EXCHANGE RATE REFORM POLICIES AND TRADE BALANCES IN NIGERIA

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Abstract
This paper investigates the effect of the exchange rate on the trade balance in Nigeria between 1970 and 2012. Annual data were collected from the Central Bank of Nigeria's Statistical Bulletin, and World Development Indicator of the World Bank. Co-integrating and Error Correcting Method were used for this estimation. The main findings that emerged from the study were that; the levels of income of the country as well as its trading partners were strong determinants of the trading activities in Nigeria economy, the effect of exchange rate on trade balance was significant in the long run, but contrary to the aspiration of the policy makers and in contrast to the j- curve hypothesis, the exchange rate had an inverse relationship with the trade balance in Nigeria.

Keywords: Exchange Rate, Trade Balances, National Incomes

JEL Classification Codes: F31, F19, F43

INTRODUCTION

Exchange rate arrangement in Nigeria has undergone significant changes over the past four decades; it shifted from a fixed exchange regime in the 1960s to a pegged arrangement between 1970s and mid-1980s. Nigeria finally adopted exchange rate reform policy under Structural Adjustment Programme (SAP) which applied floating regime since 1986.Before this reform, the fixed exchange regime in operation was believed to have induced an overvaluation of the naira; this engendered significant distortions in the economy and gave vent to massive importation of

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finished goods with adverse consequences for domestic production, balance of payments position and the nation's external reserves level. The SAP which encompasses exchange rate liberalization has since mainly began to depreciate the value of naira. For instance, the rate which was $1.8 to the ₦1 sometimes before SAP was downgraded by fiat from ₦2 to ₦60 to the Dollar in one swoop after SAP. This had gone as much as ₦150 to the Dollar in 2009 and ₦160 in 2012 (CBN 2014). This has in no small measure contributed to the instability of other macroeconomic variables such as inflation, interest rate, money supply etc. This effect of exchange rate on various macro-economic variables in the recent past has been one of the major discussions in macroeconomic debate. A most prominent issue in economic literature is the degree of exchange rate flexibility that should be permitted by any country.

The policy measures have different implications in fixed exchange rate regime compared to a floating exchange rate regime. It is unanimously agreed in economic literature that fiscal policy is relatively ineffective in floating exchange regime compare to fixed exchange regime, while monetary policy is very effective in floating exchange rate regime compare to fixed exchange regime. Under fixed exchange rate, monetary policy is ineffective compare to floating exchange regime while fiscal policy is very effective compare to floating exchange regime. An increase in money supply in floating exchange rate results into a fall in exchange rate thus local currency depreciates, this consequently lead to an increase in exportation and decrease in importation. This implies that current account is greater than zero. In the other way, an increase in government expenditure will lead to an appreciation of local currency which eventually crowd out export and thus current account is negative. An increase in government expenditure under fixed exchange rate lead to an increase in output which also encourages current account to be greater than zero. An increase in money supply will have no effect on the output level. The need to ensure that a realistic exchange rate of the naira is achieved has been a major objective of the Central Bank of Nigeria for quite a long time now. Sanusi (2004) submits that the right exchange rate is the one that facilitates the optimal performance of Nigeria economy as part of the new integrated global village and make it produce more, import less, export more and buy more domestic goods. Krueger (1983) was of the opinion that although the role of the exchange rate is generally agreed upon, the system of exchange rate and the relative efficiencies of the various systems remain a matter of contention. The policy environment sets the preconditions or minimum requirements for effective exchange rate management and stability, and ultimately determines the optimal exchange rate policy to pursue. The exchange rate mechanism depicts the system of exchange rate administration while the policies applied reflect the objective of moving the exchange rate through defined path.

After over two decades of this policy, the concern is about the extent at which this reform impact on the performance of the real sector of the economy. The manufacturing sector has not shown any significant improvement and our major exports are still primary product which is subjected to price fluctuation in the international market. Nigeria's high import propensity of finished consumer goods and the foreign exchange earnings from oil continued to generate output and employment growth in other countries from which Nigeria's imports originated

(Sanusi, 2004) This suggest the need for the verification of the extent to which import substitution and export promotion objectives of exchange rate policies have been realized in Nigeria.

However, recent political manifesto is the concern about the detrimental effect the high rate of exchange rate in Nigeria, in consonance with Professor Soludo, Governor of the Central Bank of Nigeria (2007), realizing the situation described above and the fact that all is not yet well with the prevailing exchange rate policy after many years of various trials. There were advocates for a stronger managed floating system of foreign exchange management in Nigeria whereby a dollar will cost ten Naira or less. This attempt which was immediately rebuffed by the administration of the then President Obasanjo under the pretence of inadequate consultation has re emanated in 2015 campaign promises. This generated a lot of controversy on the viability of the proposal, as well as effectiveness of the existing exchange rate policy. On the other side, the International Monetary Fund (IMF) believes that Nigeria currency is still being overvalued and by implication suggesting measures that will further depreciate the naira (CBN2006). Though, the Central Bank of Nigeria had discarded the claim, describing it as being baseless. However, the question is 'to what extent has the erstwhile depreciation of the currency help our trade relationship with other nations?'It is now a subject of empirical research to establish the effectiveness of the exchange rate policies on trade balance which this study attempt at achieving.

The paper is organized as follows. Section I consists of the background to the study. Section II contains a brief theoretical and empirical framework. Section III describes the model specification, technique of analysis and data descriptions. Section IV presents the empirical results and their interpretation in relation with the literature. Section V provides conclusion and some implications for policymakers stemming from the empirical results.

LITERATURE REVIEW

There are two aspects of trade balance responsiveness to changes in the exchange rate; the long-run and the short-run response. The long-run describes the steady state between the new level of the exchange rate and the trade balances. Once the steady state has been attained, the dynamic responses are worn out and the system is in a new equilibrium. Short-run deterioration of the trade balance as a reaction to depreciation is known in the literature as the J-curve. The name stems from the pattern of the trade balance caused by contracts outstanding during the exchange rate change. The J-curve occurs due to sticky domestic-currency prices of exports, which are subject to medium term contracts. So, export prices in foreign currency fall and at the same time import prices in terms of domestic output increase. After a certain time lag export and import volumes adjust to new prices and the trade balance starts to improve. Put differently, the J-curve represents a possible transition path from the old equilibrium level to the new equilibrium level.

It is commonly believed that the effect of the real exchange rate on a country's trade balance follows a J-curve effect: currency depreciation worsens a country's trade balance in the short run but improves it in the long run. The rationale behind the J-curve is that import prices

respond quickly to exchange rate changes, while import and export volumes adjust slowly to movements in relative prices. Thus, the initial effect of depreciation on the trade balance is "perverse" if import value increases by more than the increase in export value. In the long run, however, the trade balance will improve when import and export volumes adjust to the higher (lower) import (export) prices. The literature that has modeled the relationship between the trade balance and exchange rates, appeared first with the seminal paper of Bickerdike (1920), and then continued with Robinson (1947) and Metzler (1948). These are the sources of what has become known as the Bickerdike-Robinson- Metzler (BRM) model, or the elasticity approach (referred to here as EA) to the balance of payments. The elasticity approach emphasis the relative price effects of depreciation and suggest that depreciation works best when demand elasticities are high. The core of this view is the substitution effects in consumption (explicitly) and production (implicitly) induced by the relative price (domestic versus foreign) changes caused by a depreciation.

The model is an examination and exposition of the condition under which adjustment (depreciation) of exchange rate can be used to correct a deficit in the balance of trade. According to the theory, Currency devaluation or depreciation affects a country's balance of trade through changes in the relative prices of goods and services internationally. A trade deficit nation may be able to reverse its imbalance by lowering its relative prices, so that exports increase and imports decrease. This can be done by permitting the exchange rate to depreciate in a free market or by devaluing the currency in a fixed exchange rate system. The ultimate outcome of currency depreciation or devaluation depends on the price elasticity of demand for a nation's imports and the price elasticity of demand for its export. Depending on the size of demand elasticities for a nation's exports and imports, trade balance may improve, worsen, or remain unchanged in response to depreciation. The general rule that determines the actual outcome is propounded by Marshall Lerner. He submitted that depreciation will improve the trade balance if the depreciating nation's demand elasticity for imports plus the foreign demand elasticity for its export exceeds unity. Also depreciation will worsen the trade balance if the sum of demand elasticities is less than unity. However the effect will remain unchanged if the sum of demand elasticities equals unity.

Empirically, various studies have been conducted to assess the influence of exchange rate on trade balance of different economies of the world, with the objective of providing valuable inputs to policy makers on the effectiveness of exchange rate policy to a country's foreign trade. More importantly, a large number of literatures have examined the shortrun and longrun relationship between exchange rate and trade balances on many economies of the world. However the effects of exchange rate on trade performance are yet to be conventionally agreed to. Neither theoretical nor empirical works has got a widely agreed and an established definite result on whether or not a nominal devaluation or depreciation of a country's domestic currency improves its trade balance, or even if exchange rate plays a role in determining trade flows. Bulk of the early literatures adopted traditional Ordinary Least Square Method (OLS), Instrumental Variables (IV) or Two Stage Least Square (2SLS) Techniques; {Miles, 1979; Bahmani-Oskooee,

1985; Meade, 1988; Rosenweig and Koch, 1988; Noland, 1989 and Marwa and Klein, 1996}, the empirical evidence was mixed and inconclusive. The availability of advanced cointegration techniques in time series analysis ushered in a new round of empirical testing from early 1990, yet, the empirical evidence on this area of study still remained mixed and inconclusive.

The short-run and long-run relationships between the trade balance and exchange rate have been subject to many empirical studies. Here is a brief overview is provided of methodologies and results of the literature for developed and emerging economies. Gylfason and Schmid (1983) found support for a long run relationship between exchange rate and trade balance with an expected increase in trade balance due to a 10% devaluation of Pakistan's rupee to be equal to 1.3% of Pakistani GNP. A study on the effect of 24 devaluation episodes in developing countries over the period 1959-66, Cooper (1971) found that overall, devaluation improved trade balance and balance of payments. In another study on devaluation and macroeconomic performance, Kamin (1988) discovered that the trade balance was improved by devaluation through its stimulation of exports. Similarly, Salant (1977), Gylfason and Risager (1984) established that devaluation improved trade balance. However the study of Miles (1979) found that devaluation did not improve trade balance. Devaluation was also found to worsen the trade balance and the balance of payments (Solimano, 1986; Roca and Priale, 1987; and Horton and McLaren, 1989). Hernan Rincon C (1998) on his own part examined the short and long run exchange rate effects on trade balance for Colombia. He concluded that devaluation improves trade balance and that the long run effect of exchange rate devaluation on trade balance is enhanced if accompanied by reduction in money stock and or increase in income. Nusrate Aziz (2008) carried out a similar study on Bangladesh and the result also demonstrated that the Real Effective Exchange Rate (REER) has a significant positive influence on Bangladesh trade balance in both short and long run. Sulaiman and Adnan (2010) estimated the impact of real exchange rate depreciation on balance of trade in Pakistan with a conclusion that there is a long run relationship among the variables. Khim-Sen Liew et al(2007) study addresses the question of whether exchange rate changes have any significant and direct impact on trade balance between ASEAN-5 countries and Japan for the sample period from 1986 to 1999, this study found that the role of exchange rate changes in initiating changes in the trade balances has been exaggerated. It concluded that trade balance is affected by real money, rather than nominal exchange rate. Balogun (2007) examined the effect of exchange rate policy on the bilateral intra-West African Monetary Zone and global inter- WAMZ using Panel data. He then concluded that exchange rate does not matter much to intra- WAMZ exports to warrant its use as an instrument of bilateral trade stimulation but can potentially be used as a common tool of balance of trade payment adjustment against the rest of the world. Petrović and Gligorić (2010) examined whether exchange rate depreciation improves trade balance, and whether appreciation worsens it. The paper shows that exchange rate depreciation in Serbia improves trade balance in the long run, while giving rise to a J-curve effect in the short run.

However, studies in this area have rarely been done on Nigerian economy. Several previous studies relating to exchange rate in Nigeria have focused on variables such as foreign

reserves, interest rate and economic growth as well as other areas of interest. For instance, Hycenth and Dennis (2008) worked on exchange rate dynamics and current account balance in Nigeria. Akinbobola and Ojetayo (2010) assesses the relationship between real exchange and domestic output growth in Nigeria Only very few literature exist in the direction of exchange Nigeria's rate and trade, among which are, the ones of Balogun (2007) and Oluwatosin et al (2011) which both considered the relationship between exchange rate and trade in West African Monetary Zone. The most recent study available on Nigeria in this area is that of Omojimite and Akpokodje (2010). However, his analysis is criticized for the hazard of omission of important variable or misrepresentation of variable, his study only considered the impact of exchange rate reforms on non-oil exports in Nigeria while the oil exports was neglected on the premise of the usual assumption that exchange rate reforms has nothing to do with oil exports since they are not likely to affect oil prices and by extension oil exports. The study found a small positive effect of exchange rate reforms on non-oil exports through the depreciation of the value of the country's currency.

However, a thorough consideration of currency depreciation though may not directly affect the price and the volume of oil exports but may have a multiplier effect on the demand side of the economy via increased domestic currency in circulation, which may eventually lead to increased demand for foreign products. This study will differ from the previous studies by incorporating both oil and non-oil export of Nigeria in its analysis of the impact of exchange rate on trade performance in Nigeria. Since the study will cover both pre reform period and reform period it will consider whether or not 1986 reform has any significant effect on our trade balances. It will further applies more advanced econometric techniques thereby correcting for the probable spurious regression which could possibly have been the case with Ordinary Least Square Method adopted by previous studies on the relationship between exchange rate depreciation and trade balance in Nigeria economy.

MODEL SPECIFICATION, TECHNIQUE OF ANALYSIS AND DATA DESCRIPTION

In assessing the short-run and the long-run effects of changes in the exchange rate on the trade balance, whether at the aggregate or at the bilateral level, it is a common practice to regress a measure of trade balance directly on real exchange rate while controlling for real income at home and in foreign country. In specifying such a trade balance model in Nigeria, we follow the elasticities approach as applied by other related studies (Rose and Yellen, 1989; Rose, 1990; Bahmani-Oskooee and Brooks, 1999 and Arora et al, 2003).

Let's denote P, P *, e, eP *, and E respectively as export price in domestic currency, import price in foreign currency, the domestic price of a unit of foreign exchange, import price in domestic currency, and the real exchange rate or E eP*/P. while X, M and TB represent the values of export, import and trade balances respectively. Y_t and Y_n respectively stand for foreign income and domestic income. While export is a function of real exchange rate and foreign income, import depends on real exchange rate and domestic income. Since trade balance is the difference between exports and imports, trade balance is by implication a function of real

exchange rate, foreign income and domestic income. Hence, applying and extending, exports, imports, the real trade balance can be expressed as:

$$X = X(E, Yt) \quad 1$$

$$M = M(E, Yn) \quad 2$$

$$TB = TB(E, Yn, Yt) \quad 3$$

The partial derivative of the real trade balance with respect to real depreciation is given by:

$$\delta TB/\delta E = \delta X/\delta E - E\delta M/\delta E - M > \text{or} < 0 \quad 4$$

It can be shown that if TB = 0, equation (5) will be reduced to the Marshall-Lerner condition.
The sign of equation (5) depends on whether the volume effect of increased exports would be greater or less than the value effect of imports (Krugman and Obstfeld, 2003). The sign of $\delta TB/\delta Y_n$ in equation (3) is unclear because higher real income in the home country may increase imports, leading to a deterioration of the trade balance, or reduce imports due to growth in import-substitute production. The sign of $\delta TB/\delta Y_t$ in equation (3) is also ambiguous because higher real income in the "world" may increase exports to the "world" from Nigeria or reduce imports from Nigeria due to growth in import-substitute production in the "world".
To measure the elasticity of the trade balance with respect to the real exchange rate, real income in the home country, and real income in the world, equation (3) can be expressed as a log-log equation;

$$\text{Log TB} = \varphi_0 + \varphi_1 \log Y_n + \varphi_2 \log Y_t + \varphi_3 \log RER + \varphi_4 D_R \log RER + \varphi_5 D_R + \varepsilon_t \quad 5$$

However, to capture the effect of reform policy of 1986, we introduce a dummy variable D_R that will take the following values: $D_R = 0$ for years from 1970 to 1986 and 1 for 1987 to 2012

The effect of this dummy variable can be dichotomized in order of these two values ascribed to the dummy variables.

For $D_R = 0$, we will have

$$\text{Log TB} = \varphi_0 + \varphi_1 \log Y_n + \varphi_2 \log Y_t + \varphi_3 \log RER + \varepsilon_t \quad 6$$

And for $D_R = 1$, we will have,

$$\text{Log TB} = \varphi_0 + \varphi_5 + \varphi_1 \log Y_n + \varphi_2 \log Y_t + (\varphi_3 + \varphi_4) \log RER + \varepsilon_t \quad 7$$

This specification expresses trade balance between Nigeria and other countries of the world (TB) defined as the difference between Nigerian's imports from other countries and her exports to other countries as a function of Nigerian's income Y_n, income of other countries of the world Y_t, and the real exchange rate (REER). Where φ_1 measures the elasticity of trade with respect to income in the home country, φ_2 denotes the elasticity of trade balance with respect to incomes of the trading partners (foreign income), and φ_3 represents the elasticity of the real exchange rate. We expect an estimate of φ_1 to be positive as an increase in domestic (Nigeria) income generally leads to an increase in imports. A negative estimate for φ_1 is possible if increase in domestic income reflects expansion in the production of import-substitute goods (Bahmani-Oskooee, 1986). An estimate of φ_2 is expected to be negative as an increase in trading partner's income leads to higher exports by Nigeria. However, a positive estimate of φ_2 is possible if increase in foreign income comes from an expansion in foreign production of substitutes for Nigeria export goods. Finally, RERis defined in a way that a decrease reflects a real depreciation of Nigerian Naira. If depreciation is to decrease imports and increase exports, hence improve the trade balance, an estimate of φ_3 would be positive. The trade-weighted Nominal Effective Exchange Rate (NER) indices for Nigeria represent the value of the Naira in terms of a weighted basket of currencies. The weights represent the relative importance of each currency to the Nigerian economy. In other words, it represents the share of each of the selected countries in Nigeria's total trade. Therefore, the NER index measures the average change of the Naira's exchange rate against all other currencies.

In constructing the NER index, the geometric approach was adopted, while ab initio, 10 major trading partners, which control about 76.0 per cent of Nigeria's trade with the rest of the world, were selected. These are: Belgium, France, Italy, Japan, The Netherlands, Spain, Switzerland, Germany, United Kingdom and the United States of America. However, following the dynamism in Nigeria's International Trade, there had been some modifications in the group of selected trading partners. Thus, the following are the current major trading partners: Brazil, China, France, Germany, India, Belgium, Italy, Ghana, South Africa, Netherlands, Spain, United Kingdom and United States of America. In view of the non-stationarity nature of time series data, modern economists are skeptical of the reliability of results from some estimation techniques such as the Ordinary Least Square (OLS) method, this study, first of all, attempted to examine the time series properties of the data used. If the data is not stationary, log or differences need to be taken to make them stationary. Therefore, the Unit root test will be carried out on the main variables using Augmented Dickey Fuller (ADF) test. A series x_t is stationary if its mean, variance and auto-covariance are independent of time. A series is said to be integrated of order d, if the series becomes stationary after differencing it d times. In this case, Augmented Dickey Fuller (ADF) is applied by estimating an ordinary least squares equation as follows.

$$\Delta x_t = a_o + \gamma x_{t-1} + a_2 t + \sum_{i=1}^{4} \beta i \Delta x_{t-1} + \varepsilon_t \qquad 8$$

Where Δ is the difference operation, x_t is the log of the series, a_o is the intercept term, γ is the coefficient of the lagged value of the series x_{t-1}, a_2 is the coefficient with respect to time t, $\Sigma\beta_i\, x_{t-1}$ is the summation of the lagged values' coefficients and ε_t is the error term. The above specification of the ADF test includes both a constant and a time trend so that the presence of a drift and or trend can be detected and taken into consideration in specifying the co-integration test and ECM model.

If the individual series are non-stationary at levels, we will proceed by testing whether the series are jointly co-integrated or not. When the existence of one or more co-integrated equation(s) is confirmed, then the Vector Error Correction Modeling (VECM) technique would be used to examine the contribution of exchange rate policy changes to trade performance in Nigeria, otherwise, Vector Autoregressive Regression (VAR) analysis applies. The VAR that incorporates cointegration is called Vector Error Correction (VECM) model. The VECM model allows the long-term behavior of the endogenous variables to converge to cointegrating (i.e. long-term equilibrium) relationships while allowing a wide range of short-term dynamics. To test for cointegration, the conventional Johansen test procedure shall be used.

The Johansen procedure is described as follows. Defining a vector $x_t$of n potentially endogenous variables, it is possible to specify the data generating process and model x_t as an unrestricted vector autoregression (VAR) involving up to k-lags of x_t specified as:

$$x_t = \mu + A_1 x_{t-1} + \ldots\ldots + A_k\, x_{t-k} + \varepsilon_t \quad u_t \sim IN(0, \mu_i), \qquad 9$$

where; $x_t$is (n x 1) and each of the $A_i$is an (n x n) matrix of parameters. Sims (1980) advocates this type of VAR modeling as a way of estimating dynamic relationships among jointly endogenous variables without imposing strong *a priori* restrictions (Harris, 1995). This is a system in reduced form and each variable in x_t is regressed on the lagged values of itself and all the other variables in the system. If the result allows rejection of the null of a unit root in the estimated residuals, then we can say that the series are co-integrated of order one. Under these conditions, an Error Correction Model can be formulated. Since the model given in (9) is a long run relationship it is necessary to modify (9) in order to incorporate the short-run dynamics. A common practice is to express (9) in an error-correction modeling format.

Equation (7) can be re-specified into a vector error correction model (VECM) as:

$$\Delta x_t = \mu + \Gamma_1 \Delta x_{t-1} + \ldots\ldots + \Gamma_{k-1}\, \Delta x_{t-k+1} + \Pi x_{t-k} + \varepsilon_t \qquad 10$$

Where $\Gamma_i = -(I - A_1 - \ldots\ldots - A_i), (i = 1, \ldots\ldots, k-1)$ and $\Pi = -(I - A_i - \ldots\ldots - A_k)$, Iis a unit matrix, and $A_i (i = 1, \ldots\ldots p)$ are coefficient vectors, p is the number of lags included in the system, ε is the vector of residuals which represents the unexplained changes in the variables or influence of exogenous shocks. The Δ represents variables in difference form which are I(0) and stationary and μ is a constant term. Harris (1995) states that specifying the system this way has information on both the short and long-run adjustment to changes in x_t through estimates of Γ_i and Π

respectively. In the analysis of VAR, Π is a vector which represents a matrix of long-run coefficients and it is of paramount interest. The long-run coefficients are defined as a multiple of two (*n x r*) vectors, α and β ', and hence Π =αβ ', where α is a vector of the loading matrices and denotes the speed of adjustment from disequilibrium, while β ' is a matrix of long-run coefficients so that the term $\beta' x_{t-1}$ in Equation (10) represents up to (*n-1*) cointegrating relationships in the cointegration model. It is responsible for making sure that the x_t converge to their long-run steady-state values. Impulse response analytical method is also adopted to consider the short-run interaction between the exchange rate and trade performance in the economy.

Data Description

Balance of trade (BT): this is the difference between total exports and imports of merchandise (both oil and non-oil).

Real Effective Exchange Rate (RER): the exchange rate concept used in this model is the real effective exchange rate. It removes the price effect on the exchange rate movements indicated by real nominal exchange rate by deflating exchange rate indices by corresponding indices of relative prices. It thus takes care of inflation both in the domestic economy and a country's trading partners. It is derived by multiplying the nominal exchange rate with the quotient of foreign consumer price index and domestic consumer price index i.e. ep*/p.

Foreign Income (FG): The weighted average of Gross Domestic products (GDP) of 52 major trading partners of Nigeria all denominated in US dollars was computed and used as the foreign or world income.

Domestic Income (NG): The Gross Domestic Product of Nigeria was used as Domestic Income.

Nature and Sources of Data

Secondary annual data on imports, exports, and exchange rate were sourced from the Central Bank of Nigeria Statistical Bulletin, while those for foreign income and domestic income were obtained from the World Bank's World Development Indicators.

EMPIRICAL RESULTS AND INTERPRETATION OF RESULTS

To determine the stationarity properties of the variables, Augmented Dickey Fuller (ADF) was employed. Table1 below presents the estimates of the ADF test at both level and first difference. It is evident from the results that all the variables were non stationary at levels, that is, they were not integral of order zero I(0) which is an indication that all the variables have unit roots in the level data. Therefore, analyzing the data at level without first differencing will lead to misspecification. In other words, in the presence of unit roots, variables need to be differenced in order for the series to be stationary. In the case of this study, after first difference, all the

variables became stationary at 5 percent level of significance. This implies that the series are integral of order one or I(1). Therefore, the presence of significant cointegration relationships among the variables could be determined.

TABLE 1
Augmented Dickey Fuller Test

Variables	Level	1st difference
LBT	-0.9065	-3.9577*
LFG	-2.5700	-3.4275**
LNG	-0.6647	-3.5890**
LRER	-2.0808	-5.3336*

****, **, ***, indicates 1%, 5%, and 10% level of significance respectively***
All the variables are expressed in log forms

The multivariate cointegration test in Table 2 established whether there was at least one linear long run relationship among the variables of interest which have all been found to be integrated of order one. If there is cointegration, it shows evidence of a long-run relationship between the variables and appropriateness of proceeding to estimate the impacts of exchange rate on trade balance both in the short run and the long run. Cointegrated variables share common stochastic and deterministic trends and tend to move together through time in a stationary manner even though the variables in the study may be non-stationary.

In order to investigate the existence or otherwise of longrun linkages among the four variables in the system which were each integral of order one, the study applied the multivariate cointegration test technique developed by Johansen (1990). The results of the cointegration tests as shown in Table 2 confirms that there are two cointegration relationship among the variables included in the model, this is because the null hypothesis of no cointegration was rejected for the variables. This evidence of cointegration among the variables rules out spurious correlations and implied that at least one direction of influence could be established among the variables. Schwarz and Akaike Criterion are employed to select the VAR lag order.

TABLE 2
Cointegration Test

Estimates of λ-max and trace tests, Series: LBT LFG LNG LRER, Exogenous series: DRE LDRE								
Null	Alt r	Eigenvalue	λ-max	Critical value	Prob**	Trace	Critical value	Prob**
0	1*	0.956161	93.81686	27.58434	0.0000	124.2974	47.85613	0.0000
≤ 1	2*	0.551048	24.02519	21.13162	0.0190	30.48050	29.79707	0.0417
≤ 2	3	0.147952	4.803373	14.26460	0.7664	6.455312	15.49471	0.6417
≤ 3	4	0.053576	1.651939	3.841466	0.1987	1.651939	3.841466	0.1987

** denotes rejection of the hypothesis at the 0.05 level.*
***MacKinnon-Haug-Michelis (1999) p-values*

To examine the longrun effects of exchange rate on trade performance, Vector Error Correction Model which incorporates both the long run and short run effect estimate simultaneously is adopted. The VECM has two parts, the estimates of the long run effects as shown in equation (9) and the estimates of the short run dynamic interaction among the variables as shown in equation (10). The beauty of VECM is that once the variables are non-stationary but cointegrated, the estimates from VECM are more efficient than either the Ordinary Least Square (OLS) or orthodox VAR estimates. The VECM also saves one from the agony of endogeneity problem and the inherent spurious inferences associated with Ordinary Least Square (OLS) estimates. The coefficient of the lagged error correction term (ECM) as shown in Appendix Eis negative and significant (a feature necessary for model stability). The significance of the lagged ECM shows that there is a long-run causal relationship between the trade balance and exchange rate as well as domestic income and foreign income. It also indicates that all the variables are adjusting to their long-run equilibrium relationships. The negative coefficients (and the magnitudes) of the ECM indicate the speed of adjustment to the long-run equilibrium relationship. The long run regression reveals that all the variables are statistically significant at 5% level of significance. However, φ_1 which is the coefficient of domestic income is positive while φ_2 and φ_3 which are respectively the coefficients of foreign income and real effective exchange rate are negative. The theoretical notion suggests that the export and import increases as the real income of the trade partners and domestic income rises respectively and vice visa. In that case we could expect φ_2<O and φ_1>O. However, imports may decline as income increase if the real income rises due to an increase in the production of import substitute goods, and in that case we would expect φ_2>O and φ_1<O. The effect of changes in real exchange rate on balance of trade is ambiguous. Hence φ_3 could take any sign positive or negative. However, if depreciation is to decrease imports and increase exports, and hence improve the balance of trade, φ_3 are expected to be positive. Generally, if real depreciation takes place, which causes the real exchange rate to increase, the exports go up, the imports fall as a consequence, and it improves the trade balance. The converse is also true.

LBT = 1.6 LNG - 2.9LFG - 3.8LRER+ 25.71633 11

The above long run estimate indicates that the real effective exchange rate and the growth in foreign income of the trade partners impact negatively on the trade balance of Nigerian economy, whereas effects of growth in domestic income on Nigerian trade balance is positive. The result clearly shows that an increase in the world income is not transmitted into an increase in Nigeria export. This may also signify the failure of diversification in the policy of economic reform. This relationship thus explains that in the long run, the real exchange rate has a negative and significant impact on the trade performance of Nigeria. The higher the real effective exchange rates, the lower the trade balances of Nigeria. The estimated coefficient indicates that a 10% increase in the real effective exchange rate, keeping all other variables constant, made the trade balance of Nigeria to worse off on the average of about 38 percent. This result disproof Omojimite and Akpokodje (2010) and corroborates Hycenth and Dennis (2008) and shows the failure of the exchange rate policies to either promote export or reduce import. This is contrary to the apriori expectation. This fact emanate from the fact that the crude oil which dominate Nigeria export is more responsive to international oil politics as dictated by OPEC and the oil importers rather than the exchange rate policies in the country. The positive sign of the estimated coefficient for the domestic income variable is consistent with the monetary view which says income has a positive relationship with the trade balance. However since an increase in domestic income is positively related to trade balance, the higher the Nigeria income, the better the trade balances. The estimate shows that 10% increase in Nigeria income keeping all other variables constant brought about 16% increase in the trade balance. The negative sign of the estimated coefficient of the foreign income indicates that as the foreign income increase by 10%, Nigeria trade balance decreased by about 29%. This reflect further our inability to diversify our economy to accommodate this increase in foreign income, there are several substitute to the oil I n world market thereby our economy is always at receiving ends.

However, in the shortrun estimate, only the effect of foreign country income is significant while those of the real effective exchange rate and national income are insignificant. The exchange rate policy reform policy did not have significant effect on the trade balance in the shortrun. The implication is that both fixed and flexible exchange rate regime has the same effect on the trade interaction between the country and other part of the world. This primarily may be because the trading pattern of the country remains insignificantly different within these periods. Nigeria is primarily mono-cultural economy both at the fixed and flexible exchange rate regime. The flexible exchange rate introduced in 1986 had not been able to transform the production and consumption pattern in the economy successfully. The R^2 of the regression as shown in Appendix E is about 48% which indicate that the model adequately captured the effect of exchange rate, domestic income and foreign income on the trade balance in Nigerian economy but the adjusted R^2 is about 32% which also bothered on the fitness of the model. However, since the aim of this work is not to cover all the variables determining trade balance, there are possibilities of omission of some variables which also determines trade balance. It is worth

noting that though high R^2 denote the fitness of regression, it should however be noted that low adjusted R^2 does not necessarily imply poor regression. Since the objective of this study is neither to obtain high R^2 per se nor high adjusted R^2, but rather to obtain dependable estimates of the true population regression, noticing co-efficient and draw statistical inferences about them. In empirical analysis, it is not unusual to obtain a very high R^2 or adjusted R^2, but find that some of the regression coefficients either are statistically insignificant or have signs that are contrary to a priori expectations. Therefore we should be more concerned about the logical or theoretical relevance of the explanatory variables to the dependant variables and their statistical significance (Gujarati, 2005).F statistics test the joint significance of the variables in the model, if significant; it implies the model has explanatory power with respect to the dependent variable. The critical value at five percent level of significance is 2.84 while the F- Statistics for the model is 2.88. Since the calculated F - Statistics value is greater than the critical F -Statistics value then the model has explanatory power with respect to the trade balance to a large extent. Normality, heteroskedacity and autocorrelation test carried out as shown in appendices B,C and D show that there are no autocorrelation and heteroskedacity in the variables involved and that the variables involved are multivariate normal. These tests are necessary to avoid spurious regression.

However, most scholars prefer to employ impulse response and variance decomposition to analyze the contribution of policy variables to target variables in macroeconomic model in the shortrun. This is because the individual coefficients in the estimated VAR models are often difficult to interpret; there are suspicions about the statistical efficiency of the coefficient estimates (Gujarati, 2005). Thus a stability test was carried out and all the points lied inside the circle as revealed in Appendix F, therefore, we can conclude that the model is stable and inferences drawn on its impulse response was consistent. This test ascertains that there is no unit root in the model as the presence of unit root will render it unstable.

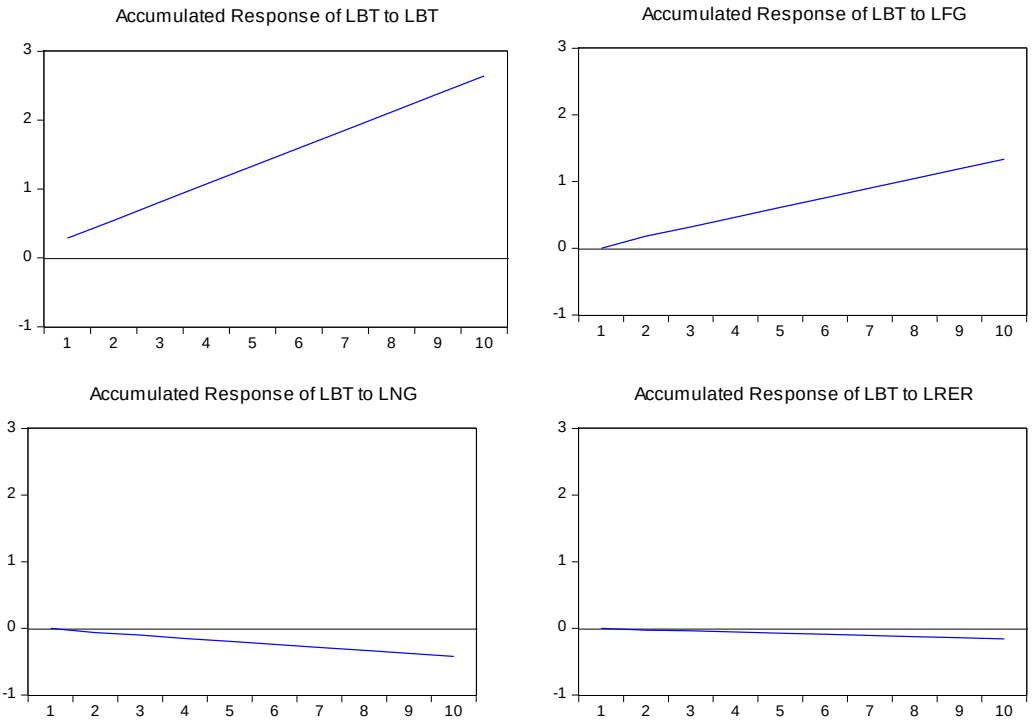
The impulse response shows a graphic representation of a simulation of the system response to a unit shock or a standard deviation shock of the variables. It tells us how trade will react to an unexpected change in the exchange rate and other variables. Moreover, the result of the impulse response also confirms the weakness of exchange rate to influence trade balance favourably in the short run. As the graph in Fig 1 indicates, a shock on exchange rate in the shortrun leads to a decline in the growth of trade but this dies off in second period but could not be sustained in the third period, it thereafter return to a level at which a shock on the exchange rate leads to a further decline in the trade balance. A shock in exchange rate initially reduced the growth rate of the trade and thereafter maintains a stagnant but declining posture after two years up to the tenth period. As shown in accumulated response graph in Fig2, a unit shock to the exchange rate has a negative effect on trade balance in the long run. However, the inability of the trade balance to improve significantly after the initial shocks contradicts the report of Oluwatosin et al (2011) and negates the existence of j-curve hypothesis in Nigeria.

TABLE 3
Response of Trade Balances to Shock in Exchange Rate and other Variables

Period	LBT	LFG	LNG	LRER
1	0.287839	0.000000	0.000000	0.000000
2	0.542167	0.181390	-0.063449	-0.028721
3	0.808911	0.319700	-0.102084	-0.035340
4	1.071459	0.466088	-0.153735	-0.056168
5	1.332866	0.612384	-0.196288	-0.072008
6	1.594603	0.756520	-0.241792	-0.089807
7	1.856232	0.901832	-0.286263	-0.106733
8	2.118033	1.046635	-0.331248	-0.123898
9	2.379784	1.191702	-0.376105	-0.140992
10	2.641549	1.336671	-0.420993	-0.158113

Cholesky Ordering: LBT LFG LNG LRER

Fig 2 Accumulated Response to Cholesky One S.D. Innovations



SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

This paper investigates the effect of the exchange rate on the trade balance in Nigeria between 1970 and 2012. Annual data were collected from the Central Bank of Nigeria's Statistical Bulletin, and World Development Indicator of the World Bank. Cointegrating and Error

Correcting Method were used for this estimation. This method requires checking of the time series property of the variables involved to avoid spurious regression. The hypothesis of unit root were accepted at levels for all the variables while the hypothesis of unit root were rejected for all the variables at first difference using Augmented Dickey Fuller test and a stable longrun relationship was examined using Johansen Cointegration test.

The main findings that emerged from the study were that the levels of income of the country as well as its trading partners were strong determinants of the trading activities in Nigeria economy; this may be as a result of relatively small open economy of the country. It may also either be as a result of the over dependence of the economy on the oil which is subject to the shock in the international market, or the overreliance of the economy on imported consumer and producer goods. The effect of exchange rate on trade balance was significant in the long run, but contrary to the aspiration of the policy makers and in contrast to the j- curve hypothesis, the exchange rate had an inverse relationship with the trade balance in Nigeria.

Conclusion and Recommendation

This study therefore concludes that the effect of exchange rates on trade balance in Nigeria in the longrun is negative and significant. Also, that the exchange rate policies in Nigeria are not effective specifically in promoting nonoil exports of the country, as well as in reducing the importation of consumer goods. As a result of significant negative effect of exchange rate policy reform on the trade balance, this study therefore recommends that government should through the Central Bank of Nigeria embark on a fixing realistic exchange rate in a stronger official market while allowing the market forces to fluctuate within the rigid parameter.It should however be noted that the right exchange rate is the one that facilitates the optimal performance of Nigeria economy as part of the new integrated global village and make it produce more, import less, export more and buy more domestic goods. Government should in addition ensure an appropriate policy mix that produces conducive atmosphere for production. The availability of basic infrastructural facilities such as stable power supply, adequate water supply, good road networking, reliable financial institution framework and adequate security will enhance local productivity. To achieve macroeconomic goal of the economy more attention should be given to fiscal policy and also pay more attention to internal adjustment mechanism to normalize both consumption and production pattern of the economy.

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APPENDIX A

VAR Lag Selection Criteria

Lag	AIC	SBC	LOGLIKELIHOOD
1	0.57*	0.94*	-0.53*
2	0.85	1.43	0.41
3	1.04	1.83	3.44

Source: Author's computation from E-views 8 package

APPENDIX B

Autocorrelation Test

VEC Residual Serial Correlation
LM Tests
Null Hypothesis: no serial correlation at lag order h
Sample: 1970 2012
Included observations: 30

Lags	LM-Stat	Prob
1	20.49981	0.1985
2	8.301815	0.9394
3	12.97090	0.6749
4	13.73186	0.6187
5	13.32444	0.6489
6	9.999608	0.8666
7	11.43938	0.7816
8	14.97113	0.5268
9	16.53382	0.4164
10	15.05699	0.5205
11	19.71158	0.2335
12	14.59493	0.5545

Probs from chi-square with 16 df.

Source: Author's computation from E-views 8 package

APPENDIX C

Normality Test

VEC Residual Normality Tests Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Sample: 1970 2012
Included observations: 30

Component	Skewness	Chi-sq	Df	Prob.
1	-0.101515	0.051526	1	0.8204
2	-0.343517	0.590021	1	0.4424
3	-0.169473	0.143606	1	0.7047
4	-0.142457	0.101469	1	0.7501
Joint		0.886622	4	0.9265

Component	Kurtosis	Chi-sq	Df	Prob.
1	3.054834	0.003759	1	0.9511
2	2.125576	0.955772	1	0.3283
3	2.644315	0.158140	1	0.6909
4	3.011173	0.000156	1	0.9900
Joint		1.117827	4	0.8914

Component	Jarque-Bera	Df	Prob.
1	0.055284	2	0.9727
2	1.545793	2	0.4617
3	0.301746	2	0.8600
4	0.101625	2	0.9505
Joint	2.004449	8	0.9809

Source: Author's computation from E-views 8 package

APPENDIX D

VEC Residual Heteroskedasticity Tests

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Sample: 1970 2012
Included observations: 30

Joint test:

Chi-sq	df	Prob.
142.1324	130	0.2203

Individual components:

Dependent	R-squared	F(13,16)	Prob.	Chi-sq(13)	Prob.
res1*res1	0.381657	0.759661	0.6880	11.44970	0.5732
res2*res2	0.141662	0.203129	0.9970	4.249869	0.9882
res3*res3	0.271454	0.458581	0.9188	8.143626	0.8341
res4*res4	0.476086	1.118414	0.4102	14.28259	0.3542
res2*res1	0.508590	1.273799	0.3191	15.25770	0.2915
res3*res1	0.234847	0.377757	0.9584	7.045399	0.8998
res3*res2	0.515965	1.311957	0.2997	15.47894	0.2784
res4*res1	0.546354	1.482292	0.2256	16.39062	0.2287
res4*res2	0.498821	1.224979	0.3457	14.96463	0.3096
res4*res3	0.520571	1.336389	0.2878	15.61714	0.2704

Source: Author's computation from E-views 8 package

APPENDIX E

Vector Error Correction Estimates
Date: 08/31/15 Time: 01:15
Sample (adjusted): 1972 2012
Included observations: 30 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LBT(-1)	1.000000

LFG(-1)	2.921791
	(1.28932)
	[2.26615]
LNG(-1)	-1.607000
	(0.34793)
	[-4.61870]
LRER(-1)	3.756158
	(0.17886)
	[21.0004]
C	-25.71633

Error Correction:	D(LBT)	D(LFG)	D(LNG)	D(LRER)
CointEq1	-0.073725	0.002058	-0.000977	-0.265775
	(0.03068)	(0.00218)	(0.00528)	(0.01285)
	[-2.40286]	[0.94513]	[-0.18503]	[-20.6817]
D(LBT(-1))	-0.207798	0.000598	-0.018193	0.284634
	(0.22510)	(0.01597)	(0.03873)	(0.09428)
	[-0.92314]	[0.03744]	[-0.46973]	[3.01908]
D(LFG(-1))	9.023147	0.091150	0.468935	-1.912382
	(3.20826)	(0.22767)	(0.55201)	(1.34372)
	[2.81247]	[0.40036]	[0.84951]	[-1.42320]
D(LNG(-1))	-1.738512	-0.048159	-0.210890	-1.458019
	(1.37283)	(0.09742)	(0.23621)	(0.57499)
	[-1.26637]	[-0.49433]	[-0.89282]	[-2.53575]
D(LRER(-1))	0.021043	0.001619	-0.035885	0.000264
	(0.11997)	(0.00851)	(0.02064)	(0.05025)
	[0.17540]	[0.19018]	[-1.73848]	[0.00525]
C	-0.142547	0.055710	0.073163	0.430757
	(0.23310)	(0.01654)	(0.04011)	(0.09763)
	[-0.61152]	[3.36779]	[1.82419]	[4.41211]
DRE	0.177105	-0.023866	0.056020	-0.537333

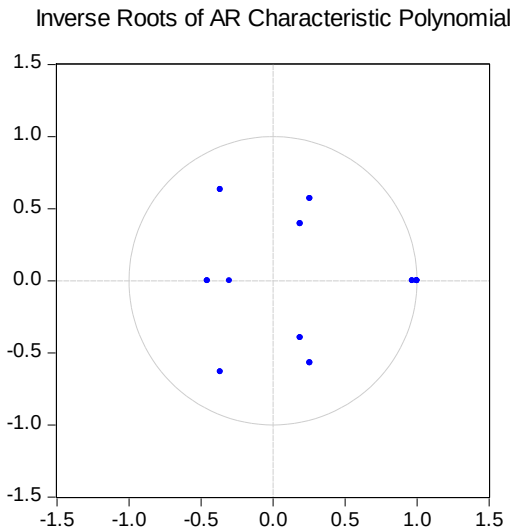
	(0.14217)	(0.01009)	(0.02446)	(0.05954)
	[1.24575]	[-2.36561]	[2.29019]	[-9.02413]
LDRE	0.136444	-0.010671	-0.043012	0.974611
	(0.11291)	(0.00801)	(0.01943)	(0.04729)
	[1.20841]	[-1.33174]	[-2.21396]	[20.6088]
R-squared	0.478357	0.436992	0.583790	0.964451
Adj. R-squared	0.312380	0.257853	0.451360	0.953140
Sum sq. resids	1.822726	0.009179	0.053960	0.319743
S.E. equation	0.287839	0.020426	0.049525	0.120556
F-statistic	2.882068	2.439403	4.408278	85.26665
Log likelihood	-0.555193	78.81222	52.24249	25.55337
Akaike AIC	0.570346	-4.720814	-2.949500	-1.170225
Schwarz SC	0.943999	-4.347162	-2.575847	-0.796572
Mean dependent	0.103859	0.033952	0.102124	-0.023511
S.D. dependent	0.347116	0.023711	0.066862	0.556915

Determinant resid covariance (dof adj.)	7.65E-10
Determinant resid covariance	2.21E-10
Log likelihood	163.2098
Akaike information criterion	-8.480655
Schwarz criterion	-6.799218

Source: Author's computation from E-views 8 package

APPENDIX F

Stability test



Source: Author's computation from E-views 8 package

APPENDIX G

	LBT	LFG	LNG	LRER
Mean	4.768951	13.15046	11.82126	0.481972
Median	4.760516	13.26564	11.88900	0.839486
Maximum	6.770398	13.67502	13.61468	1.465540
Minimum	2.111424	12.32364	9.952381	-2.017245
Std. Dev.	1.452259	0.397943	1.223458	0.827487
Skewness	-0.121548	-0.631315	-0.027980	-1.476143
Kurtosis	1.714259	2.236713	1.555754	4.240361
Jarque-Bera	2.711024	3.446663	3.307547	16.23627
Probability	0.257815	0.178471	0.191327	0.000298
Sum	181.2202	499.7175	449.2077	18.31493
Sum Sq. Dev.	78.03511	5.859270	55.38340	25.33517
Observations	38	38	38	38

Source: Author's computation from E-views 8 package

APPENDIX H

Covariance Analysis: Ordinary
Date: 02/24/17 Time: 11:09
Sample: 1970 2012
Included observations: 38
Balanced sample (listwise missing value deletion)

Correlation t-Statistic Probability	LBT	LFG	LNG	LRER
LBT	1.000000			

LFG	0.954449	1.000000		
	19.19292	-----		
	0.0000	-----		

LNG	0.981972	0.959428	1.000000	
	31.16940	20.41673	-----	
	0.0000	0.0000	-----	
LRER	0.006133	-0.146501	-0.001688	1.000000
	0.036802	-0.888594	-0.010128	-----
	0.9708	0.3801	0.9920	-----

Source: Author's computation from E-views 8 package