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THE J-CURVE HYPOTHESIS: AN INVESTIGATION OF BILATERAL TRADE BETWEEN NIGERIA AND EUROPEAN UNION

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Abstract This study investigates bilateral J-curve in the short-run and the Marshall-Lerner (ML) condition in the long-run between Nigeria and European Union 15 in particular and between Nigeria and each of the EU15 countries. Covering 1999:Q1–2012:Q4 period and employing Autoregressive Distributed Lag approach, this study found no evidence of the J-curve and that the Marshall–Lerner condition is not satisfied in bilateral case between Nigeria and EU15, but found evidence of the J-curve in bilateral cases between Nigeria and each of Austria, Denmark, Germany and Italy in the short-run, while in the long-run, the Marshall-Lerner condition exists only in the case of Luxemburg. The study concludes that to improve Nigeria's trade balance, the naira is to be appreciated against the currencies of EU15 countries.

Keywords: J-curve, Marshall-Lerner (ML) condition**,** Trade balance, Exchange rate, Nigeria, European Union
JEL Classification: F14, F31

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1. Introduction

The earlier literature on the relationship between terms of trade and trade balance in international economics concentrated on the investigation of Marshall-Lerner (ML) condition-named after the two economists who discovered it independently, Alfred Marshall (1842-1924) and Abba Lerner (1903-1982), which postulates that for a country to benefit from currency devaluation, the absolute sum of elasticities of import demand and export demand must be greater than unitary. While this condition is a long-run phenomenon, the more recent literature explains the short-run post devaluation behaviour of the relationship. This started with the work of Maggi (1973) who first explained the short-run post-devaluation behaviour of the U.S. trade balance. He observed that the U.S. trade balance continued to deteriorate despite the authorities' effort to control it through further devaluation in the short-run. He then explained the phenomenon and highlighted that the consequences ware resulted due to the lags of *currency contracts*, *pass-through*, and *quantity adjustments* transitions. He showed that these dynamics of the response of balance of trade to currency depreciation trace out a j-shaped time path, which he eventually coined as 'J-curve'.

In the last four decades, three consequent groups of studies on the J-curve phenomenon emerged. The first group employed aggregate data by investigating the relationship between a reporting country and the rest of world. The second group used disaggregated bilateral data between a reporting country and its major trading partner(s), while the more recent studies disaggregated the data further to analyse the bilateral trade data at commodity/industry level.
To date in Nigeria, the literature on J-curve phenomenon attracted little scholarly attention and all the studies to the best of our knowledge used aggregate data and ended with mixed

conclusions.This study will try to bridge the gap to investigate the existence of the bilateral J-curve by analyzing both the short-run and the long-run impacts of exchange rate changes on bilateral trade between Nigeria and its major trading partner E.U[1] and then disaggregating the study further by investigating the existence of the phenomenon between Nigeria and each of the countries that made up E.U.15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, U.K).

This study is structured as follows. In the next section we reviewed the relevant literature on the J-curve phenomenon. Following the literature review, we discuss the trade balance model. Data description and data sources are in the subsequent section. The empirical estimation procedures and results are presented and discussed in the succeeding section, and finally, conclusions are drawn in the closing section.

2. Literature Review

The J-curve hypothesis has gained relevance since the end of the Bretton Woods System in 1973 (Kulkarni and Clarke, 2009). The work of Magee (1973) is believed to be the first work on testing the J-curve hypothesis in the international economics literature (Bahmani-Oskooee and Goswami, 2003). All the studies that follow that of Magee (1973) up to the work of Rose and Yellen in 1989 employed aggregated data to explain the hypothesis. These studies play a greater role in shaping the concept of the J-curve hypothesis, for example see the work of: Magee (1973), Junz and Rhomberg (1973), Miles (1979), Kruger (1983), Himarios (1985), Bahmani-Oskooee (1985), Brissimis and Leventankis (1989), Bahmani-Oskooee (1989a). Some empirical studies include:

In his search for the phenomenon, Bahmani-Oskooee (1985) conducted a study on four developing nations that employed different exchange rate system between 1973-1980 He maintained that during the study period India and Thailand pegged their currency to U.S.D while Korea used fixed exchange rate system against the U.S.D and subsequently from 1979 moved to managed float rate system and Greece was chosen because it used floating rate system throughout the period under study. He proves that the elasticities condition is no longer the necessary and sufficient conditions for the successful devaluation. He then suggests a short-run procedure for detecting the impacts of currency devaluation on trade balance, but he was careful to say that even though, his results have sound theoretical implication, but it is more of empirical observation than theory.

Rosenweig and Koch (1988) use the U.S. aggregate monthly trade data for the period 1973-1986. They employ Granger Tests of Causality to examine the relative depreciation of the US dollar and the lag in improving the trade balance. They noted that the delayed improvement in the US trade balance has been significantly longer than most economists forecast, which they termed *Delayed J-curve*.

Narayan (2004), examines the evidence of the phenomenon by investigating the casual relationship of real effective exchange rate, real domestic and foreign income on trade balance variables of New Zealand within the Granger causality framework, and also investigates, using the impulse response analysis, whether a J-curve pattern exists for New Zealand over the 1970–2000 period. He adopts ARDL approach to cointegration. His results show that New Zealand’s trade balance, REER and domestic income and foreign income are not cointegrated, that there is a casual connection in both directions between trade balance and foreign income, the existence of a one way link from trade balance to real effective exchange rate, but still there is clear evidence for the existence of the J-curve path for New Zealand's trade balance.

Rose and Yellen (1989) bring out the shortcomings associated with models using aggregate data and introduced a simple model using bilateral trade data of U.S. Their main arguments are that when one uses disaggregated data, (1) he does not require to construct the proxy of the rest-of-the-world income variable which is very cumbersome and may not be reliable, and (2) aggregation bias is also limited. Their study uses U.S and its seven major trading partners' quarterly data for the period of 1963–1988. Although, when they test the cointegration, they employed OLS technique, but no statistically reliable evidence of a stable J-curve is detected because of several deficiencies they encountered as noted by Bahmani-Oskooee and Brooks (1999).

Bahmani-Oskooee and Brooks (1999), employ ARDL approach to cointegration and error correction modelling on U.S. and her six major trading partners' trade data in their study, using quarterly trade data for the period 1973Q1–1996Q2. They reached a conclusion that, although they couldn't provide any evidence of J-curve in the short-run, but their results suggest that the U.S trade balance has long-run favourable advantage after dollar depreciation against the currencies of her six major trading partners.

Hacker and Hatemi-J (2003) tests the J-curve for five North European countries, viz. Belgium, Denmark, Netherlands, Norway, and Sweden. They employed generalized impulse response functions. Their results provide empirical support for the J-curve in the short-run and in the long-run export-import ratio appears to be higher than the low point of its early dip in almost all cases. The study also shows that, in the majority of the cases, the export-import ratio appears in many periods after the depreciation to be converging from below to a higher long-run equilibrium.

Bahmani-Oskooee, Economidou & Goswamin (2006) observe the existence of J-curve between the United Kingdom and her twenty major trading partners between the period of 1973:1-2001:3. They employ ARDL approach for cointegration on U.K imports and exports trade data. They were able to detect the phenomenon in only two cases in the short-run, and the long-run, the result is not equally helping as the trade balance appeared favourable in five cases out of twenty.

Following the inherent mixed conclusions from the first group of the literature that employs aggregate data and the second group that adopts the bilateral data, a new group emerged in the J-curve literature and started gaining momentum from the end of the last decade. The first work in this category is the work of Ardalani and Bahmani-Oskooee (2007), when they propose to disaggregate the trade data by employing imports and exports at the commodity level. Through the data bank of the Bureau of Census (of U.S.), they were able to identify 66 commodity groupings for which monthly data from January 1991 till August 2002 were available. They employ error-correction modelling technique. Their results were unable to find strong support for the J-curve phenomenon (as the phenomenon prevailed only in 6 out of 66 industries), whereas, in the long-run, effects of real depreciation of the dollar were favourable at least in 22 industries.

Some other studies in this group are conducted by Yazici and Islam (2011), and also conducted by Soleymani and Saboori (2012). Yazici and Islam (2011)investigate the short-run and long-run impact of exchange rate and customs union on the trade balance at commodity-group level of Turkey with EU (15) for the period of 1982:I to 2001:IV. They employ Bounds testing approach and adopt a new strategy in the model selection phase to ensure that optimal model is selected from those models satisfying both diagnostics and cointegration. Their results indicate that in the short-run exchange rate matters in determination of trade balance of 13 commodity groups out of 21 and customs union in 8 cases. In the short-run no J-curve effect is observed in any of industries, while for the long-run effect, real depreciation of Turkish Lira and customs union have not significantly affected trade balance of any of industries. Thus their finding suggests that exchange rate policy can't be used as a policy tool to improve the trade balance. They then conclude that the factors that are significant determinants of trade balances of Turkish industries in the long-run are Turkish and EU (15) real incomes.

Soleymani and Saboori (2012) consider 67 industries (2-digit and 3-digit SITC classifications) bilateral trade data between Malaysia and Japan for the period of 1974 – 2009, and investigate the J-curve phenomenon and the long-run effect of the real depreciation of Malay ringgit against Japanese yen on the trade balance of those industries. They employ the Bounds testing approach to cointegration and error-correction modelling. Their findings suggest that, although the majority of the industries are affected by the real ringgit depreciation in the short-run, but the phenomenon exits in only twenty-two industries while the short-run effects turn into the favourable long-run effects in twenty-four cases.

The studies on this phenomenon about Nigeria are very scanty and all the studies reviewed in this work use aggregated data to test the existence of hypothesis in the Nigerian economy. Thus, results of these studies ended with mixed conclusions possibly due to aggregation bias. These studies include Oyinlola et al (2010) who apply the bounds testing (ARDL) approach to cointegration to analyze Nigeria's trade data between 1980:I to 2007:IV. Their empirical results indicate that real domestic and real foreign incomes affect Nigeria's trade balance both in the short-run and in the long-run, but that the naira depreciation/devaluation affects her trade balance only in the long-run, suggesting that the M-L condition is satisfied.

The above study is reinforced by Bahmani-Oskooee and Gelan (2012) who test the J-curve hypothesis for nine African countries for the period 1971Q1–2008Q1 (in the case of Nigeria) using the bounds testing approach to co-integration and error-correction modelling. They were unable to find any support for the short-run J-curve effect in all countries studied. But they found that a real depreciation is expected to improve the trade balance in the long run in the case of Egypt, Nigeria, and South Africa while for Burundi, Kenya, Mauritius, Morocco, Sierra Leone and Tanzania real depreciation seems to have no long-run favourable impact on the trade balance.

But one recent study of Akonji et al (2013), found the evidence of J-curve in Nigeria. They employ Co-integration, Vector Auto regression Estimate, Granger Causality and Variance Decomposition to analyze the hypothesis to test the impact of depreciation of naira on the trade balance in the Nigeria economy for the period 1980-2010. They found that J-curve hypothesis do exist in the Nigeria economy, as their study shows that there is absence of long-run relationships among variables under consideration, but found that there is short run relationship between exchange rate devaluation and trade balance through Granger causality test and therefore confirming the existence of J-curve hypothesis, that is, domestic currency devaluation have bi-directional effect on trade balance in the short-run but with little effect in the long-run. They therefore, recommend the need to diversify the sources of foreign exchange apart from petroleum sector, so as to benefit from the initial devaluation of the domestic currency, in term of increasing Nigeria's exports earnings.

Most of the studies on this phenomenon relevant to the European Union employed either trade data at bilateral level or at industry level. One of them is Hsing (2009) who tests the J-curve for the bilateral trade between six selected new EU countries and US. He employs the Johansen co-integration test and the generalized impulse response function based on the vector error-correction model. He finds that the J-curve is not empirically confirmed for any of these new EU countries. But rather, after a shock to real depreciation, the trade balance improves in the case of Czech Republic, but deteriorates for Hungary, Poland, Slovakia, and Slovenia, while it improves first and then deteriorates for Croatia. Estimated co-integrating equations show that except for the Czech Republic, currency real depreciation deteriorates the trade balance for the other five countries in the long run.

Bahmani–Oskooee and Hosny (2012) use Egypt's quarterly data for commodity trade with her major trading partner, the European Union (EU) for the period 1994I–2007IV, and employ the bounds testing approach to test the impact of currency depreciation on trade balance. The results reveal the evidence of J-curve phenomenon in 24 out of the 59 industries that trade between the two regions.

Verheyen (2012) found evidence of cointegration in more than 75% of cases. He observes on the $/€ exchange volatility effect on exports from eleven euro zone countries to the US using monthly data for the period 1996 M02 - 2009 M10. He employed the ARDL bounds testing approach for cointegration on disaggregated SITC export categories. His results suggest that if exchange rate volatility does exert a significant influence, it is typically negative. Furthermore, the exports most often negatively affected seem to be those of SITC categories 6 and 7.

3. Trade Balance Model

The trade balance model proposed by Rose and Yellen (1989) later used by Bahmani-Oskooee (1991), and echoed by Bahmani-Oskooee and Brooks (1999) which models the real trade balance to be a direct function of the real domestic income, real foreign income and real effective exchange rate, is closely followed in this study as it has become popular among researchers.[2] It is given below:

$$\ln TB_t = \alpha + \lambda \ln REEX_t + \beta \ln Y_{N,t} + \gamma \ln Y_{EU,t} + \varepsilon_t \qquad (1)$$

Where the measure of the trade balance at time t (TB_t) is defined as the ratio of Nigeria's nominal exports to E.U.(15)over her nominal imports from the same group of countries.[3]The ratio is used to make the measure of trade balance unit free (Bahmani-Oskooee, 1991). He argues that this method is sensitive-free to units of measurement, and that it also detects the rate of change of either nominal or real trade balance. The method also helps one to present the model in log specifications, thus the first differenced variables can quantify and measure the rate of movement or change. Y_{Nt} is the Nigeria's real GDP, Y_{EUt} is the real GDP of Nigeria's trading partner (EU15), and $REEX_t$ is the real bilateral effective exchange rate defined in a way that an increase reflects a real depreciation of the naira against the currency of a trading partner and ε_t is an error term. Considering the signs in equation (1), we expect the estimate of λ to be positive implying that real depreciation of naira (i.e. increase in $REEX_t$) encourages Nigeria to export more and imports less, hence, improvement in its trade balance. This positive sign of λ is an indication that the ML condition is satisfied in the long-run. But for β and γ, we expect their estimates to be either positive or negative, implying that supply side factors may dominate the demand side or the reverse may be the case. That is to say, if the increase in the domestic income is due to increase in production of locally manufactured substitutes of foreign goods, the estimate of β is to be positive indicating improvement in Nigeria's trade balance. But if the increase in the domestic income is to encourage importation of foreign goods, the coefficient will be negative, signifying deterioration of trade balance. On the other hand, the estimate of γ shall be positive if the increase in the national income of a partner encourages importation from Nigeria, or be negative if the increase of the partner's national income is due to increase in production of locally manufactured substitutes. It is very important at this point to note that to detect the J-curve phenomenon we expect the values of λ to be negative and significant at the lower level and then followed by the positive ones at higher levels in the short-run. For us to test the phenomenon, we incorporate the short-run dynamics into the long-run model. Therefore, we employ bounds testing approach to cointegration, that is, Autoregressive Distributive Lag – ARDL approach to cointegration introduced by Pesaran et al. (2001). This approach has econometric superiority over other cointegration procedures. First, the estimates from small sample sizes are super consistent (Narayan 2004).Second, "the approach allows us to distinguish the short-run effects from the long-run effects simultaneously" (Bahmani-Oskooee, and Kovyryalova 2008). It also has the advantage of avoiding the classification of variables into I(1) or I(0), hence, there is no need for unit root pre-testing(Bahmani-Oskooee and Brooks 1999). The ARDL error correction model specifications of the variables in (1) is

$$\Delta \ln TB_t = \alpha_0 + \sum_{j=0}^{k} \lambda_j \Delta \ln REEX_{t-j} + \sum_{j=0}^{l} \beta_j \Delta \ln Y_{N,t-j} + \sum_{j=0}^{m} \gamma_j \Delta \ln Y_{EU,t-j} + \sum_{j=1}^{n} \theta_i \Delta \ln TB_{t-j} + \delta_1 \ln REEX_{t-1} + \delta_2 \ln Y_{N,t-1} + \delta_3 \ln Y_{EU,t-1} + \delta_4 \ln TB_{t-1} + \varepsilon_t \quad (2)$$

In the above model, k,l,m,n stand for the lag lengths. Thus, we detect the short-run effect of real depreciation of naira on Nigeria's trade balance by the sign and significance of λs, that is, we can obtain the evidence of J-curve if negative estimate(s) of λs at earlier lags preceded the subsequent positive one(s), while the sign and significance of $\delta_1$normalizedon δ_4 indicates the long-run effect. The ARDL procedure then involves two stages. Firstly, the null hypothesis of 'non-existence of the long-run relationship' defined by H_0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ is tested against the alternative of H_1: $\delta_1 \neq 0$ or $\delta_2 \neq 0$ or $\delta_3 \neq 0$ or $\delta_4 \neq 0$. The relevant statistic to test the null is the familiar F-statistic. The distribution of this F-statistic is non-standard irrespective of whether the variables are I(0) or I(1) (Bahmani-Oskooee and Brooks 1999). Therefore, we compare our computed F-statistic results with critical values provided in Pesaran *et al*(2001 Table CI(iii) Case III pp.300)to accept or reject H_0. In this table, there are two separate sets of values in which one assumes the variables to be I(0) and the other assumes them to be I(1). To test cointegration, we reject the null hypothesis of no cointegration (H_0) if the computed F-statistics results are greater than the upper bounds critical values, and accept it if the result is less than the lower critical value, while if the computed F-statistics result is in between the two bounds, the results become inconclusive, thus we may use error correction model (ECM) suggested by Kremers *et al*. (1992) to detect cointegration in such an inconclusive case. But in this study we follow a slightly different procedure using a new strategy[4] in finding the model for the estimation which is proposed and first put into use by Yazici and Islam (2011).Their new strategy in finding the model for the estimation works like this: the maximum lag length on each first differenced variable in the error correction version of the ARDL model (as in equation 2 in this study) is set at let's say 10. The model corresponding to each possible lag combination is to be estimated and then those combinations that satisfy the diagnostic tests of normality, no serial correlation and no heteroscedasticty at least at 10 % level should be selected. In case no cointegration is established for a combination, it is discarded. Then, in order to determine the optimal model, AIC is to be applied to the set of those lag combinations that satisfy diagnostic tests and at the same time indicate a cointegration. They also determined the optimal lag combinations that would have been selected had the method of the previous literature is adopted. Their report shows that out of 15 cases, it is only in three cases that all four conditions they impose are satisfied simultaneously. In other 12 cases at least one of the conditions fails with the previous literature.

4. Data Description and Data Sources

The data used in this study is the quarterly bilateral trade data between Nigeria and E.U.15 for the period of 1999:1-2012:4.[5] The bilateral exchange rates between naira and euro, naira and Danish krone, naira and sterling pound, naira and Greek drachma, and naira and Swedish krona for the study period are used. The Nigeria's GDP and CPI and that of respective E.U members are equally sourced.

The import, export and trade volume data for both Nigeria and respective E.U members (all values in euro) covering the study period are sourced from Eurostat. The Nigeria's GDP (quarterly gross domestic product at current basic prices in ₦$'m$) is sourced from the Central Bank of Nigeria (CBN), while that of E.U members are seasonally adjusted and adjusted data by working days at current basic prices in €$'m$, sourced from Eurostat.The CPI for Nigeria is sourced from National Bureau of Statistics (Nigerianstat), and the source for E.U members is Eurostat, except Greek and Swedish CPIs. The Greek's for the first eight quarters (1999:1-2000:4) that are not available there, are sourced from Greek statistics page[6], while the Swedish which is also not available in Eurostat is sourced from Swedish statistics page[7]for the whole period under study. All the CPIs are indexed to year 2000.

5. The Empirical Estimation Procedures and Results

In this study we start with applying the F-test, as it is the known fact that the number of lags imposed on the first differenced variables could influence the results as demonstrated by Bahmani-Oskooee and Brooks (1999). Therefore, following Bahmani-Oskooee and Gelan (2006) and Ardalani and Bahmani-Oskooee (2007) we carry the F-test by varying the order of lag lengths from the minimum of four lags to a maximum of nine lags (which is the maximum lag order that can be accommodated by our data size) on each first-differenced variable. We then follow the procedure of the new strategy adopted by Yazici and Islam (2011) to select the optimum number of lags in the model selection phase and select the optimal model from the set of those models that satisfy both diagnostic tests (of normality, no serial correlation and no heteroscedasticty at least at 10 % level) and cointegration in order to ensure that a statistically reliable and cointegrated model is picked up for estimation. In order to determine the optimal model, Akaike Information Criteria (AIC) has been applied to the set of those lag combinations that satisfy diagnostic tests and at the same time indicate a cointegration. It should be noted that lags are imposed without any pre-determined condition to determine maximum lag length, as argued by Bahmani-Oskooee, and Goswami (2003), that "lags are imposed arbitrarily without using any criterion to search for optimum length". As suggested by Pesaran et. al. (2001) we select the orders of an ARDL model specified as ARDL (k,l,m,n) representing the lags belonging to four variables (TB, RER, Y_N, $Y_{E.U}$) by searching across $(p+1)^k = (p+1)^4$ ARDL estimations where k is the number of variables included in Equation (1), p is the lag order chosen in the previous stage and reported in Table 2, spanning by p=0, 1, …9,.

It can be observed from Table 1 that as the number of lags are varied so the outcomes of the four conditions (tests), e.g. when the maximum lag is set at four, out of sixteen cases, four cases (Austria, Denmark, Ireland and Sweden) failed the tests (diagnostic and cointegration tests), therefore, those that failed are discarded. But when the maximum lag is increased to six, only one case (France) failed the tests. At the maximum lag of eight and nine all the sixteen cases passed the tests suggesting that any of the two can be chosen. In this study, the most meaningful result between the two (i.e. 8 & 9) is picked for analysis, that is to say the result that appears likely predictable in theory is chosen from the two for analysis in this study except in the case of Luxemburg where the maximum lag of six appeared to be more stable than others. This can be observed from Table 2.

Having done so, we now investigate the j-curve phenomenon. For brevity of presentation, we report the coefficient estimates of the lagged first differenced real exchange rate only so that we can analyze the J-curve pattern in the short-run. The sign of the coefficient of the exchange rate determines the existence of the J-curve effect. That is, an initially (at least one lagged) negative coefficient that is significant at least at the 10% level followed by a significant positive one(s) on the lag coefficients would be consistent with the J-curve phenomenon.

From Table 3, we start with the aggregate (E.U 15) results in our short-run analysis. We can observe that the lagged coefficient of the real exchange rate ($\Delta \ln REEX$) is neither negative nor significant signifying that the real depreciation of naira against the currencies of this group of countries has no short run effects on the bilateral trade balances between Nigeria and this group of countries. Therefore with this result the J-curve is said to be unobservable between Nigeria and E.U.15. To do away with the aggregation bias, these countries are considered at individual levels to observe whether the phenomenon exists.

In the case of Austria, movements in the value of $\Delta \ln REX$ variable results in significant changes in its bilateral trade balance with Nigeria in many of the subsequent lags. In the first quarter following a real depreciation of naira, the trade balance depreciates immediately with 5% level of significance, and consequently this effect reverses and turns to positive effects in the 2^{nd}, 4^{th} and 7^{th} lags respectively. The 3^{rd}, 5^{th} and 6^{th} lags are not considered in the decision criteria building as they are insignificant. This result forms a typical text book J curve as the negative impact on trade balance is preceded the positive sequent ones. Similarly, the same trade balance behaviour is detected in the bilateral trade between Nigeria and Germany, that is, as naira depreciates against euro trade balance deteriorates from the first quarter and then improves immediately. A similar result is also detected in the case of Denmark, as deterioration starts right from the first quarter following the depreciation of naira against Danish krona and immediately starts improving in the second quarter suggesting that the phenomenon exists. The same story could be told on the bilateral trade between Nigeria and Italy. The trade balance deteriorates immediately following the real depreciation of naira against euro but subsequently improves at the sixth lag. This result is also consistent with the phenomenon.

One may be tempted to form the opinion on the existence of the phenomenon in the cases of Netherlands, Spain and Sweden. Observing Table 3 shows that the results of the coefficients in these cases start with negative and then turn into positives at subsequent lags, but one should not be carried away due to the fact that the coefficients are not statistically significant at the earlier lags even at the 10 percent level (and therefore should not be considered in forming the opinion) suggesting that J-curve effect is not observable in Nigeria's trade with these countries.

Further observation of Table 3 indicates that in the cases of Finland and United Kingdom, there are no specific short-run pattern in that the significant figures start with positive then followed by negative and end with positive again. Thus, this behaviour presupposes that the J-curve does not exist in Nigeria's bilateral trade with these countries.

The J-curve phenomenon cannot be observed in the bilateral trade between Nigeria and Luxemburg, as the coefficient of $\Delta \ln REX$ appear to be insignificant following the naira depreciation against euro, implying that the real depreciation of naira has no effect on the bilateral trade balance between Nigeria and Luxemburg at least in the short run.

In the bilateral trade balance between Nigeria and each of the Belgium, Greece, Ireland and Portugal, the exchange rate carries at least one significant negative coefficient, indicating that exchange rate is a major factor in Nigeria trade to each of these countries' markets in the short-run, meaning that real depreciation of naira leads to the deterioration of Nigeria's bilateral trade balance with each of these countries in the short-run. Even though, the evidence of classical J-curve as explained by Maggi (1973), that the trade balance deteriorates and then improves following the real depreciation of currency in the short-run, cannot be detected in these cases but we can still detect the phenomenon if the J-curve is defined to reflect short-run deterioration and long-run improvement as put forward by Rose and Yellen (1989), therefore, we need to look at the long-run impact of currency depreciation and combine it with the short-run to form further opinions.

In the case of France the real depreciation of naira against euro improves Nigeria's trade balance in the short-run, contradicting the theoretical expectation as can be observed from Table 3.

These analyses highlight the significance of analyzing bilateral data versus aggregate data because aggregate data may fail to reveal some of the important relationships that could have exist at bilateral levels.

On the other hand, the long run impacts of a real depreciation on the trade balances specified in (1) and incorporated in to (2)is inferred by the size and significance of δ_1 that is normalized on δ_4(Ardalani and Bahmani-Oskooee, 2007, Bahmani-Oskooee and Bolhasani, 2008). Therefore, we report the estimates of δ_1, δ_2, δ_3, and δ_4 that were used to form the error-correction term from equation (2) in Table 4.
As expected from the literature, the impact of real exchange rate depreciation on trade balance leads to a rise in the real exchange rate, paving the way for an improvement in the trade balance. An increase in real domestic income will stimulate imports and the coefficient of the domestic income is expected to be negative. If, however, the increase in the domestic income is due to an increase in the production of import-substitute goods, the impact on the trade balance of the domestic income will be positive. While a rise in the trading partner's real income will increase the exports and therefore the trade balance will improve. Like in the case of domestic income, if the rise in the partner's income is resulting from the increase in the production of import-substitutes, the effect on the trade balance will be negative.

From our analysis, the long-run results revealed that the real depreciation of naira against the currencies of those countries that made up the group of E.U 15 has an unfavourable impacts on the Nigeria's trade balance with this group of countries in the long-run as can be observed from the table that the *lnREEX* has negative and significant coefficient after the real devaluation of naira against the currencies of these countries implying that at least at the bilateral trade level with this group of countries, exchange rate is a significant determinant of the corresponding trade balance. This result reveals that the Marshall-Lerner (ML) condition does not hold.

This aggregate result is not surprising looking at the fact that real depreciation of naira against the currencies of those countries deteriorates Nigeria's trade balance in ten out of fifteen bilateral cases, while in one case the trade balance appears favourable to Nigeria, the other four cases remained unaffected by changes in real exchange of naira against euro.

To put it in details, our results show that in the long run, the real depreciation of naira exchange rate against these currencies is significantly effective on the bilateral trade balances of Nigeria with 11 countries in this group. But while in the 10 cases out of the 11 (Austria, Denmark, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, and United Kingdom) the real depreciation of naira brings unfavourable outcome on the Nigeria's trade balance contradicting the literature, in the remaining case (of Luxemburg) it leads to favourable balance of trade as presupposes theoretically and equally satisfies the Marshall-Lerner (ML) condition. While for the remaining four bilateral cases (Belgium, Finland, Greece and Portugal), the Nigeria's trade balance does not respond to real exchange rate changes in the long run, indicating that exchange rate policy can't be used effectively here to improve the bilateral trade balance with this group of four countries.

If we are to form our opinion based on the 'new definition', we can detect the 'inverse J-curve' in the cases of France, Netherlands, Spain and Sweden. Examining their cases in both Table 3 and Table 4 reveal that the coefficients appeared to be positive and statistically significant at 10% or 5% at 2^{nd} and 4^{th}lags for France, 2^{nd}, 3^{rd}, 4^{th}, and 6^{th} for Netherlands, 3^{rd}, 4^{th} and 7^{th} for Spain and 7^{th}, 9^{th} and 10^{th} for Sweden respectively in the short run, while in the long-run the result turns to be negative and significant in all case, thus combining the two results suggests that the inverse phenomena are also observable in these cases.

The Nigeria's (domestic) real income plays a significant role in the determination of Nigeria's bilateral trade balance with E.U.15 in the long-run, as increase of Nigeria's domestic income is mostly as a result of increase in domestic production of substitute goods as suggested in the literature, leading to the improvement in trade balance. But this result is biased at aggregate level. We therefore minimize this bias and re-examine these countries bilaterally as can be observed from Table 4. It appears that it is only in the cases of Portugal and United Kingdom that increase in Nigeria's real income encourages importation resulting in deterioration in its bilateral trade balances in the long run, but in other seven cases (Belgium, Finland, Greece, Ireland, Italy, Luxemburg and Netherlands) increases in domestic real income brings about improvements in the trade balances. This might be resulted from an improvement in the domestic production of the foreign goods substitutes as explained in the theory. Whereas, in the remaining cases (i.e. Austria, Denmark, France, Germany, Spain and Sweden), Nigeria's (domestic) real income does not play any significant role in the determination of Nigeria's bilateral trade balance with these countries because the results of the coefficients are statistically insignificant, thus, does not have any significant effect on trade balance in the bilateral trade.

The results of the impact of foreign real income (of E.U 15) on the Nigeria's trade balance portrays as $lnY_{E.U.15}$ in Table 4,suggest that foreign income is one of the most important factors that influence the Nigeria's bilateral trade especially with the group of E.U.15. To give lucid explanation, we re-examine the results at bilateral level, the Nigeria's bilateral trade balances respond to the foreign real income in 9 out of 15 countries, while it remains unimportant factor in other 6 cases. Increase in the real income of Portugal, Spain and United Kingdom cause improvement in Nigeria's bilateral trade balance with these countries as they are expected to import more from Nigeria implying that income-effect is relevant here, while on the other hand, the increase in the real domestic income of Austria, Belgium, Finland, Ireland, Luxemburg and Netherlands worsen the Nigeria's trade balance with these countries. This may be due to a theoretical explanation that, an increase in real foreign income in these countries is caused due to the improvement in the domestic production of the products they import from Nigeria thus import less, hence deteriorates the Nigeria's bilateral trade balances, that is substitution-effect is more considerable in these cases.

Furthermore, at the last stage of our analysis, we investigate the stability of the short-run as well as long-run coefficients. Although we have required in the model selection stage that diagnostic tests (for normality, no serial correlation and no heteroscedasticity) be satisfied at least at 10% confidence level, but the evidence of coinegration found in equation (2) is not a confirmation that coefficients estimated are stable as argued by Bahmani-Oskooee and Brooks (1999). Therefore, we follow (Bahmani-Oskooee, and Goswami, 2003) and apply cumulative sum (CUSUM) and cumulative sum of the squared (CUSUMSQ) tests proposed by Brown et al. (1975) for parameter stability tests, as they explain that "The CUSUM and CUSUMSQ statistics are updated recursively and plotted against break points. To ensure stability of all coefficients, the plot of these two statistics must stay within the 5 percent significance level portrayed by two straight lines whose equations are given in Brown et al., 1975, Section 2.3". When the CUSUM and CUSUMSQ statistics are stable they suggest that the parameters of trade balance equation are stable over sample period so that estimated coefficients can be considered stable enough for forecasting and policy analysis as argued by Yazici and Islam (2012). Summary of the inspection of the plots where the resultant statistics are depicted versus the study period can be observed from Table 5 whether CUSUM and CUSUMSQ are stable or unstable, are summarized with letters *S* and *U* representing that the coefficients derived from the bounds testing approach.

As reflected in Table 5, clearly the stability of coefficient estimates is supported in the case of aggregate because the plots of both CUSUM and CUSUMSQ fall within the critical values. The results for the individual seven countries (Belgium, Denmark, France, Luxemburg, Spain, Sweden and U.K) yielded similar outcomes. In other eight cases (Austria, Finland, Germany, Greece, Ireland, Italy, Netherlands, and Portugal), either the CUSUM test or the CUSUMSQ test appeared unstable.

Now that our results establish that, in 15 cases, only 47% of the cases appeared to be stable in both CUSUM and CUSUMSQ tests. But 87% are stable in CUSUM test while 60% are stable in CUSUMSQ test implying that the parameters of trade balance equation are reasonably stable over sample period so that estimated coefficients can be considered for forecasting and policy analysis.

6. Conclusions

All previous researches that investigate the relationship between the trade balance and its determinants in Nigeria employed aggregate data and provided inconclusive results. We are therefore tempted to argue that these inconclusive results could be due to aggregation. In this study we investigate the existence of J-curve phenomenon between Nigeria and her largest trading partner - European Union. To minimize the aggregation bias we employed disaggregated bilateral data of Nigeria and each of these counties that form E.U.15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, U.K) for the period (1999:Q1 – 2012:Q4) to investigate the short-run and the long-run response of the trade balance to naira depreciation against the currencies of these countries. The main conclusions of this study are that, even though at the aggregate level, the J-curve pattern is not detected in the short-run, and that in the long-run real depreciation of the naira against the currencies of E.U.15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, U.K) has negative impact on Nigeria's trade balance with this group of countries and that the Marshall-Lerner (ML) condition does not receive any support. But at bilateral level, the evidence of the phenomenon is found in four cases, viz. Austria, Denmark, Germany and Italy in the short-run, while in the long run the Marshall-Lerner (ML) condition exists only in the case of Luxemburg, suggesting that naira depreciation against the currencies of these countries should not be considered as a good measure to control the Nigeria's bilateral trade balances in most markets of the countries in this group. Furthermore, both domestic and foreign real incomes play a significant role in the determination of Nigeria's trade balance with E.U.15. Therefore, for Nigeria to improve its trade balances against these countries, it should consider the production of import substitute products as an important factor. Moreover, higher inflation rate may be one of the factors that contribute to the failure of currency depreciation to improve the Nigeria's trade balance in the long-run. Therefore, naira appreciation against the currencies of these countries rather than depreciation will favor Nigeria's bilateral trade balances against this group of countries in the long-run.

Endnotes

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1. The E.U.27 has overcome the U.S. to become the Nigeria's major trading partner in recent years. Observations of Appendix A Table A.1 and Table A.4 show that in 2010, Nigeria's major exports partner was U.S.A (34.4% of Nigeria's exports goes to U.S) followed by E.U.27 with 23.1%, although the overall major trading partner to Nigeria was U.S.A busting the trade volume of $37,692.48m between them, but the major import partner in that year was E.U.27. (with 21.8% of the Nigeria's import coming from E.U.27). In 2011 and 2012 E.U.27 happen to be both the major import and major export partner to Nigeria. This can be seen from Table A.2 which portraits Nigeria's imports from E.U. as $15,632.7m and export as $35,759.8m in 2011, while Table A.3 shows the same (import from and export to E.U.27) for 2012 as $8,355.1m and $50,942.9m, respectively.

2. Bahmani-Oskooee and Brooks (1999), Arora, et al (2003),Bahmani-Oskooee, and Goswami, (2003), Bahmani-Oskooee, and Ratha (2004b), Narayan (2004), Bahmani-Oskooee, et al (2006), Halicioglu, (2007), Ardalani and Bahmani-Oskooee (2007), Bahmani-Oskooee and Kovyryalova (2008), Bahmani-Oskooee and Bolhasani (2008), Baek et al (2009), Bahmani-Oskooee, and Kutan,(2009), Nazlioglu and Erdem (2011), Šimáková, J. (2012), Soleymani, and Saboori, (2012), and Umoru and Eboreime (2013) all used the similar trade balance model in their study.

3. In quarters (periods) where no export or imports is made 1€ is assumed to be the value of export/import in order not to lose the information. This is because when the value is zero the value of the ratio will also be zero or undefined when taken as logarithm.

4. An algorithm developed by M. Qamarul Islam (a professor of statistics), Çankaya University, Department of Economics, Ankara, Turkey, is used in this new strategy.

5. Because this is the exact number of the union members as at 1st Jan., 1999 and the date also corresponds with Economic and Monetary Union (Euro-area) establishment date. Using E.U.15

as a proxy of E.U. is also justified as they cover a larger share of the Nigeria's bilateral trade with E.U. From Table 1.5 in Appendix A, the total exports of Nigeria to E.U.15 is $159,345.19m (which is 99.87% of $159,560.55m - total exports to E.U.27) from 1999-2012 while the total import from the E.U.15 is $99,055.04 (which is 96.25% of $102,912.73 - total imports from E.U.27) during the study period.

6. Hellenic Statistical Authority (EL. STAT.)

7. Statistics Sweden

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Table 1: Calculated Diagnostic and Cointegration Tests Results for Different Lag Length Imposed on the First-Differenced Variables.

Trading Partner	Tests	t_{-4}	t_{-6}	t_{-8}	t_{-9}
E.U. 15 (Aggregate)	NORML	1.587(0.452)	1.332(0.514)	3.654(0.161)	3.458(0.177)
	SCORR	6.686(0.153)	4.576(0.334)	6.817(0.146)	4.433(0.351)
	HTSCD	0.007(0.933)	0.584(0.445)	0.008(0.928)	0.015(0.902)
	COINT	4.045*	3.848*	6.324***	6.529***
Austria	NORML	discarded	4.135(0.127)	0.313(0.855)	0.083(0.959)
	SCORR	discarded	5.067(0.281)	7.519(0.111)	7.649(0.105)
	HTSCD	discarded	2.660(0.103)	0.025(0.875)	0.023(0.878)
	COINT	discarded	5.140***	5.959***	6.049***
Belgium	NORML	0.397(0.820)	1.787(0.409)	0.423(0.810)	0.251(0.882)
	SCORR	1.507(0.825)	3.796(0.434)	3.709(0.447)	7.014(0.135)
	HTSCD	1.091(0.296)	0.812(0.367)	0.084(0.772)	1.628(0.202)
	COINT	3.919*	4.039*	4.975**	4.081*
Denmark	NORML	discarded	4.401(0.111)	2.313(0.315)	3.908(0.142)
	SCORR	discarded	4.229(0.376)	6.149(0.188)	6.963(0.138)
	HTSCD	discarded	0.388(0.533)	0.008(0.929)	0.129(0.719)
	COINT	discarded	4.196*	8.373***	9.514***
Finland	NORML	0.518(0.772)	0.016(0.992)	0.158(0.924)	0.092(0.955)
	SCORR	4.669(0.323)	0.811(0.937)	5.285(0.259)	5.455(0.244)
	HTSCD	0.099(0.753)	0.094(0.759)	0.284(0.594)	0.686(0.408)
	COINT	3.913*	3.795*	6.703***	5.726***

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Table 1 Continues

France	NORML	0.046(0.977)	discarded	3.226(0.199)	1.762(0.414)
	SCORR	6.546(0.162)	discarded	6.999(0.136)	6.273(0.180)
	HTSCD	0.013(0.911)	discarded	0.567(0.452)	0.509(0.476)
	COINT	4.188*	discarded	5.392**	6.087***
Germany	NORML	1.153(0.562)	0.042(0.979)	1.492(0.474)	0.310(0.856)
	SCORR	3.460(0.484)	1.885(0.757)	7.201(0.126)	7.587(0.108)
	HTSCD	1.505(0.220)	2.195(0.138)	0.001(0.973)	0.003(0.953)
	COINT	6.296***	6.788***	6.049***	4.928**
Greece	NORML	0.959(0.619)	1.064(0.588)	1.028(0.598)	0.588(0.745)
	SCORR	7.430(0.115)	7.307(0.121)	6.753(0.150)	3.568(0.468)
	HTSCD	0.313(0.576)	0.434(0.510)	0.000(0.987)	0.005(0.942)
	COINT	6.070***	4.595**	4.686**	5.902***
Ireland	NORML	discarded	2.771(0.250)	2.047(0.359)	0.177(0.915)
	SCORR	discarded	3.920(0.417)	7.067(0.132)	4.768(0.312)
	HTSCD	discarded	1.260(0.262)	1.789(0.181)	0.000(0.995)
	COINT	discarded	21.087***	17.617***	13.814***
Italy	NORML	1.226(0.542)	1.765(0.414)	1.300(0.522)	0.535(0.765)
	SCORR	7.207(0.125)	7.026(0.135)	4.356(0.360)	7.014(0.135)
	HTSCD	0.737(0.391)	2.207(0.137)	2.207(0.137)	0.321(0.571)
	COINT	9.177***	12.676***	6.535***	9.359***
Luxemburg	NORML	1.127(0.569)	1.295(0.523)	0.121(0.941)	0.200(0.905)
	SCORR	7.437(0.115)	6.691(0.153)	6.289(0.179)	6.413(0.170)
	HTSCD	0.803(0.370)	0.000(0.992)	0.068(0.794)	0.040(0.841)
	COINT	10.460***	6.595***	9.960***	9.592***

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Table 1 Continues					
Netherlands	NORML	1.047(0.593)	1.657(0.437)	0.730(0.694)	0.644(0.725)
	SCORR	3.611(0.461)	5.904(0.206)	7.371(0.118)	7.117(0.130)
	HTSCD	1.807(0.179)	0.003(0.959)	2.285(0.131)	0.013(0.908)
	COINT	9.844***	9.707***	5.193**	6.934***
Portugal	NORML	0.558(0.757)	1.269(0.530)	1.225(0.542)	0.399(0.819)
	SCORR	6.914(0.141)	5.278(0.260)	4.699(0.320)	7.136(0.129)
	HTSCD	0.697(0.404)	2.693(0.101)	2.569(0.109)	0.011(0.915)
	COINT	7.083***	6.013***	4.948**	10.571***
Spain	NORML	1.364(0.506)	3.071(0.215)	0.775(0.679)	0.733(0.693)
	SCORR	5.817(0.213)	5.894(0.207)	4.911(0.297)	4.478(0.345)
	HTSCD	1.004(0.316)	0.046(0.829)	1.406(0.236)	1.622(0.203)
	COINT	7.493***	4.533**	5.632***	4.274*
Sweden	NORML	discarded	0.261(0.878)	2.734(0.255)	2.382(0.304)
	SCORR	discarded	7.518(0.111)	3.884(0.422)	1.453(0.835)
	HTSCD	discarded	0.476(0.490)	1.903(0.168)	1.816(0.178)
	COINT	discarded	4.954**	6.084***	6.165***
U.K	NORML	0.612(0.736)	0.019(0.990)	1.668(0.434)	0.771(0.680)
	SCORR	0.813(0.937)	0.937(0.919)	2.777(0.596)	7.317(0.120)
	HTSCD	0.326(0.568)	0.001(0.973)	0.018(0.895)	0.166(0.683)
	COINT	4.611**	4.668**	4.104*	9.193***

Notes: Figures in parentheses indicate p-values of the relevant statistic. NORML= Normality, SCORR= No Serial Correlation, HTSCD= No Heteroscedasticity, and COINT= Cointegration at least at 10 % level. F statistic is the result of the test statistic for the null hypothesis of no cointegration, where the critical value bounds are (2.72, 3.77) for 90%, (3.23, 4.35) for 95%, (4.29, 5.61) for 99% confidence levels obtained from Table CI(iii) Case III (p.300) in Pesaran et. al. (2001). Rejection of the null hypothesis is denoted by * for 90%, by ** for 95%, and by *** for 99% confidence levels. Discarded = the model that do not satisfy the diagnostic and cointegration tests.

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Table 2:Optimal Lag Orders Selection

Trading Partner	Optimal Lags	Chosen Max. Lag
E.U. 15 (Aggregate)	9, 0, 7, 1,	9
Austria	9, 6, 8, 4,	9
Belgium	6, 1, 8, 8,	8
Denmark	1, 5, 8, 0,	8
Finland	5, 8, 4, 8,	9
France	2, 4, 4, 5,	8
Germany	4, 6, 8, 0,	8
Greece	7, 0, 3, 9,	9
Ireland	6, 6, 3, 6,	8
Italy	9, 5, 0, 7,	9
Luxemburg	1, 0, 5, 1,	6
Netherlands	9, 5, 8, 5,	9
Portugal	6, 7, 8, 2,	9
Spain	7, 8, 3, 4,	9
Sweden	1, 9, 0, 0,	9
U.K	9, 9, 2,7,	9

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Table 3: Short-Run Coefficient Estimates of Exchange Rate Variable

Trading Partners	**t**	t_{-1}	t_{-2}	t_{-3}	t_{-4}	t_{-5}	t_{-6}	t_{-7}	t_{-8}	t_{-9}
E.U. 15 (Aggregate)	-0.637 (-0.823)									
Austria	-47.370** (-4.053)	48.509* (1.916)	32.520 (1.350)	71.738** (3.670)	-8.403 (-0.794)	13.758 (1.633)	20.316** (2.718)			
Belgium	0.550 (0.510)	-3.073* (-2.581)								
Denmark	-8.845** (-2.140)	8.928* (1.843)	2.817 (0.608)	2.467 (0.565)	-1.621 (-0.380)	13.982** (3.550)				
Finland	4.050 (0.570)	7.417 (1.230)	-4.663 (-0.689)	15.099** (2.342)	-14.432** (1.933)	20.570** (3.390)	-1.332 (-0.194)	2.911 (0.468)	-8.581 (-1.499)	
France	0.247 (0.212)	3.460** (3.211)	1.910 (1.598)	2.655** (2.415)	1.394 (1.503)					
Germany	-3.338* (-1.929)	6.892** (2.908)	3.538 (1.664)	6.277** (3.740)	0.431 (0.275)	2.406 (1.529)	2.385* (1.791)			

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Greece	-1.786**									
	(-2.147)									
Ireland	-6.717	-4.147	-7.864**	-1.330	-4.194	-9.410 **	-10.263**			
	(-1.670)	(-1.273)	(-2.671)	(-0.460)	(-1.423)	(-2.961)	(-2.888)			
Italy	-4.687**	-0.759	-0.790	1.179	2.117	2.385*				
	(-2.841)	(-0.512)	(-0.561)	(0.884)	(1.539)	(1.812)				
Luxemburg	11.969									
	(1.166)									
Netherlands	-0.375	8.445**	12.501**	5.611*	1.376	4.662**				
	(-0.225)	(2.571)	(3.409)	2.090	0.695	2.715				
Portugal	1.961	1.087	-5.571*	-6.078**	-5.741**	-6.516**	-4.512*	-5.055*		
	(0.737)	(0.355)	(-2.015)	(-2.209)	(-2.299)	(-2.573)	(-2.023)	(-2.122)		
Spain	-1.621	1.744	3.194 **	2.333*	0.821	-0.923	1.564*	0.801	1.258	
	(-1.570)	(1.279)	(3.084)	(1.954)	(0.663)	(-1.143)	(1.828)	(0.931)	(1.284)	
Sweden	3.775	-7.042	10.050	2.196	-1.397	-0.172	13.871**	3.509	12.615*	12.065*
	(0.487)	(-0.913)	(1.458)	(0.336)	(-0.216)	(-0.864)	(2.202)	(0.536)	(2.005)	(1.931)
U.K	6.344**	-12.318**	-7.362**	-8.889**	0.613	6.931**	-1.339	10.684**	2.136	8.560**
	(2.294)	(-3.349)	(-2.883)	(-2.907)	(0.234)	(2.279)	(-0.580)	(3.299)	(1.186)	(3.654)

Notes: *, **, indicate significance levels at 10%, and 5% respectively. Figures in parentheses before each coefficient indicate the value of the t-statistic.

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Table 4: Long-Run Coefficient Estimates

Trading Partner	Constant	ln RER	ln Y_N	ln $Y_{E.U.15}$
E.U. 15 (Aggregate)	-0.949** (-6.927)	-1.797** (-3.537)	0.711* (1.778)	-5.261* (-1.765)
Austria	-2.198 (-1.302)	-26.062** (-3.968)	13.155 (1.674)	-105.751** (-2.288)
Belgium	1.323** (3.998)	0.968 (1.647)	5.624** (3.787)	-34.736** (-39.56)
Denmark	-4.808** (-6.794)	-6.201** (2.313)	-1.871 (-1.170)	6.454 (0.603)
Finland	2.795** (2.878)	0.958 (0.240)	16.261** (3.882)	-65.842** (-4.821)
France	-0.841** (-3.144)	-2.265** (-5.198)	0.835 (0.860)	-4.101 (-0.621)
Germany	-1.388** (-8.536)	-5.378** (-6.480)	-0.382 (-1.361)	-3.614 (-1.227)
Greece	2.842 (1.190)	-0.506 (-1.026)	12.578** (2.565)	-27.707 (-1. 683)
Ireland	-0.245 (-0.776)	-2.055** (-5.624)	2.206** (2.776)	-9.483 ** (-4.953)
Italy	-0.848** (-10.764)	-0.596** (-2.588)	0.812** (2.743)	-1.859 (-0.659)
Luxemburg	5.062** (2.733)	11.189** (2.737)	21.361** (3.010)	-60.173** (-2.905)

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Table 4 Continues

Netherlands	1.090**	(2.785)	-6.318**	(-5.622)	7.283**	(4.769)	-48.430**	(-4.773)
Portugal	-1.295**	(-17.398)	0.041	(0.171)	-0.660**	(-4.625)	8.935**	(6.190)
Spain	-1.501**	(-8.456)	-2.510**	(-5.343)	0.237	(0.543)	3.706**	(2.596)
Sweden	-1.704**	(-2.070)	-8.255**	(-2.461)	-1.443	(-0.646)	-6.758	(-1.303)
U.K	-5.661**	(-5.910)	-6.179**	(-9.934)	-15.907**	(-5.183)	57.284**	(5.102)

Notes: *, **, indicate significance levels at 10%, and 5% respectively. Figures in parentheses after coefficient indicate the value of the t-statistic.

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Table 5 : Summary of cumulative sum and cumulative sum of the squared tests

Trading Partner	**CUSUM**	**CUSUMSQ**
E.U. 15 (Aggregate)	*S*	*S*
Austria	*S*	*U*
Belgium	*S*	*S*
Denmark	*S*	*S*
Finland	*S*	*U*
France	*S*	*S*
Germany	*S*	*U*
Greece	*U*	*S*
Ireland	*S*	*U*
Italy	*S*	*U*
Luxemburg	*S*	*S*
Netherlands	*S*	*U*
Portugal	*U*	*S*
Spain	*S*	*S*
Sweden	*S*	*S*
U.K	*S*	*S*

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Appendix A

Table A.1: Nigeria's Top Five Major Trading Partners (values in mil. U.S.D) in Year 2010

Major Import Partner				Major Export Partner			
s/n	Partner	Mil. $	%	s/n	Partner	Mil. $	%
	World(Total)	44,235.3	100.0		World(Total)	84,000	100.0
1	E.U. 27	9,632.8	21.8	1	U.S.A	29,755.9	34.4
2	U.S.A	7,936.5	17.9	2	E.U. 27	19,405.9	23.1
3	China	7,324.4	16.6	3	India	9,068.5	10.8
4	Antigua &Barbuda	2,479.5	5.6	4	Brazil	6,042.0	7.2
5	India	2,377.3	5.4	5	Equatorial Guina	2,675.2	3.2

Source: World Trade Organization (WTO)-International Trade and Market Access Data

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Table A.2: Nigeria's Top Five Major Trading Partners (values in mil. U.S.D) in Year 2011

Major Import Partner				Major Export Partner			
s/n	Partner	Mil. $	%	s/n	Partner	Mil. $	%
	World(Total)	56,000	100.0		World(Total)	114,500	100.0
1	E.U. 27	15,632.7	27.9	1	E.U. 27	35,759.8	31.2
2	U.S.A	11,517.3	20.6	2	U.S.A	28,326.6	24.7
3	China	9,447.7	16.9	3	India	12,7900	11.2
4	Antigu & Barbuda	4,537.7	8.1	4	Brazil	10,554.8	9.2
5	Brazil	3,550.1	6.3	5	Australia	4,671.4	4.1

Source: World Trade Organization (WTO)-International Trade and Market Access Data

Table A.3: Nigeria's Top Five Major Trading Partners (values in mil. U.S.D) in Year 2012

Major Import Partner				Major Export Partner			
s/n	Partner	Mil. $	%	s/n	Partner	Mil. $	%
	World(Total)	51,000	100.0		World(Total)	116,000	100.0
1	E.U. 27	8,355.1	16.4	1	E.U. 27	50,942.9	43.9
2	China	7,715.4	15.1	2	U.S.A	24,139.3	20.8
3	U.S.A	4,887.0	9.6	3	India	15,895.2	13.7
4	India	2,887.6	5.7	4	Brazil	10,791.5	9.3
5	Brazil	2,867.6	5.6	5	China	8,038.7	6.9

Source: World Trade Organization (WTO)-International Trade and Market Access Data

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Table A.4: Nigeria's Top Two Major Trading Partners (values in mil. U.S.D) from Year 2008 – 2012

Nigeria's Trade with E.U 27				Nigeria's Trade with U.S.A		
Years	Imports	Exports	**Trade Volume**	Imports	Exports	**Trade Volume**
2008	8,208.67	17,516.65	**25,725.32**	2,313.08	34,758.31	**37,071.38**
2009	7,795.76	11,203.64	**18,999.39**	2,041.59	13,618.24	**15,659.83**
2010	9,632.84	19,405.89	**29,038.73**	7,936.54	29,755.94	**37,692.48**
2011	15,632.68	35,759.79	**51,392.47**	11,517.28	28,326.60	**39,843.88**
2012	8,355.13	50,942.90	**59,298.03**	4,886.97	24,139.34	**29,026.31**

Source: World Trade Organization (WTO)-International Trade and Market Access Data

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Table A.5: Nigeria's Exports to and Imports from E.U.27 and E.U.15 (values in mil. euro) from Year 1999 – 2012

Years	Exports		Imports	
	E.U.27	E.U.15	E.U.27	E.U.15
1999	2,803.64	2,794.75	3,040.29	3,003.92
2000	6,415.69	6,412.63	3,976.42	3,860.98
2001	6,474.17	6,458.21	5,181.11	5,059.79
2002	5,026.80	5,000.82	5,215.47	5,130.05
2003	6,184.36	6,164.05	5,071.43	5,010.35
2004	5,233.89	5,223.77	5,276.90	5,184.69
2005	8,389.14	8,384.62	5,972.35	5,757.80
2006	10,808.49	10,802.12	7,013.26	6,710.56
2007	10,199.39	10,187.63	8,459.86	8,180.64
2008	15,723.17	15,697.99	10,906.59	10,515.55
2009	10,420.11	10,406.19	9,184.81	8,720.77
2010	14,505.19	14,492.56	10,654.25	10,205.56
2011	24,411.48	24,385.78	12,892.44	12,158.39
2012	32,965.02	32,934.07	10,067.53	9,555.99
Total	**159,560.55**	**159,345.19**	**102,912.73**	**99,055.04**

Source: Eurostat- http://appsso.eurostat.ec.europa.eu/nui/show.do?query

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