1983 2013				
Variable	Coefficient	Std.Error	t-Statistic	prob.
AGX(-2)	-395.07	233.20	-1.69	0.10
TOP	6346.789	4558.69	1.39	0.17
TOP(-1)	-7482.87	4151.78	-1.80	0.08
EXR	386.53	298.54	1.29	0.21
EXR(-2)	246.95	309.72	0.80	0.43
ECM(-1)	0.07	0.17	0.45	0.66
C	181903.7	29883.60	6.09	0.00
R-squared	0.66	Prob(F-statistic)	0.00	
Adjusted R-squared	0.58	Durbin- Watson stat	1.68	
F-statistic	7.91			

The result of Parsimonious error correction mechanism (ECM) indicates that volume of Agricultural exports from lag 2 is not significant and equally has negative impact on quantity of cocoa export in Nigerian. The implication of this result is that the total government expenditure on Agriculture is not lager enough to transform the economy with regard to cocoa export. This may be due to high level of corruption in the Agricultural sector. Situations were loans and other facilities are granted non famers may equally be major factors. The result also revealed that exchange rate from lag 2 is not statistically significantly, but has positive impact on the equatity of cocoa export in Nigerian.

The statistical significance of the ECM is an indication of satisfactory speed of adjustment. The result indicates that 7% of the errors are corrected each period. The R^2 of 0.66 indicates that about 66% of the variation in cocoa export is explained by the final variables that entered the parsimonious model.

Ordinary Least Square (OLS) Test

The ordinary least squared (OLS) result shows that 69 percent of the total changes in Nigeria's export quantity of cocoa is explained by volume of agricultural export, exchange rate, trade openness and world prices of cocoa taken together. This is a nice fit as unexplained variation is 31% ie 1-0.69.

The F-test with a value of 4.59 and probability of 0.00 suggests that the volume of agricultural export, exchange rate, trade openness and world price of cocoa are significant

factors to be taken into consideration when explaining the charges in the level of cocoa export in Nigerian economy. This indicates a rejection of the hypothesis which states that there is no significant relationship between exchange rate and cocoa export in Nigerian economy and acceptances of the alternative hypothesis, that there is significant relationship between exchange rate and cocoa export in Nigeria.

The t-test suggests that exchange rate (EXR) with a value of 2.15 and probability of (0.04) is statistically significant in explaining the changes in quantity of cocoa exports in Nigeria. The implication of this result is that the rate of exchange of the naira to the US dollar has untold impact on cocoa export in Nigeria. this result is in line with Verter and Becvarova (2014), Essien, Akpan and Etim (2011) but contrary to Abolagba et al 2010.

The t-test equally suggests that Agricultural export (AGX), trade openness (TOP) and world prices of Cocoa (WPC) with values of 0.50, -1.05 and -0.94 respectively are not statistical significantly in explaining the changes in the level of cocoa export in Nigeria. The non-significance of the world price of cocoa is in line with Abolagba et al 2010, while the non significance of trade openness is contrary to Verter and Becvarova (2014).

The coefficient of determination R^{-2} for the model is 0.67, which indicates that there is positive relationship between the dependent variables (CEX) and the explanatory variables EXR, AGX,TOP and WPC as the explanatory variables accounted for 67% of the variations in cocoa export while the remaining 33% variation in quantity of cocoa export is explained by the error term.

The Durbin Watson (DW) test with a value of 2.20 did not show support for the existences of first order serial correlation in the model.

Table 5. Summary of OLS Result

Dependent variable: LOG (CEX)				
Sample: 1980 - 2013				
Variable	Coefficient	Std Error	T-Stat	prob
LOG(AGX)	0.09	0.17	0.49	0.62
LOG(TOP)	-0.14	0.13	-0.05	0.30
LOG(WPC)	-0.08	0.08	-0.94	0.36
LOG(EXR)	0.16	0.08	2.15	0.04
C	12.2	0.94	12.97	0.00
R-squared	0.69		Prob(F-statistic)	0.00
Adjusted R-squared	0.67		Durbin- Watson stat	4.59
F-statistic	2.20			

Diagnostic Tests

The diagnostic statistics are used to test the behavior of random variables. It tests whether the errors are properly distributed, homoskedastic, serially correlated and stable.

Table 6. Summary of Diagnostic Result

Breusch- Godfrey serial correlation LM			
F-statistic	0.16	Probability	0.85
White – Heteroskedasticity			
F-Statistic	0.22	Probability	0.90

The Breusch-Godfrey serial correlation LM test was used to test whether the residuals are serially correlated. The Breusch-Godfrey serial correlation LM test with a probability of 0.85 indicates that the residuals are not serial correlation. The result of the White - Heteroskedasticity test with a value of 0.90 indicates that the residuals are homoskedastic.

CONCLUSION AND POLICY IMPLICATIONS

The growth rate of cocoa export is affected by exchange rate, agricultural export, trade openness and world price of cocoa taken together. And there is a long run relationship between cocoa export and exchange rate, agricultural export, trade openness as well as world price of cocoa. Furthermore, exchange rate and Agricultural export are directly related to cocoa export while trade openness and world price of cocoa are inversely related to cocoa export therefore the study recommended that there should be free market determination of exchange rate especially for cocoa export, Farmers should have access to facilities provided by government to increase the level of their output and volume of cocoa export, and mall holder cocoa farmers should enjoy input subsidy, in addition, affordable loans should be provided for them to ensure increase cocoa production and export.

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