What nexus exists between exchange rate and trade balance? The case of Nigeria vis-à-vis UK, US and Hong Kong

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Abstract

The role of exchange rate movements in determining the trading position of a country and the ultimate welfare of its people vis-à-vis its trading partners is enormous. Consequently, this study is conducted to examine the nature of the trading relationship between Nigeria and its trading partners in three continents-North America, Europe and Asia. The study specifically focuses on how the fluctuation of naira vis-à-vis the pound sterling, dollar and Yuan affects Nigeria's trading position in relation to UK, US and Hong Kong (China). Quarterly data that span the period from 1981 to 2015 were used and linear and Non-linear ARDL estimation techniques were deployed to prove the existence of linear and nonlinear J-Curve. The findings, based on linear ARDL, show no proof of J-Curve in all the models, however, cointegration exists between the trade balance and the exchange rate dynamics. In non-linear ARDL, the existence of J-Curve is only observed in Nigeria-Hong Kong model. However, the findings show that there is both the existence of cointegration and the short-run and the long-run asymmetric nexus between exchange rate dynamics and trade balance in all the models. The overarching implication of the finding is that devaluation of Naira will not improve Nigeria's trading position vis-à-vis trading partners considered.

Keywords: Exchange Rate Dynamics, Trade Balance, J-Curve, ARDL, NARDL

JEL Classification: F31

1.0. Introduction

Economists, particularly, trade experts and policymakers have been interested in the relationship between exchange rate dynamics and trade balance for a very long time. The rationale for this interest stems from two facts. First, exchange rate dynamics determine the betterment of a country's trading position with its trading partners. Second, trading position (measured in terms of trade balance) relative to its trading partners shows whether the country is gaining from the trade or not or whether the country is indebted or not to its trading partners. In this area, two theories or hypotheses have guided the research activities. The first is the Marshall-Learner condition and the second is the J-Curve phenomenon. The Marshall-Learner condition (named after two economists Alfred Marshall and Abba Learner) states that the devaluation of currency will only improve trade balance when the sum of elasticity of demand for exports and imports is greater than one. J-Curve credited to Magee (1973), on the other hand, states that currency devaluation will first lead to deterioration in trade balance before improving it. Theoretically, devaluation of currency has two

effects on the trade balance, namely: volume effect and price effect. In the case of volume effect, a country that devalues its currency is expected to have an increase in the volume of its exports, thereby increasing the revenue which accrues to the government of the country. As regards the price effect, it is expected that the price of import of the country that devalues its currency will rise therefore reducing the volume of import from its trade partners.

Since the proposition of these two hypotheses, the trajectory of research has proceeded in three ways. The first line of research begins with the testing of the short-run relationship between exchange rate movements (devaluation) and trade balance with the aim to either validate or refute J-Curve. Notable authors include Magee (1973) and Bahmani-Oskooee (1985, 1989a, b). While Magee (1993) coined the concept of J-Curve based on the conclusion he drew from the study he conducted using the US data, Bahmani-Oskooee, (1985, 1989a, b) provided the empirical evidence using the data of one European country and three Asian countries (Greece, India, Korea and Thailand). He introduced lag structure into the trade balance model to account for the short-run dynamic effect of exchange rate devaluation on trade balances in the four countries.

However, the development of econometric methods capable of capturing both the short-run dynamic and long-run effect of currency devaluation on trade balance led to the second strand of research. Rose and Yellen (1989) pioneered the research in this direction. They used error correction method developed by Engle-Granger in 1987 to test the validity of J-Curve between the US and its six trading partners (Japan, Canada, U.K., France, Germany and Italy). Since their study, several studies have been conducted across different countries using different econometric techniques, ranging from Johansen cointegration to autoregressive distributed lag methods (Arndt and Dorrance, 1987; Hacker and Hatemi 2003; Moura and Da Silva 2005; Halicioglu 2007; Ivanovski, Churchill and Nuhu, 2017).

One common feature characterising the first and second strand of studies is that they assumed the symmetric relationship between exchange rate movements and trade balance, that is, currency devaluation will have the same effect on the trade balance. This, however, yields bias results or better put mixed empirical findings. Consequently, other authors have called for investigating the asymmetric relationship between exchange rate movements and trade balance. The argument put forward in support of nonlinear evaluation of the effect of currency devaluation on the total trade balance is premised on the fact that the prices of both exports and imports react in a nonlinear manner to movements in exchange rate Bussiere (2013). Bahmani-Oskooee and Fariditavana (2015, 2016) further argue that expectations of traders about the future exchange rate movements are nonlinear during the periods of appreciations and depreciation. Following these

arguments, series of studies have been conducted to test nonlinearity of J-Curve (Aliyu and Tijani, 2015; Bahmani-Oskooee and Fariditavana, 2015, 2016; Bahmani-Oskooee and Baek, 2016, Bahmani-Oskooee, Halliciaglu and Ghodsi, 2016; Nnadozie, 2017; Bahmani-Oskooee, Bose and Zhang, 2017).

Apart from the aforementioned issues, there are other two methodological issues that have gained prominence in the literature. To test J-Curve, some authors employ the aggregate trade data between a country and the rest of the world, taking the rest of the world as a single trading partner or using a single country to represent the rest of the world and thus modelling currency devaluation-trade balance nexus in either linear or nonlinear way. Accessing the validity of J-Curve in this way has been argued to lead to biased conclusions resulting from the data aggregation bias (Rose and Yellen, 1989). Consequently, others have considered the use of disaggregate trade data between a country and its trading partners to improve the findings regarding the validity of J-Curve (see Rose and Yellen, 1989; Bahmani-Oskooee and Kara, 2005; Bahmani-Oskooee and Kantipong, 2001; Bahmani-Oskooee, Bose and Zhang 2017).

With regard to testing the validity (refutability) of J-Curve in Nigeria, several studies have investigated the dynamics of the relationship between exchange rate movements and trade balance. Most of these studies, albeit, focus on linear relationship between exchange rate movements and trade balance using different econometric techniques ranging from OLS to ARDL (Ogbonna, 2009; 2011; Oyinlola, Adeniyi and Omisakin, 2011; Loto, 2011; Ogundipe, Ojeega and Ogundipe, 2013; Akpansung and Babalola, 2013; Umoru and Eboreime, 2013; Igue and Ogunleye, 2014; Anoke, Odo and Ogbonna, 2016; Ibrahim, Akinbobola and Ikotun, 2017). However, in recent time, attention has been devoted to modelling of exchange rate devaluation and trade balance in Nigeria asymmetrically. Pioneer study in this regard is Aliyu and Tijani (2015) who used threshold cointegration and error correction estimation technique to uncover the asymmetric nexus between exchange rate movements and total trade balance. Using linear and nonlinear autoregressive distributed lag methods; Nnadozie (2017) examined the symmetric and asymmetric effects of exchange rate on Nigeria's trade balance, albeit the author used aggregate trade balance data. While Aliyu and Tijani (2015) documented asymmetric nexus between exchange rate and trade balance, the findings by Nnadozie (2017) appears to be mixed. She, however, concluded that currency appreciation hurts Nigeria's trade balance.

This current study joins the extant studies that have examined the asymmetric relationship between exchange rate movements and trade balance in Nigeria. Our study is similar to that of Nnadozie, (2017) but different in several ways. While Nnadozie, (2017) used aggregated data, we

make use of disaggregated data. By focusing on the disaggregated data, it is possible to know a country that Nigeria has a better trading relationship with. This would be hardly discovered using aggregated data. Besides, the use of aggregated data is usually fraught with aggregation bias which is avoided by using disaggregated data. Since our interest is to examine the case of bilateral relationship between Nigeria and its trading partners in North America, Europe and Asia, we chose the United States in North America, the United Kingdom in Europe and Hong Kong in Asia and then model the effects of exchange rate movements on trading position of Nigeria relative to these three countries asymmetrically. These three countries were selected because they have a history of trading with Nigeria, particularly the US and the UK.[1] Second, to provide robustness for our study in the spirit of Nnadozie (2017) and Bahmani-Oskooee, Bose and Zhang (2017), we consider the symmetric vis-à-vis asymmetric modelling the effect of exchange rate movements on trade balance between Nigeria and its three trading partners.

Following this introduction, the rest of the study is structured as follows: section two presents the stylized facts on Nigeria's trading position relative to the US, the UK and Hong Kong. Section three focuses on the models, the methodologies as well as the data sources and description. While section four presents the findings, section five concludes and offers policy recommendations.

2.0. Stylised Facts of Exchange Rate Movements and Trade Balance between Nigeria and its Trading Partners

2.1 The Evolution of Exchange Movements and Policies in Nigeria Vis-à-Vis Pound Sterling, Dollar and Yuan (Renminbi)

Exchange rate management and the attendant policies have evolved and several factors have determined its dynamics over time in Nigeria. These factors can be broadly categorised into both internal and external factors. From the collapse of Bretton Wood Institutions fixed exchange rate policy, political and socioeconomic events in Nigeria's trading partners, particularly the British and the US and the economic crises within the countries, the value of the Nigerian currency has moved from being the stable currency to unstable currency and vice versa. The Central Bank of Nigeria (CBN hereafter) established in 1958 before the independence of Nigeria in 1960 is saddled with the responsibility of managing the exchange rate. Since its inception, the CBN has introduced several measures and policies to safeguard the value of naira, however, most of the times; its concerted efforts have been thwarted by the aforementioned factors and others.

[1] *Hong Kong in China is chosen because China economy is growing and Hong Kong is perceived to be an industrial hub of China with a high demand for raw materials from Nigeria.*

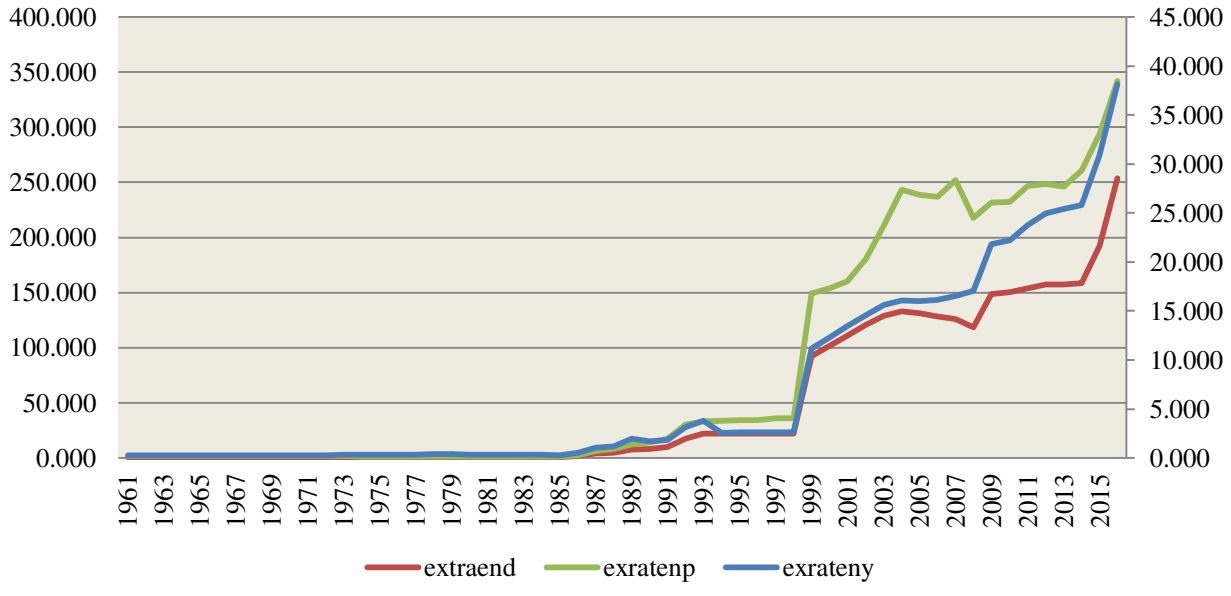
Beginning from the 1960s, Nigeria's currency, known as Nigerian pound, was pegged against the British pound sterling in ratio one to one, that is, one Nigerian pound is equivalent of one British pound. This was in operation until 1967 when the civil war broke out in Nigeria. By the year 1967, the British government devalued its currency. However, the Nigerian government did not devalue the Nigerian pound. Instead, the government simply valued the Nigeria pound in terms of the dollar. Consequently, between 1967 and 1985 the average value of Nigerian currency, now the Naira which was introduced in 1973, relative to the pound is 1.40, that is, ₦1.40 per one pound. During the same periods, the average value of naira against the dollar and Renminbi was about ₦0.68 per dollar and ₦0.33 per Renminbi respectively. Also, during this period, several events with regard to the exchange rate regime or policy took place. The sudden collapse of Bretton Woods' exchange rate policy (pegging) led to the adoption of a floating exchange rate in the international financial market. As a result, Nigeria also abandoned pegging of the naira to a single currency in 1974, thereby pegging it to either the British pound sterling or US dollar. By 1976, Nigeria further pegged her currency against a weighted basket of seven currencies including the US dollar, the British pound sterling, the Japanese yen, the French franc, the Swiss franc, the German mark and the Dutch guilder. During this period, the management of the exchange rate was centrally controlled by the CBN.

By 1986, the centralised management of the exchange rate was abandoned as a result of the inability of the policy to provide formidable mechanisms for the management of the allocation of the exchange rate. The springing up of parallel exchange rate market which widened the gap between the official exchange rate and the parallel rate and the macroeconomic crisis of the 1980s also led to the abandonment of centralised control of exchange rate. In the same year, the government adopted the IMF's Structural Adjustment Programme with the goal to revitalise the recessed economy. With the adoption of the IMF's Structural Adjustment Programme, controlled exchange rate policy or regime was replaced by the market-determined exchange rate system. In line with this policy, the government established the Second-tier Foreign Exchange Market (SFEM) in September 1986 which strengthened market forces to determine the exchange rate of naira against dollar and pound sterling. Also, Bureaux de Change was established in 1989 with the mandate to offer a foreign exchange to private organisations or individuals. However, instead of these measures put in place by the monetary authority to stabilise the value of naira, the measures led to a significant depreciation of exchange rate against the major currencies such as the dollar, pound sterling including Chinese Yuan (Renminbi). For example, the average exchange rate of naira against pound sterling moved from ₦1.40 per pound sterling between 1973 and 1985 to about ₦22.99 per pound sterling in 1986. Similarly, the naira also depreciated against the dollar and

Chinese Yuan (Renminbi). It stood at an average of ₦14.20 naira per dollar and ₦2.182 per Yuan (Renminbi) respectively.

However, from exchange rate data, it is observed that between 1993 and 1998, the exchange rate was fixed against the dollar at approximately about 22 naira per dollar. During this period, Autonomous Foreign Exchange Rate (AFEM) was established in 1995 in which the CBN sold the dollar to the buyers at a market rate. With the advent of democratic government in 1999 and the introduction of Interbank Foreign Exchange Market (IFEM), the value of naira depreciated further significantly from ₦22 per dollar to ₦92.34 per dollar, ₦149.40 per pound sterling and ₦11.15 per Yuan respectively. Since then, several measures have been introduced to further manage the foreign exchange rate in Nigeria. In February 2006, Whole Sale Auction System (WDAS) was introduced with the goals to unify the exchange rate between the official exchange rate and inter-bank exchange rate and thereby stabilising the value of naira against other currencies. Although some achievements were recorded in terms of stabilisation of naira, particularly against the dollar, this does not, however, stop further depreciation of naira against the US dollar, the British pound and Chinese Yuan (Renminbi). As at 2016, the value of naira against the dollar, pound sterling and Yuan stood at ₦253.49 per dollar, ₦342.26 per pound sterling and ₦38.15 per Yuan respectively (see Figure 1 for the trend of the exchange rate of naira against the pound sterling, dollar and Yuan).

Figure 1: The Values of Naira against Pound Sterling, Dollar and Yuan



2.2. Nigeria's Trade Balance Vis-à-Vis UK, US and Hong Kong (China)

The trade relationship between Nigeria and the United Kingdom (Britain) is historical in nature, dated back into the pre-colonial, colonial and post-colonial eras. The trade relationship that began with illegitimate slave trade before the colonial era dovetailed into legitimate trade in primary agricultural products and crude oil during the colonial and post-colonial eras. In the case of the US, crude oil is the major driver of its trade relationship with Nigeria. Although crude oil is parts of commodities that Hong Kong (China) imports from Nigeria, primary commodities such as agricultural related products dominate the trade relation between Nigeria and Hong Kong (China). This study will, however, not dwell on the nitty-gritty of bilateral relations among these countries and Nigeria, for this has been dealt with by the historians, the political scientists and the economists alike in the literature (See Adeniran, 1989; Akinbi, 2006 and Akinbi, 2015 for Nigeria-British Trade Relation; Agada, 2003; Onuoha, 2005 and Ogbodo, 2012 for Nigeria-US Trading Relation; Ogunkola, Bankole and Adewuyi, 2008; Udeala, 2010; Agubamah, 2014 and Odeh, 2014 for Nigeria-China Trade/Bilateral Relation). In order to avoid re-inventing of the wheel, the stylised facts presented in this section focuses on the brief analysis of Nigeria's trading position vis-à-vis the United Kingdom, the US and Hong Kong. The trends of bilateral trade relation between Nigeria and its trading partners over time are presented in figure 2 and 3 respectively. While Figure 2 depicts the trade relation between Nigeria vis-à-vis the UK and US, Figure 3 shows the trade relation between Nigeria and Hong Kong.

Beginning with the Nigeria-UK trade relation, Nigeria recorded a trade deficit of about $22.93 million between 1960 and 1962. However, between 1963 and 1970 and 1972 and 1974, Nigeria enjoyed a favourable trade balance of about $25.15 and $355.83 million relative to the United Kingdom respectively. The huge trade surplus accrued to Nigeria, particularly between 1972 and 1974, could be ascribed to the export of crude oil to the United Kingdom. It could be recalled that crude oil was discovered at Oloibiri, the current Bayelsa State, in 1956 and became commercialised in the late 1960s. Since then the crude oil has become the main export commodity of Nigeria and it accounts for about 90% of total exports in the country. After 1974 the country has been recording, most of the times, trade deficit until the years 2012 and 2013 when it recorded a trade surplus of about $1.48 billion. The trade scenario between the two countries shows that Nigeria has not benefited much from its bilateral relationship with the United Kingdom.

In the case of Nigeria-US trade relation, Nigeria has benefited, most of the time, from its trading with the US. Beginning with a trade surplus of about $13.50 million between 1960 and 1962, Nigeria recorded a trade deficit of about $25.67 million between 1963 and 1968. Since the

1970s, the country has recorded a trade surplus, on average, of about $6.67 billion. However, between 2014 and 2015 it recorded a trade deficit of about $4.11 billion. With regard to Nigeria-Hong Kong trade relation, Nigeria has not really benefited from its trading with Honk Kong. In fact, Nigeria has been importing more from Hong Kong than it exports to Hong Kong as shown by Figure 3. Available statistics show that Nigeria recorded a trade deficit to the total sum of $8.09 billion with Hong Kong since the 1960s.

Figure 2: Balance between Nigeria vis-a-vis UK and US

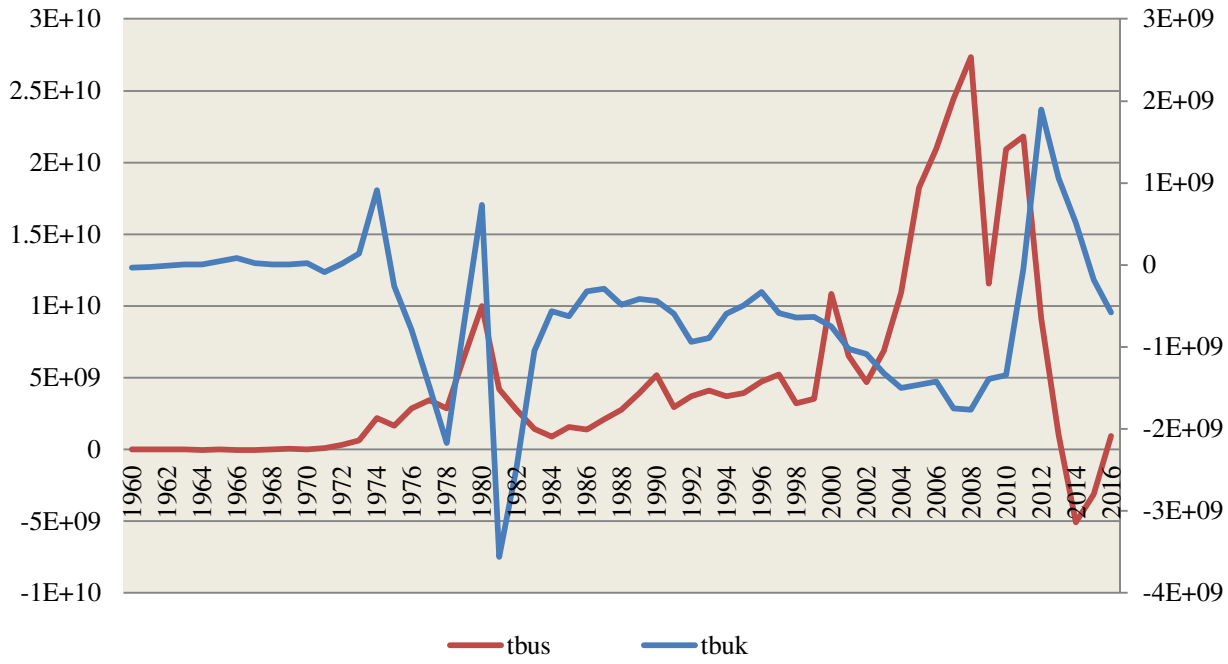
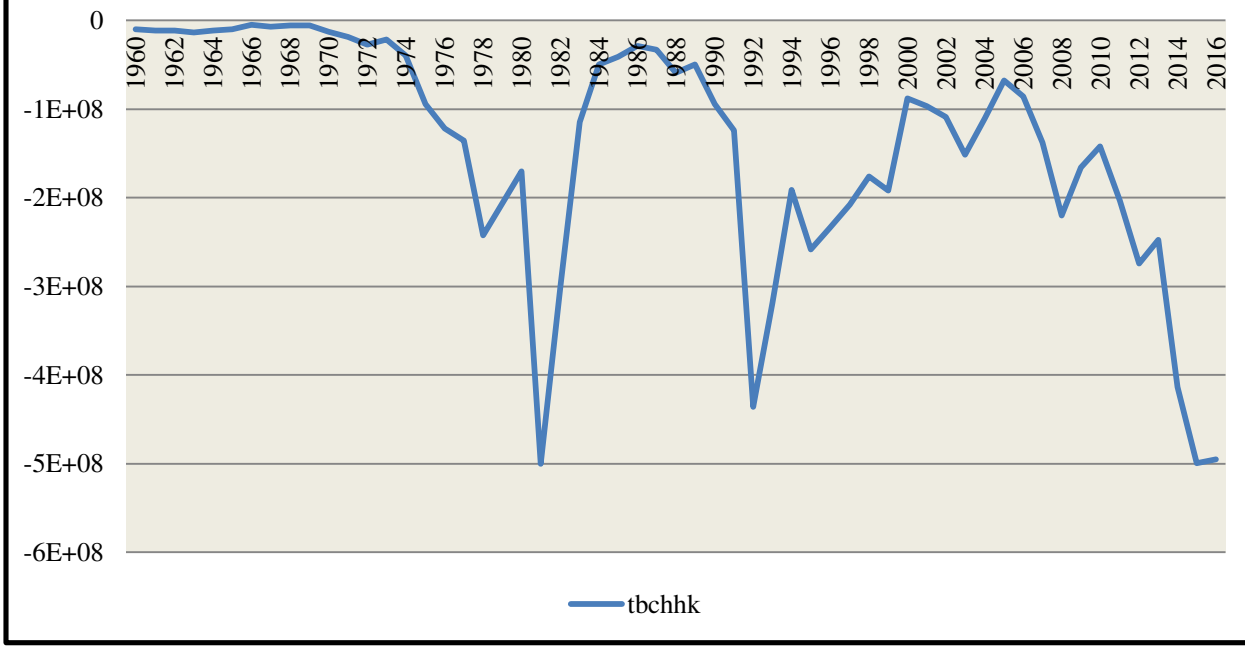


Figure 3: Trade Balance between Nigeria and China (Hong Kong)



3.0. The Models, the Methods and the Materials

3.1. The Models and the Methods

In the spirit of extant studies such as Nnadoize (2017) and Bahmani-Oskooee Bose and Zhang (2017), this study specifies the exchange rate movements-trade balance nexus as:

$$Ln(TB_t^i) = \alpha_0 + \alpha_1 Ln(REX_t^i) + \alpha_2 Ln(Y_t^N) + \alpha_3 Ln(Y_t^i) + \varepsilon_t \quad (1)$$

Where *i's* denote US, UK and Hong Kong. $Ln(TB_t^i)$ is the natural logarithm of trade balance between Nigeria and its trading partners, $Ln(REX_t^i)$ represents the natural logarithm of real exchange rate between Nigeria and its trading partners and it is defined as the price of the currencies of Nigeria's trading partners per unit of domestic currency, naira, multiplied by the ratio of the domestic price level and trading partners' price levels ($REX_t = NEX_t(\frac{P_t}{P_t^*})$) , the price level is measured using consumer price index of Nigeria and each of the trading partners, $Ln(Y_t^N)$ is the natural logarithm of domestic income represented by real GDP, $Ln(Y_t^i)$ connotes the natural logarithm of the income of Nigeria's trading partners and ε_t is the error term assumed to be normally distributed with zero mean and constant variance.

A priori, the coefficient of domestic income and trade balance can either be positive or negative depending on whether the growth in domestic income is spent on domestic goods or imported goods. If an increase in domestic income is spent on imports, the coefficient is expected to be negative, otherwise, it would be positive. The growth in income of trading partners with Nigeria is expected to improve the country's trade balance. Hence, the coefficient of foreign income with trade balance is expected to be positive. Finally, a devaluation (depreciation) naira, that is, a rise in the exchange rate, is expected to have a positive effect on the trade balance. Therefore, the coefficient between the real exchange rate and trade balance should be positive.

The equation 1 can be re-parameterised in a dynamic form known as the autoregressive distributed lag model developed by Pesaran et al. (2001) to capture the short-run and long-run effects of real exchange rate movements on the trade balance.

$$\Delta Ln(TB_t^i) = \alpha_0 + \alpha_1 Ln(TB_{t-1}^i) + \alpha_2 Ln(REX_{t-1}^i) + \alpha_3 Ln(Y_{t-1}^N) + \alpha_4 Ln(Y_{t-1}^i) + \sum_{i=1}^{n} \lambda_1 \Delta Ln(TB_{t-1}^i)$$

$$+ \sum_{i=0}^{n} \lambda_2 \Delta Ln(\mathrm{REX}_{t-1}^i) + \sum_{i=0}^{n} \lambda_3 \Delta Ln(\mathrm{Y}_{t-1}^N) + \sum_{i=0}^{n} \lambda_4 \Delta Ln(\mathrm{Y}_{t-1}^i) + \varepsilon_t \quad (2)$$

Where Δ denotes first difference operator, α_0 is the drift component of the model, ε_t is the error term, α_1 to α_4 represent the long-run multiplier for each of the variables while λ_1 to λ_4 are the short-run dynamic parameters. The null hypothesis of long-run ARDL cointegration states that there is no long-run relationship between real exchange rate movement and trade balance between Nigeria and its trading partners. The null hypothesis is tested against the alternative hypothesis of the long-run relationship between real exchange rate and trade balance. The null hypothesis is specified as: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$ while the alternative hypothesis is specified as: $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0$. If equation 2 is assumed to be cointegrated, the error correction model that shows the speed of adjustment from the short-run to the long-run equilibrium is specified as:

$$\Delta Ln(TB_t^i) = \alpha_0 + \sum_{i=1}^{n} \lambda_1 \Delta Ln(TB_{t-1}^i) + \sum_{i=0}^{n} \lambda_2 \Delta Ln(\mathrm{REX}_{t-1}^i) + \sum_{i=0}^{n} \lambda_3 \Delta Ln(\mathrm{Y}_{t-1}^N) + \sum_{i=0}^{n} \lambda_4 \Delta Ln(\mathrm{Y}_{t-1}^i) + \phi ect_{t-1} + \varepsilon_t \quad 3$$

where ect_{t-1} is the error correction term. *A priori*, the coefficient of error term must be negatively signed, less than one and statistically significant for the model 3 to be considered cointegrated. n is the lag order selected by Alkaike Information Criterion (AIC).

The equations, 1, 2 and 3 assume symmetric nexus between real exchange rate and trade balance, that is, the appreciation and depreciation of naira have the same effect on the trade balance between Nigeria and its trading partners. However, as argued in the existing studies, the dynamics of the relationship between exchange rate movements and trade balance are not linear. Hence, the need to examine the asymmetric relationship between real exchange rate movements and trade balance. To do this, this study employs NARDL advanced by Shin, Yu and Greenwood-Nimmo, (2014), capable of capturing the asymmetric short-run and long-run effects of real exchange rate movements on the trade balance. Thus, we proceed first to the specification of the asymmetric long-run regression for real exchange rate-trade balance nexus as:

$$Ln(TB_t^i) = \beta_0 + \beta_1 Ln(REX_t^{i+}) + \beta_2 Ln(REX_t^{i-}) + \beta_3 Ln(Y_t^N) + \beta_4 Ln(Y_t^i) + u_t \quad 4$$

where $\beta_1, \beta_2, \beta_3$ and β_4 are the coefficients of the long-run to be estimated. $Ln(REX_t^{i+})$ and $Ln(REX_t^{i-})$ are the partial sum of positive and negative changes in the real exchange rate between Nigeria and its trading partners. The decomposition of the real exchange rate into positive and negative changes can be achieved as follow:

$$Ln(\mathrm{REX}_t^{i+}) = \sum_{j=1}^{t} \Delta Ln(REX_j^{i+}) = \sum_{j=1}^{t} \max(\Delta LnREX_j, 0)$$

$$Ln(\mathrm{REX}_t^{i-}) = \sum_{j=1}^{t} \Delta Ln(REX_j^{i-}) = \sum_{j=1}^{t} \min(\Delta LnREX_j, 0) \qquad 5$$

From equations 4 and 5, the nonlinear autoregressive distributed lag model can be specified as follows:

$$\Delta Ln(TB_t^i) = \gamma_0 + \gamma_1 Ln(TB_{t-1}^i) + \gamma_2^+ Ln(REX_{t-1}^{i+}) + \gamma_3^- Ln(REX_{t-1}^{i-}) + \gamma_4 Ln(Y_{t-1}^N) + \gamma_5 Ln(Y_{t-1}^i) + \sum_{i=1}^{n} \eta_i \Delta Ln(TB_{t-1}^i)$$

$$+ \sum_{i=0}^{o} ((\delta_t^+ \Delta Ln(\mathrm{REX}_{t-1}^{i+}) + \delta_t^- \Delta Ln(\mathrm{REX}_{t-1}^{i-})) + \sum_{i=0}^{p} \theta_i \Delta Ln(\mathrm{Y}_{t-1}^N) + \sum_{i=0}^{q} \varphi_i \Delta Ln(\mathrm{Y}_{t-1}^i) + \zeta_t$$

6

Where n, o, p and q are the lag operators or orders and $\gamma_0, \gamma_1, \gamma_2^+, \gamma_3^-, \gamma_4$ and γ_5 are the long-run coefficient parameters, $\sum_{i=0}^{o} \delta_i^+$ and $\sum_{i=0}^{o} \delta_i^-$ are the asymmetrically distributed lag coefficients. The long-run positive and negative effects of real exchange rate movements on trade balance are computed as: $\mu_2 = -\frac{\gamma_2^+}{\gamma_1}$ and $\mu_3 = -\frac{\gamma_3^-}{\gamma_1}$ respectively. The null hypothesis of no long-run effects of appreciation and depreciation of naira on the trade balance between Nigeria and its trading partners can be tested by this equality relation $-\frac{\gamma_2^+}{\gamma_1} = -\frac{\gamma_3^-}{\gamma_1}$ against the alternative hypothesis of long-run effects of appreciation and depreciation of the value of naira on trade balance specified as $-\frac{\gamma_2^+}{\gamma_1} \neq -\frac{\gamma_3^-}{\gamma_1}$. If the null hypothesis is rejected in favour of the alternative hypothesis, it means that there is an asymmetric long-run effect of exchange rate movements on the trade balance in Nigeria. Similarly, the null hypothesis of no short-run asymmetric effects of exchange rate movements on trade balance can be confirmed by the relation $\sum \delta_i^+ = \sum \delta_i^-$ against the alternative hypothesis of short-run asymmetric effects of exchange rate movement on trade balance specified as $\sum \delta_i^+ \neq \sum \delta_i^-$. If the equality relation is rejected in favour of inequality relation, it implies the existence of short-run effects of exchange rate movements on the trade balance. Both short-run and long-run effects can be affirmed using Wald test after running NARDL. Suffice to mention that some preliminary tests such as correlation test and unit root tests are important before estimation of NARDL. More importantly, it is crucial to perform unit root test to ascertain that

none of the variables is integrated of order 2 since NARDL is only applicable when the series are integrated of either order 0 or 1 or both.

3.2. The Materials

This study employs quarterly data covering a period from 1981 to 2015. The data are extracted from three main sources, namely: International Monetary Fund (IMF), International Financial Statistics (IFS) and Central Bank of Nigeria (CBN).[2] Specifically, trade balance is extracted from direction of trade data provided by IMF, foreign incomes proxied by seasonally adjusted real GDP and exchange rate between Nigeria and its trade partners (measured in terms of foreign currency vis-à-vis of domestic currency) are obtained from IFS and domestic income represented by seasonally adjusted real GDP is sourced from CBN. The results of the descriptive statistics of the variables in logarithm form are presented in Table 1.

Table 1: Descriptive Statistics Results

	tb_{uk}	tb_{us}	tb_{ch}	y^f_{uk}	y^f_{us}	y^f_{ch}	y^d	$rexrate_{uk/nig}$	$rexrate_{us/nig}$	$rexrate_{ch/nig}$
Mean	1.543	-1.454	3.765	26.474	30.031	26.439	8.695	5.303	4.906	2.890
Maximum	5.969	1.535	8.672	26.859	30.433	27.092	9.760	6.418	5.894	3.902
Minimum	-0.687	-3.456	0.251	26.002	29.498	25.568	7.963	3.725	3.613	1.342
Std. Dev.	1.309	0.879	1.265	0.257	0.286	0.440	0.563	0.615	0.579	0.631
Skewness	0.829	1.308	0.268	-0.209	-0.328	-0.347	0.502	-0.725	-0.623	-0.763
Kurtosis	3.742	5.398	4.271	1.738	1.790	2.105	1.910	2.603	2.200	2.891
Obs.	140	140	140	140	140	140	140	140	140	140

Note: tb, $rextrate$, y^d ***and*** y^f ***are trade balance between Nigeria and its trading partners, real exchange rate, domestic income proxied by seasonal adjustment real GDP and foreign income proxied by each trading partner seasonal adjustment real***

4. Empirical Findings

4.1. Correlation Results

In this section, the empirical findings are presented. However, before the presentation of the main results, it is expedient to examine the nature of correlation among the variables. This is done for two main reasons. The first is to examine the extent of the association among the variables. The second is to verify if there is a problem of multicollinearity among the variables. The results of the correlation analysis are presented in Table 2. In the table, correlation results are presented based on the model of each of Nigeria's trading partners. In the Nigeria-US trading model, the real exchange rate is negatively and significantly correlated with trade balance between Nigeria and the US while Nigeria's income and US's income are positively and significantly associated with trade balance. The reverse is the results obtained from Nigeria-Hong Kong and Nigeria-UK

[2] *IFS database is also hosted by IMF*

models. In the two models, the real exchange rate is positively and significantly associated with trade balance while domestic and foreign incomes are significantly and negatively correlated with trade balance. A cursory observation from table 2 reveals that there is no problem of multicollinearity because in most cases, the correlation values are relatively low.

Table 2: Correlation Matrix Results

	United State-Nigeria			
	tb	*rextrate*	y^d	y^f
tb	1.000			
rextrate	-0.328*** (0.0001)	1.000		
y^d	0.414*** (0.0000)	0.312*** (0.0002)	1.000	
y^f	0.174** (0.0399)	0.466*** (0.0000)	0.930*** (0.0000)	1.000
	United Kingdom-Nigeria			
tb	1.000			
rextrate	0.323*** (0.0001)	1.000		
y^d	-0.265*** (0.0016)	0.300*** (0.0003)	1.000	
y^f	-0.092 (0.2809)	0.451*** (0.0000)	0.945*** (0.0000)	1.000
	China-Nigeria			
tb	1.000			
rextrate	0.152* (0.0724)	1.000		
y^d	-0.375*** (0.0000)	0.348*** (0.0000)	1.000	
y^f	-0.367*** (0.0000)	0.535*** (0.0000)	0.938*** (0.0000)	1.000

Note: tb, $rextrate$, y^d ***and*** y^f ***are trade balance between Nigeria and its trading partners, real exchange rate, domestic income proxied by seasonal adjustment real GDP and foreign income proxied by each trading partner seasonal adjustment real GDP respectively. *, ** and *** denote 10%, 5% and 1% level of significance respectively.***

4.2. Unit Root Test Results

Another important test required to be conducted before the estimation of ARDL and NARDL is the unit root test. The unit root test is carried out with the objective to determine the stationarity properties of the variables of interest so as to avoid spurious regression. Besides, the application of ARDL and NARDL methods requires that none of the variables of interest is integrated of order 2. However, each of the variables could be integrated of either order 0 or order 1 or both orders (Pesaran et al. 2001 and Shin et al. 2014). Thus, the unit root test is conducted using Augmented Dickey-Fuller and Phillips-Perron unit root test methods. The assumption of both methods is that the variables contain a unit root, that is, they are not stationary at level. They can, however, be made stationary after being first differenced. The results of the unit root test are presented in Table 3. The results show that some of the variables are integrated of order 0, particularly the trade balance variables between Nigeria-Hong Kong and Nigeria-UK while the others such as real exchange rate and incomes (domestic and foreign) are integrated of 1. This implies that trade

balance variables between Nigeria-Hong Kong and Nigeria-UK are stationary at level and that they do not trend with time. The real exchange rate and incomes, on the other hand, are not stationary at level and they are only made stationary after being first differenced. The mixture of order 0 and 1 are good for implementation of ARDL and NARDL.

Table 3: ADF and P-P Unit Root Tests Results

	Augmented Dickey-Fuller		Phillips-Perron		Order of Integration
	Level	**First Difference**	**Level**	**First Difference**	
tb_{chi}	-5.075*** (0.0000)	-15.925*** (0.0000)	-5.077*** (0.0000)	-18.220*** (0.0000)	I(0)
tb_{uk}	-3.580*** (0.0073)	-10.052*** (0.0000)	-3.209 ** (0.0215)	-18.138*** (0.0000)	I(0)
tb_{us}	-1.814 (0.3727)	-13.581*** (0.0000)	-1.597 (0.4814)	-13.881*** (0.0000)	I(1)
$rextrate_{nig/chi}$	-1.955 (0.3065)	-10.536 *** (0.0000)	-2.154 (0.2241)	-10.618*** (0.0000)	I(1)
$rextrate_{nig/\text{uk}}$	-1.806 (0.3764)	-10.007*** (0.0000)	-2.160 (0.2221)	-10.148*** (0.0000)	I(1)
$rextrate_{nig/\text{us}}$	-2.099 (0.2454)	-10.289*** (0.0000)	-2.357 (0.1559)	-10.386*** (0.0000)	I(1)
y^{f}_{chi}	-2.154 (0.2241)	-9.496*** (0.0000)	-1.849 (0.3556)	-9.666*** (0.0000)	I(1)
y^{f}_{uk}	-1.164 (0.6887)	-4.953*** (0.0001)	-1.407 (0.5771)	-7.323*** (0.0000)	I(1)
y^{f}_{us}	-1.538 (0.5114)	-4.769*** (0.0001)	-1.583 (0.4888)	-7.591*** (0.0000)	I(1)
y^{d}	1.241 (0.9983)	-4.688*** (0.0002)	1.885 (0.9998)	-10.713*** (0.0000)	I(1)

Note: The values in parentheses are probability values
****, ** and *** denote 10%, 5% and 1% level of significance respectively.***

4.3. Linear ARDL Results

Having ascertained the stationarity properties of the variables, the next step is to estimate ARDL and NARDL to determine the effect of real exchange rate dynamics on trade balance between Nigeria and its trading partners. To estimate ARDL and NARDL, different optimal lag lengths were selected for each model. In the Nigeria-US model, one maximum lag length was selected. In Nigeria-UK model, maximum of 4 lags were chosen. Two maximum lag lengths were selected in the case of Nigeria-Hong Kong model. The optimal lag length selected is based on the Akaike Information Criterion (AIC). The results of the ARDL and NARDL are reported in Table 4.

We begin the presentation of our findings by first reporting linear ARDL results. Beginning from the error correction model which shows the speed of adjustment towards the long-run equilibrium from the short-run disequilibrium that arises from the shocks to the economy, the results show that, in all the three models, error correction coefficients are correctly signed and statistically significant. In other words, they follow a priori expectation in terms of being negative and statistically significant. Specifically, the coefficients of error correction terms are -0.267, -0.215 and -0.350 for Nigeria-UK, Nigeria-US and Nigeria-Hong Kong trade balance models

respectively. This implies that when the shocks occur about 26.7%, 21.6% and 35.0% disequilibrium that takes place in the current periods are corrected for in the next periods. However, the convergent rate towards the long-run equilibrium is very low as it takes about 3 or 4 years for the convergence to be completed. This may be attributed to the weakness of policies characterising most of developing countries, particularly in Nigeria. It could also be as a result of the sluggishness of the economy to respond to some of the promulgated policies to address any form of shocks that may hit the economy.

Concerning the issue of whether cointegration exists between trade balance and its determinants (real exchange rate, domestic income and foreign income), we used the bound testing approach to cointegration. The null hypothesis of bound-testing is that there is no cointegration among the aforementioned variables. The null hypothesis is tested against the alternative hypothesis which states that there is the existence of cointegration among them. The rejection of the null hypothesis in favour of the alternative hypothesis or otherwise is based on F-test statistics provided by Pesaran et al. (2001). Three possibilities exist in determining whether to reject the null hypothesis or to accept the alternative hypothesis. First, if the computed F-test value falls below the lower bound critical value, there is no cointegration. Second, if it falls within the upper and lower bound values, there is no definite decision with regard to the existence of cointegration. Third, if the computed F-test value falls above the upper bound value, there is cointegration. The F-test results based on a bound testing approach to cointegration are reported in Table 4. Signs ***, ** and * show that the F-test values are significant at 1%, 5% and 10% level of significance respectively. Based on the information provided above, the results show that there is cointegration between the trade balance and its determinants in all the models because the F-test values are greater than upper bound values at different levels of significance. Precisely, in Nigeria-UK and Nigeria-US models, the cointegration exists at 5% level of significance while in Nigeria-Hong Kong model; it exists at a 1% level of significance.

Turning to the proof of the existence of J-Curve hypothesis, theoretically, it is believed that to find support for J-Curve, the impact of exchange rate devaluation on trade balance must be negative and insignificant in the short-run and positive and significant in the long-run (Rose and Yellen 1989; Rose 1990). Based on this criterion, we find no support for the existence of J-Curve either in the short or in the long-run in all the models. Explicitly, in Nigeria-UK model, although exchange rate devaluation has a negative and insignificant effect on the trade balance in the short-run, an insignificant positive effect in the long-run invalidates the existence of J-Curve. In the case of the Nigeria-US model, exchange rate devaluation has a negative and significant effect on the

trade balance in the short-run (lagged in one period) and in the long-run. This implies that devaluation of naira against dollar results in continuous deterioration of the trade balance. However, devaluation of naira against Yuan (Renminbi) leads to improvement in the trade balance in the short-run and the long-run. As shown in the table, an increase in the exchange rate (depreciation or devaluation) by 1% will lead to improvement in the trade balance by 0.499% and 1.423% in the short-run and the long-run respectively. Placing our findings in the context of existing literature reveals that studies by Rose and Yellen, (1989) Ogbonna (1982); Narayan (2006); Bahmani-Oskooee and Wang (2007) Alemu and Lee (2014); Nusair, (2016); Nnadoze, (2017) found no support for J-Curve for the respective country or countries they studied.

Other explanatory variables such as domestic income and foreign income included in the models yield mixed results. In the Nigeria-UK and Nigeria-Hong Kong models, domestic income has negative effects on the trade balance in the short-run and the long-run. The findings may be attributed to the fact that Nigerians have an aggressive propensity for imported goods and services whenever their incomes increase. Similar reports have been documented for countries such as Australia, Algeria and China by studies conducted by Ivanovski, Churchill and Nuhu (2017); Guechari, (2012) and Bahmani-Oskooee, Bose and Zhang, (2017) respectively. Specifically, it is found that a 1% increase in domestic income will lead to a reduction in trade balance by 1.477% and 10.844 (lagged in one period) and 5.430% and 31.061% in the short-run and the long-run respectively. In the case of Nigeria-US, domestic income has a positive effect on the trade balance in the short-run and the long-run. Thus, a 1% increase in domestic income results in improvement in trade balance between Nigeria and the United States of America by 0.699% and 3.239% respectively. Foreign income has expected signed in Nigeria-UK and Nigeria-Hong Kong trade balance models as it has positive effects on the trade balance in the short-run and the long-run. However, in the Nigeria-US trade balance model, foreign income has a negative effect on the trade balance in the short-run and the long-run.

Finally, we performed diagnostic tests such as serial autocorrelation test, ARCH LM test for heteroscedasticity and Ramsey Reset test and as well as CUSUM and CUSUM square test. The results reported in table 4 show that there is no problem of serial correlation, heteroscedasticity and that the models are rightly specified as shown by Ramsey Reset test. However, stability tests produced mixed results. In most of the linear ARDL models, only the CUSUM test shows that the models are stable.

4.4. Nonlinear ARDL results

In this section, we report the results of the nonlinear effect of exchange rate dynamics on the trade balance. As in the case of linear ARDL, the findings here also show the existence of cointegration between trade balance and its determinants such as real exchange rate, domestic income and foreign income in all the models. Moreover, we conducted both the short-run and the long-run asymmetric tests using a Wald test. The null hypothesis of these tests is that there is no short-run and long-run asymmetric between trade balance and exchange rate dynamics. The null hypothesis is tested against the alternative hypothesis which postulates the presence of asymmetric nexus between the trade balance and exchange rate dynamics. Based on the F-test results obtained from the Wald test, it is evidence that the null hypothesis of no asymmetric relationship between trade balance and the movements in the exchange rate is rejected. This implies that there is an asymmetric relationship between trade balance and exchange rate dynamics in Nigeria with regard to its trading partners. However, the existence of the asymmetric J-Curve phenomenon is only feasible in the Nigeria-Hong Kong model based on the criterion of Bahmani-Oskooee and Fariditavana (2015, 2016), Therefore, the coefficients of positive (POS) and negative (NEG) are positive and statistically significant in both the short-run and the long-run. This implies that depreciation of naira will improve the trade balance between Nigeria and Hong Kong and appreciation of naira will hurt the trade relationship between the two countries (Bahmani-Oskooee, Ghosi and Haliciougu, 2017). There is no evidence that the depreciation of naira will improve the trading position of Nigeria in relation to the United Kingdom and the United States of America. This is not a surprising finding because the main commodity that Nigeria exports to these countries are the crude oil which it does not have control power over as the price of this commodity is determined by the forces of demand and supply in the international market. The little agricultural-related commodities being exported are exported in unprocessed forms. Therefore, it commands meagre revenue in the international market. In fact, some of these commodities are being rejected on the sanitary ground in the international market (Guardian, 2017).[3] In the short-run, domestic income has a negative and significant effect of the trade balance in Nigeria-UK model while it has a positive and significant impact in the Nigeria-US model. Foreign income has a statistically negative effect on the trade balance in Nigeria-US and Nigeria-Hong Kong models in the short-run. In the long-run, domestic income still has a negative significant effect on the trade balance in Nigeria-UK model and a positive significant effect on the trade balance in the Nigeria-US model. Lastly, all the diagnostic tests such serial autocorrelation test, ARCH LM heteroscedasticity test

[3] Most of the goods Nigeria exports to Hong-Kong are primary goods which serve as raw materials to industries in the City of China (see

and Ramsey Reset test carried out yield plausible results. CUSUM and CUSUM squared stability test yield mixed finding almost similar to the case of the linear model, except in the Nigeria-US model where CUSUM and CUSUM squared results show that the model is stable.

Table 4: Estimated Results of Linear and Nonlinear ARDL Models of Exchange Rate Dynamics and Trade Balance between Nigeria and its Trading Partners

	United Kingdom (4 lags)		**United States (1 lag)**		**China (2 lags)**	
	Linear ARDL	**Nonlinear ARDL**	**Linear ARDL**	**Nonlinear ARDL**	**Linear ARDL**	**Nonlinear ARDL**
	Short-run Results					
Δltb_{t-1}	-0.223** (0.0144)	-0.223** (0.0143)			-0.222*** (0.0081)	-0.222** (0.0190)
Δltb_{t-2}	-0.185** (0.0373)	-0.177** (0.0474)				
Δltb_{t-3}	-0.151* (0.0708)	-0.147* (0.0795)				
Δltb_{t-4}						
Δltb_{t-5}						
Δltb_{t-7}						
$\Delta lrextrate_{t}$	-0.534 (0.1554)		0.259 (0.1803)		0.498*** (0.0063)	
$\Delta lrextrate_{t-1}$			-0.345* (0.0805)			
$\Delta lrextrate_{t-5}$						0.499** (0.0117)
$\Delta lrextrate_{t} - P$		-0.756* (0.0917)		-0.057 (0.5124)		4.268** (0.0171)
$\Delta lrextrate_{t} - N$		0.199 (0.2451)		1.181* (0.0627)		
$\Delta lrextrate_{t-1} - N$						
$\Delta ly_{i,t}^{f}$	2.918*** (0.0044)	3.181 (0.1258)	-1.004*** (0.0098)	-1.999* (0.0702)	4.268 (0.3462)	-0.530 (0.9065)
$\Delta ly_{i,t-1}^{f}$					0.530 (0.9042)	-10.554 (0.0185)
Δly_{t}^{d}	-1.477*** (0.0011)	-1.538*** (0.0017)	0.699*** (0.0007)	0.753*** (0.0006)		0.243 (0.6044)
Δly_{t-1}^{d}					-10.884*** (0.0000)	
ECM_{t-1}	-0.267*** (0.0001)	-0.274*** (0.0001)	-0.215*** (0.0001)	-0.223*** (0.0000)	-0.350*** (0.0000)	-0.350*** (0.0000)
	Long-run Results					
$cons\tan t$	-243.129*** (0.0025)	-257.079 (0.1563)	112.890*** (0.0058)	37.184* (0.0966)	30.118 (0.4360)	62.170 (0.4429)
$lrexrate_{t}$	0.631 (0.1624)		-0.538* (0.0695)		1.423*** (0.0029)	
$ly_{i,t}^{f} / ly_{i,t-1}^{f}$	10.925*** (0.0021)	11.605 (0.1127)	-4.655*** (0.0034)	-8.965* (0.0721)	0.074 (0.9700)	-2.455 (0.4701)
$ly_{t}^{d} / ly_{t-1}^{d}$	-5.530*** (0.0003)	-5.611*** (0.0004)	3.239*** (0.0000)	3.379*** (0.0001)	-31.061*** (0.0000)	0.694 (0.5990)
POS		0.627 (0.2374)		-0.258 (0.5043)		1.423*** (0.0042)
NEG		0.726 (0.2345)		-0.937*** (0.0760)		1.585** (0.0414)
$WALD-SR$		3.904 (0.0026)		11.120 (0.0000)		3.072 (0.0052)

$WALD-LR$		14.921 (0.0000)		8.538 (0.0000)		15.400 (0.0000)
Bound-Testing F-Test	4.546**	3.755*	4.753**	4.721**	6.493***	4.387**
	Diagnostic Results					
R^2	0.7423 (74.23%)	0.7440 (74.40%)	0.8540 (85.40%)	0.8522 (85.22%)	0.5578 (55.78%)	0.5729 (57.29%)
$AdjR^2$	0.7261 (72.61%)	0.7257 (72.57%)	0.8473 (84.73%)	0.8454 (85.54%)	0.5340 (53.40%)	0.5429 (54.29%)
$F-stat$	45.728*** (0.0000)	40.685*** (0.0000)	127.67*** (0.0000)	125.852*** (0.0000)	23.426*** (0.0000)	19.077*** (0.0000)
DW	2.027	2.044	2.145	2.069	2.023	2.026
SCT	0.740 (0.4790)	0.978 (0.3790)	2.965 (0.0551)	1.322 (0.2701)	0.296 (0.7441)	0.150 (0.8613)
LMT	1.137 (0.2882)	1.137 (0.2883)	0.016 (0.8990)	0.346 (0.5574)	0.805 (0.3712)	1.733 (0.1903)
RRT	0.749 (0.4551)	0.773 (0.4411)	2.397 (0.0950)	2.756 (0.0673)	1.244 (0.2158)	0.869 (0.3865)
$CS(CS2)$	S(UNS)	S(UNS)	UNS(S)	S(S)	S(UNS)	S(UNS)

Note: The values in parentheses are probability values
****, ** and *** denote 10%, 5% and 1% level of significance respectively.***
CS and CS2 stand for CUSUM and CUSUM Square respectively
S and UNS mean stable and unstable respectively

5. Conclusion and Policy Implications

The dynamic nature of macroeconomic variables has called for a continuous examination of the nature of the relationship among them. This is partly due to the dynamics of the economy and the availability of sundry of econometric techniques that are capable of offering more enriching information about the relationship among the macroeconomic variables. In the light of this, this study has investigated the nature of the relationship between exchange rate dynamics and trade balance in Nigeria vis-à-vis its trading partners-UK, US and Hong Kong with the objective to substantiate the validity of symmetric and asymmetric J-Curve.

To achieve this objective we used quarterly data covering the period from 1981 to 2015 and deployed both linear and nonlinear ARDL estimation techniques of Pesaran et al. (2001) and Shin et al. (2014). However, before the implementation of the main objective of this study, some preliminary tests were conducted which include correlation test and unit root tests. The unit root tests, in particular, were carried out with the aim to confirm the usability of our main econometric techniques (linear and nonlinear ARDL) and to avoid any form of spurious estimation. The results of the correlation test showed that there is no problem of multicollinearity as the variables were moderately correlated and that of unit root tests displayed mixtures of order 0 and 1 which is useful for the implementation of ARDL and NARDL techniques.

Based on the aforementioned techniques, our findings are highlighted as follows. In the linear models, even though we found the existence of cointegration among the variables of interest,

the existence of J-Curve is absent. In other words, there is no sign that the devaluation or depreciation of naira vis-à-vis the currencies of its trading partners will improve Nigeria's trading position (trade balance). Even in the case of nonlinear models, the existence of J-Curve is only validated in the trade relationship between Nigeria and Hong Kong. However, we found that the asymmetric relationship exists between real exchange rate dynamics and trade balance between Nigeria and the selected trading partners. The post-estimation diagnostic conducted such as serial correlation test, ARCH LM heteroscedasticity test and Ramsey Reset test showed that our models are reliable.

Consequent upon the above findings, the following policy recommendations are prescribed. Unarguably Nigeria is a monocultural economy relying to a large extent on the exports of crude oil to generate its revenue, albeit Nigeria has no capacity to dictate the tune of events in the international oil market as the forces of demand and supply are the only determinant of buying and selling of crude oil which sometimes harms its economy due to oil price fluctuations. To benefit, therefore, from trading with its partners Nigeria needs to diversify its export base to non-oil sectors of the economy. This it can do by developing those sectors and improve the products thereof to meet the international demands for those products.

References

Adeniran, T., (1989). *Nigeria and Great Britain*, in *Nigeria since independence. The First 25 Years: International Relations,* (Eds., Akinyemi, A. B., Agbi, S. O., Otubanjo, A. O.), Heinemann, Ibadan, pp. 31-43.

Adeniyi, O., Omisakin, O. and Oyinlola, A., (2011). Exchange rate and trade balance in the West African Monetary Zone: Is there a J-Curve? *The International Journal of Applied Economics and Finance*, Vol. 5, No. 3, pp. 167–76.

Agada G. I., (2003). *Nigeria–US. relations in the 21st century*. An Unpublished M.Sc. Thesis. Department of political science, University of Nigeria, Nsukka

Agubamah, E., (2014). Bilateral relations: periscoping Nigeria and China relations. *European Scientific Journal*, Vol. 10, No. 14, pp. 63-70.

Akinbi, J. O., (2006). *Anglo-Nigerian Economic Relations, 1960-1990.* An Unpublished PhD Thesis, University of Benin, Benin City, Nigeria, pp. 8-69.

Akinbi, J. O., (2015). Towards an understanding of the dynamics of Anglo-Nigerian trade relations, 1971-1990. *International Journal of Developing and Emerging Economies,* Vol. 3, No. 4, pp. 14-29.

Akpabsung A. O., and Babalola S. J., (2013). Effects of real exchange rate on trade balance: Empirical Evidence from Nigeria. *Asian Journal of Empirical Research,* 3(5), 605-617.

Alemu, A. M., and Lee, J. S. (2014). Is currency depreciation always good for improving trade balance? An empirical analysis of selected Asian economies. *Indian Journal of Finance*, *8*(7), 7-17.

Aliyu, A. J., and Tijani, S. M., (2015). Asymmetric cointegration between exchange rate and trade balance in Nigeria. *Cogent Economies and Finance*, 3: 1-19.

Anoke, C. I., Odo, S. I. and Ogbonna, B. C., (2016). Effect of exchange rate depreciation on the trade balance in Nigeria. IOSR *Journal of Humanities and Social Sciences*, 21(3), 72-81.

Arndt, H. W., and Dorrance, G. (1987). The J-curve. *Australian Economic Review*, *20*(1), 9-19.

Bahmani-Oskoee, M., and Kantiapong, T., (2001). Bilateral J-Curve between Thailand and her trading partners. *Journal of Economic Development*, Vol. 26, No. 2, pp. 107 – 117

Bahmani-Oskooee, M. (1985). Devaluation and the J-Curve: some evidence from LDCs. *Review of Economics and Statistics* 67 (3): 500–504.

Bahmani-Oskooee, M. (1989a). Devaluation and the J-Curve: some evidence from LDCs: errata. *The Review of Economics and Statistics*, 71, 553–4.

Bahmani-Oskooee, M. (1989b). Effects of the US government budget on its current account: an empirical inquiry. *Quarterly Review of Economics and Statistics*, 29, 76–91.

Bahmani-Oskooee, M. and Baek, J., (2016). Does exchange rate changes have symmetric or asymmetric effects on the trade balance? Evidence from US-Korean Commodity Trade. *Journal of Asian Economics,* 1-27.

Bahmani-Oskooee, M., and Kara, O. (2005). Income and price elasticities of trade: some new estimates. *The International Trade Journal*, *19*(2), 165-178.

Bahmani-Oskooee, M. and Wang, Y., (2007). The J-Curve at the industry level: Evidence from trade between U.S. and Australia. *Australian Economic Papers*, 46, 315-328.

Bahmani-Oskooee, M., and Fariditavana, H., (2015). Nonlinear ARDL approach, asymmetric effects and the J-Curve. *Journal of Economic Studies*, Vol. 42 Issue 3 pp. 1-19.

Bahmani-Oskooee, M., and Fariditavana, H. (2016). Nonlinear ARDL approach and the J-Curve phenomenon. *Open Economies Review*, *27*(1), 51-70.

Bahmani-Oskooee, M., Bose, N. and Zhang, Y., (2017). Asymmetric cointegration, nonlinear ARDL and the J-Curve: A bilateral analysis of China and its 21 trading partners. *Emerging Markets Finance and Trade,* DOI: 10.1080/1540496X.2017.1373337

Bahmani-Oskooee, M., Ghodsi, S. H., and Halicioglu, F. (2017). UK trade balance with its trading partners: An Asymmetry Analysis. *Economic Analysis and Policy*, *56*, 188-199.

Bussiere, M. (2013). Exchange rate pass-through to trade prices: the role of nonlinearities and asymmetries. *Oxford Bulletin of Economics and Statistics* 75 (5): 731–758.
estimates", *International Trade Journal,* 19, 165-178.

Guardian Newspaper (2017). Why Nigerian agric produce is rejected at the international market. September 11, Lagos, Nigeria, https://guardian.ng/interview/why-nigerian-agric-produce-are-rejected-at-international-market/

Guechari, Y., (2012). An empirical study on the effects of real effective exchange rate on Algeria's trade balance. *International Journal of Financial Research*, Vol. 3, No. 4, pp. 102-115

Hacker, R.S. and J.A. Hatemi (2003). Is the J-Curve effect observable for Small North European economies? *Open Economies Review*, 14, 119-134.

Halicioglu, F. (2007). The J-Curve dynamics of Turkish bilateral trade: A cointegration approach. *Journal of Economic Studies*, 34, 103-119.

Ibrahim, T. R., Akinbobola, T. O. and Ikotun, J. A., (2017). Exchange rate reform policies and trade balance in Nigeria. *European Journal of Business and Management*, Vol. 9, No. 7, 33-45

Igue, N. N., and Ogunleye, T. S. (2014). Impact of real exchange rate on trade balance in Nigeria. *African Development Review, 26*, 347–358

Ivanovski, K., Churchill, S. A. and Nuhu, A. S., (2017). Modelling the Australian J-Curve: An ARDL cointegration approach. 10.13140/RG.2.2.17974.19521, https://www.researchgate.net/publication/318947825

Loto, M. A., (2011). Does devaluation improve the trade balance in Nigeria? (A test of the Marshall-Leaner condition). *Journal of Economics and International Finance*, Vol. 3(11), pp. 623-633).

Magee, S. P., (1973). Currency contracts, pass through and devaluation. *Brooking Papers on Economic Activity*, 1, 303–25.

Moura, G., and Da Silva, S. (2005). Is there a Brazilian J-Curve. *Economics Bulletin, 6*(10), 1-17.

Narayan, P. K., (2006). Examining the relationship between trade balance and exchange rate: The case of China's trade with the USA. *Applied Economics Letters*, 13:8, 507-510.

Nnadozie, O. O., (2017). Asymmetric effects of exchange rate on Nigeria's trade balance: A nonlinear autoregressive distributed lag (NARDL) approach. *West African Financial and Economic Review*, Vol. 17, No. 2, pp.23-44.

Nusair, S. A., (2016). The J-Curve phenomenon in European transition economies: A nonlinear ARDL approach. *International Review of Applied Economics*, DOI: 10.1080/02692171.2016.1214109

Odeh, L. M., (2014). Dynamic of China-Nigeria Economic Relations since 1971. *Journal of the Historical Society of Nigeria*, Vol. 23, pp. 150-162.

Ogbona, S., (2012). *An Analysis of Nigeria-US Relations, 1999-2009.* An Unpublished Master Thesis.

Ogbonna, B. C. (2009). Long Run Exchange Rate Effects on Trade Balance: Evidence from Nigeria. *Journal of Research in National Development*, Vol. 7, No. 1, pp. 127–36.

Ogbonna, B. C. (2011). The Impact of Exchange Rate Variations on Trade Balance: Evidence from Nigeria. *Journal of Research in National Development,* Vol. 9, No. 2b, pp. 393– 403.

Ogbonna, M. N., (1982). Devaluation of the naira in Nigeria. *Asian Economic Review*, 24, 19–43

Ogunkola, E. O., Bankole, A. S., and Adewuyi, A. O., (2008). *China-Nigeria Economic Relations, AERC Scoping Studies on China-Africa Relations*. Report Submitted to the African Economic Research Consortium (AERC).

Onuoha, J., (2005). The National Question and Politics of Nigeria- United States Relations *Nigerian Journal of Social Sciences*, Vol.3, No 1.

Pesaran, H. Shin, Y. and Smith, R. J., (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, 289-326

Rose, A. K., and Yellen, J. I., (1989). Is there a J-Curve?. *Journal of Monetary Economics,* 24, 53-68.

Shin, Y., Yu, B., and Greenwood-Nimmo, M. (2014). Modelling asymmetric co-integration and dynamic multipliers in a nonlinear ARDL Framework. In W. H. (Eds), *The festchrift in honor of Peter Schmidt: Econometric methods and applications* (pp. 281-314). New York: Springer.

Udeala, S. O., (2010). Nigeria-China Economic Relations under the South-South Cooperation. *African Journal of International Affairs*, Vol. 13, No. 1 & 2, pp. 61-88.

Umoru, D. and Eboreimi, M. I., (2013). J-Curve hypothesis and the Nigerian oil sector: The ARDL bounds testing approach. *European Scientific Journal*, 9(4) 314-332