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# Naira devaluation and trade balance in Nigeria

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**ABSTRACT**

This paper examines the effects of Naira devaluation on trade balance in Nigeria. Annual time's series data over the period ranging from 1986 to 2017 was used with Engle-Granger cointegration test used to test the existence of a long run relationship. The results of the estimation show that Naira devaluation had no significant influence on change in trade balance in the long-run in Nigeria in the periods under study. The result also suggests that Naira devaluation exerts no significant impact on trade balance in Nigeria over the study periods. The paper recommend that Nigerian currency should be allowed to depreciate freely through market forces and efficient money market system, official devaluation should be discouraged.

*Keywords***:** Devaluation, Trade balance, Engle-Granger

## 1. INTRODUCTION

Devaluation is a monetary policy tool of countries that have a fixed exchange rate or semi-fixed exchange rate. Devaluation refers to official reduction in the value of a currency with respect to those goods, services, or other monetary units with which that currency can be exchanged. It is an official lowering of the value of a country's currency within a fixed exchange rate system, by which the monetary authority formally sets a new fixed rate with respect to a foreign reference currency- usually dollar. Currency devaluation is a major monetary policy

option for a country facing persistent trade balance deficit. Devaluation is an attractive option for nations during recession like Nigeria (Samuel, Udo and Imolemen, 2018).

Trade balance refers to the difference between the monetary value of a nation's export and imports over a certain period. There have been several arguments about whether devaluation will improve the trade balance or the balance of payments. A devaluation of exchange rate increases the demand for domestic products as foreigners find them relatively cheaper. Alternatively, the consumer of domestic countries finds out that their imports have become more expensive and; therefore, may reduce the purchase of foreign goods and increase the consumption of domestic substitute goods. This implies that real exchange rate devaluation affects trade balance, which in turn has a direct positive impact on the exportable and importable industries in the domestic economy (Chowdhury *et al.,* 2014).

Bickerdike (1920), Robinson (1947), and Metzler (1948) argued that the necessary and sufficient condition for an improvement in the trade balance is that the elasticities of demand and supply in the domestic country must be greater than unity. This is also referred to as the Marshall-Lerner condition (Marshall, 1923; Lerner, 1944). Alexander (1952) describe how devaluation may change the terms of trade, increase production, switch expenditures from imported to domestic goods, and makes domestic goods internationally competitive, thus, improving the trade balance.

The j-curve effect states that there are different effects of exchange rate changes on trade balance in the short run and long run (Magee 1973 and Meade 1988). Hence, devaluation initially deteriorates trade balance before starting a stage of improvement and heading towards equilibrium in the long run and thus trade balance follows a j-curve time path. The literature on the J-curve effect is also mixed. Some studies found evidence in support of the J-curve effect (Ogbonna, 2010; Wong, 2011; Bahmani-Oskooee and Xu, 2012); Alemu and Jin-sang, 2014; and Odili, 2014) and others found the opposite (Alawattage, 2009; Anderson, and Styf, 2010; and Lotto, 2011).

The devaluation of Naira, the Nigerian currency since 1986, has not been able to achieve its objectives of encouraging exports, increasing foreign exchange earnings, reducing the domestics' demands for imported goods, improving foreign reserves and the current account balance of payments through improved trade balances. This is due to the fact that the Nigerian economy remains a mono-product economy that relies on crude oil export sales for over 85-90 per cent of her annual revenue.

Between 2006 and February 2015, Bonny Light crude oil prices averaged $94/barrels while the average monthly oil price between 2010 and end of 2014 stood at $104.4 /barrel (NBS, 2016). Despite the positive windfall gains arising from the benchmark oil price of $79, $77.5 and $65 in 2013, 2014 and 2015 respectively, the country's external reserves declined consistently from $53.6 Billion in 2008 to $23.47 billion in December, 2016 while in January 2017, exports declined by 26.7 per cent and imports increased by 24.8 per cent, unemployment rate increased to12.1 per cent with a negative growth rate of -1.5 per cent in December 2016 from 6.3 per cent in 2014 (CIA-WFB, 2017).

The above reality of macroeconomic indicators on the effects of post devaluation in Nigeria contradicts the findings of studies that have attempted to proffers solution to this regard. Olugbon, Omotosho & Babalola (2017); Okaro 2017; Osundina and Osundina (2016); Momodu and Akani (2016); reached consensus that Naira devaluation has a significant and positive effect on trade balance, balance of payment or economic growth in Nigeria. Anoke, Odo & Ogbonna (2016); Umoru and Oseme (2013) and Lotto (2011) held a contrary view that Naira devaluation

exerts no significant impact on trade balance and balance of payment. With plethora's of theoretical and empirical researches into how devaluation of Naira affect trade balance, there is still considerable disagreement concerning the relationships between these economic variables and the effectiveness of Naira devaluation as a tool for increasing a country's balance of trade (Onafowora, 2003). Furthermore, empirical findings of many other studies fall somewhat between the previous conclusions as there is a time lag in between the naira exchange rate devaluation and trade balance. Hence this paper aims to examine the effects of Naira devaluation on trade balance in Nigeria. The rest of the paper is structured as follows: we have a literature review, a presentation of the methodology used, a presentation of the results and finally, the conclusion and recommendations.

## 2. LITERATURE REVIEW

Mercantilism and balance of trade doctrine, was in existence during the period between 1500-1800, is considered to be the oldest approach to the BOP (Alawattage, 2009). Broadly, Mercantilists believed that the wealth of merchants and power of nations could be increased by accumulation of species (precious metals such as gold and silver that one used as money in international transactions). Hence, they strictly advocated maintaining the surplus on Balance of Trade and commodity imports were considered to be undesirable due to resulting outflow of accumulated species.

Trade theory in its standard form, relates trade in goods and services with the real exchange rate. While setting all other variables fixed, the trade theory states that the exchange rate can affect the economy´s imports and exports. A fluctuation in the exchange rate affects both the value and quantity of trade. If the real exchange rate rises for the home country i.e. if there is devaluation, the households in the domestic country can get less foreign goods and services in exchange for a unit of domestic goods and services. Invariably a unit of foreign good would give more of domestic goods, resulting in domestic households buying less foreign goods and foreign households wanting to purchase relatively more domestic goods that have now become internationally competitive (Zhang, 2008). Lerner (1944) widened the standard trade theory by including price elasticities of demand for imports and exports as important elements in determining the effect of exchange rate changes on the trade balance.

Conventional answer to currency devaluation is usually analyzed within the Mundell-Fleming model and the result is a positive effect on the trade account. The disequilibrium framework was originally put forth by the seminal papers of Mundell (1963) and Fleming (1962) and later by Dornbusch (1976). Thus, devaluation is expansionary in terms of gross domestic product (GDP), since exports increase more than imports. This theory been the simple extension of IS-LM model for short-run of an autarky economy is deficient because of the way it handles the relationship between interest rates and exchange rates. And it's true that this simplest version of Mundell-Fleming assumes that interest rates are equalized by capital flows, taking no account of expectations of future exchange rate changes, especially post devaluation effect. Further criticism of this theory is based on its implication for the asset market. The Mundell-Fleming model is based on the following equations:

The IS curve: $Y = C + I + G + NX$ ……………..………. (2.1)

$$\text{The LM curve: } M/P = L\,(i,Y) \qquad \text{……………………..} \quad (2.2)$$

A higher interest rate or a lower income (GDP) level leads to lower money demand.

$$BOP = CA + KA \qquad \text{…………………........} \quad (2.3)$$

where: BOP is the balance of payments surplus, CA is the current account surplus and KA is the capital account surplus.

Elasticity approach was propounded by Robinson (1947) and Metzler (1948) expanded by Kreuger (1983) states that, transactions under contract completed during the period of devaluation may affect the trade balance negatively in the short run but over time export and import quantities adjust, which give rise to elasticities of exports and imports to increase and quantities to adjust. In this wise, the foreign price of the domestic goods- devaluing country's export is cheaper and increase the price of imported (foreign) goods which directly reduces the demand for imports at the long run the trade balance improves. This theory clearly states that the effect of devaluation is dependent on the elasticity of exports and imports. The shortcomings of elasticity approach is mainly for, being a partial equilibrium approach which only account for the macroeconomic effects arising from price changes and out-put fluctuations in response to currency devaluation. The explanations of this approach only revolve around the issues of volumes and value responses to changes in real exchange rate (domestic denominated price). Moreover, elasticities approach assumes constant purchasing power of money which is not realistic to devaluation of the domestic currency.

Due to criticisms associated with the elasticities approach, Alexander (1952) propounded what is referred to as the 'absorption approach'. The absorption approach summarily posits that, devaluation would only have positive effects on the balance of trade if the propensity to absorb is lower than the rate at which devaluation would induce increases in the national output of tradable goods and services. The approach emphasizes changes in real domestic income as a determinant of a nation's balance of payments- exchange rate relationship.

It begins with the national income identity as shown below.

$$Y = C + I + G + X - M \qquad \text{……………………..} \quad (2.4)$$

The monetary approach focuses on both the current and capital accounts of the balance of payments. This is quite different from the elasticity and absorption approaches, which focus on the current account only. Oladipupo and Onotaniyohuwo (2011) states that, the general view of monetary approach makes it possible to examine the balance of payments not only in terms of the demand for goods and services, but also in terms of the demand for and the supply of money. Critics have argued that, the monetary approach to devaluation-changes in nominal exchange rate can only have temporary effect and that there will be no long-run equilibrium relationship between the trade balance and the real exchange rate (Salasevicius & Vicious, 2003). Besides, the approach further criticisms are: it disagree on the basis of the assumption of stable demand for money, although, money demand is stable in the long-run but less stable in the short-run and full employment is not feasible due to some elements of involuntary unemployment across countries.

Bahmani-Oskooee and Harvey (2016) investigates the impact of exchange rate devaluation on the trade balance between Singapore and Malaysia.

The study uses annual data that covered the period 1974 to 2011. The model was analyzed with Error Correction Model, Akaike's Information Criteria (AIC) to select the optimal lags and other diagnostic statistics- LM: Lagrange Multiplier test of residual serial correction, RESET. They find that, the trade balance of 79 industries is affected by exchange rate devaluation in the short run. They also found that, short-run effects last into the long run in only 19 industries which mostly happen to be small industries. Bahmani-Oskooee and Bolhassani (2012) investigates the impact of uncertainty due to exchange rate devaluation on trade balance between the United States and Canada. They use disaggregated annual trade data over the period 1962-2006 for 152 industries. The study found that in the short run, trade flows of almost two-thirds of the industries are affected by exchange rate devaluation. Whereas, in the long-run, less than one-third of the trade flows are affected.

Zeeshan, *el al*. (2016) investigates the impact of devaluation on balance of trade and the External Debt, in the case of Pakistan, using time series data over the period of 1980 to 2014. Their study use ARDL (Autoregressive distributed lag model) econometric technique for analysis. The study found that devaluation disfavour trade balance for the case of Pakistan for the period reviewed. Fathi and Mustafa (2016) analyzed the impact of competitive devaluation on the foreign trade of Turkey for the period 1965-2014, using Co-integration, ARDL. The results indicated that positive and significant correlation between TB and RER and also between TB and GDP. Olugbon, Omotosho, and Babalola, (2017) investigates the impact of devaluation of exchange rate on Nigerian trade balance. Using a time series data for the period 1974 to 2014, the Johansen cointegration and the error correction methodologies were employed. Empirical results from VECM model estimations; indicate that devaluation of the Naira pulls import demand and pushes export demand. Result of the export demand function also showed a positive and a significant impact of the world income growth rate on the export performance. Okaro, (2017) investigates the effect of currency devaluation on the economic growth in Nigeria. The study relied on time series data generated for a period of 16years, from 2000-2015.

The Ordinary Least Square (OLS) regression method was used for the analysis. The result of the analysis showed that, there was a significant relationship between Currency devaluation and real GDP in Nigeria; there was a significant relationship between Currency devaluation and external debt in Nigeria and there was no significant relationship between Currency devaluation and private domestic investment in Nigeria. Osundina and Osundina, (2016) analysed the effectiveness of currency devaluation in Nigerian economy using Ordinary Least Square Methods- OLS.

The result of the analysis shows that devaluation reduces importation; encourages exportation and increases interest rate. Iyoboyi and Mufutau, (2014) investigates the impact of exchange rate devaluation on Nigeria's BOP using time series data from 1961 to 2011. The study was undertaken within a multivariate vector error correction framework. A long-run equilibrium relationship was found between Nigeria's BOP and the macroeconomic variables employed in the study. Ogundipe, Ojeaga, and Ogundipe, (2013) investigated the long-run effect of currency devaluation on the trade balance of Nigeria from 1970-2010. The study used a methodology that combined monetary model based on Nigeria economy they used the Johansen co-integration and variance decomposition analyses. Their major findings include; exchange rate devaluation induced an inelastic and significant relation on trade balance in the long run, there existed no short run causality from exchange rate devaluation to trade balance, and money supply volatility contributed more to variance in trade balance than exchange rate volatility.

## 3. METHODOLOGY

The paper adopts ex-post facto research design, because the researcher has no direct control over the variables involved. This is because the issues investigated relates to events that have already taken place and for which a causal- comparative evaluation was carried out to analyze the objectives of the study. The paper makes use of secondary data, which are annual time-series. The data covered a period of 33 years, 1986 to 2018. Data was sourced from Central Bank of Nigeria (CBN) various statistical bulletins, National Bureau of Statistics (NBS) Annual Reports and International Financial Statistic (IFS) data. The variables that was used in this study were selected on the basis of their theoretical importance, usefulness as a measure of the key construct of the study namely, currency depreciation, money demand and trade balance, and findings from their usage in previous empirical literature. The E-views 10 econometric software package was used to analyze the data.

The theoretical framework for this paper is based on disequilibrium framework put forth by Mundell (1963) and Fleming (1962) and later by Dornbusch (1976) which has become a conventional answer to currency devaluation that is usually analyzed within the Mundell-Fleming model. The traditional IS-LM model deals with autarky economy, while the modern Mundell-Fleming model describes a small open economy.

The empirical model of this study is based on the theoretical framework presented above. The study drawn from the works of Bahmani-Oskoee (1985, 1989), Buluswar, *et al.* (1996), Agbola (2004), Alawattage (2009), Baye (2011) and similar to that of Ogundipe, *et al.* (2013):

Some key variables like domestic interest rate, domestic money supply and foreign money supply having significant effects on import, exports and trade balance of an economy shall be considered as determined by economic theory. Therefore, the trade balance of an economy shall be taken as the difference between export revenue (X) and import revenue (M); therefore, the trade balance of Nigeria is expressed as follows:

$$TB = X - M = P_x Q_x(P_x/e, Y^*) - eP_m^x, Q_m(eP_m^x, Y) \dots\dots\dots\dots\dots\dots. (3.1)$$

where: *TB* represents trade balance, *X* is exports revenue, *M* is export expenditure, $P_x$ is the naira price of exports, $Q_x$ is the quantity of exports, $P_m$ is foreign currency price of imports, $Q_m$ is the quantity of imports, *e* is the value of foreign currency in terms of Nigeria naira, *Y* is the domestic national income, *Y\** is foreign income.

Specifically, the empirical trade model used in this study for estimation is

$$lnTB = a_0 + a_1 lnY_D + a_2 lnDC + a_3 lnOPEN + a_4 RES^* + a_5 IR_D + a_6 REXRD + \varepsilon_t \dots (3.2)$$

where: *lnTB* = log of trade balance, $lnY_D$ = log of real domestic income, *lnDC* = log of Domestic credit, *lnOPEN* = log of degree of openness, RES\* = foreign reserve, $IR_D$ = represents domestic interest rate, *REXRD* = real exchange rate and $\varepsilon_t$ = is the error term.

## 4. RESULTS AND DISCUSSIONS

The graphical illustration of the variables used is presented in Figure 1 with all variable integrated of order 1 except for openness (OPEN) and real exchange rate (REXRD).

Figure 1 depicts logged values of trade balance (TB) in Nigeria graphed against five independent variables over the sample period. The trend depicts a steadily growing TB initially thereafter declining. Trend for YD and DC show steady increase over the years with the exception of IR and RES respectively. Therefore, there exist signs of possible interactions between trade balance and our explanatory variables although the extent of these interactions may vary.
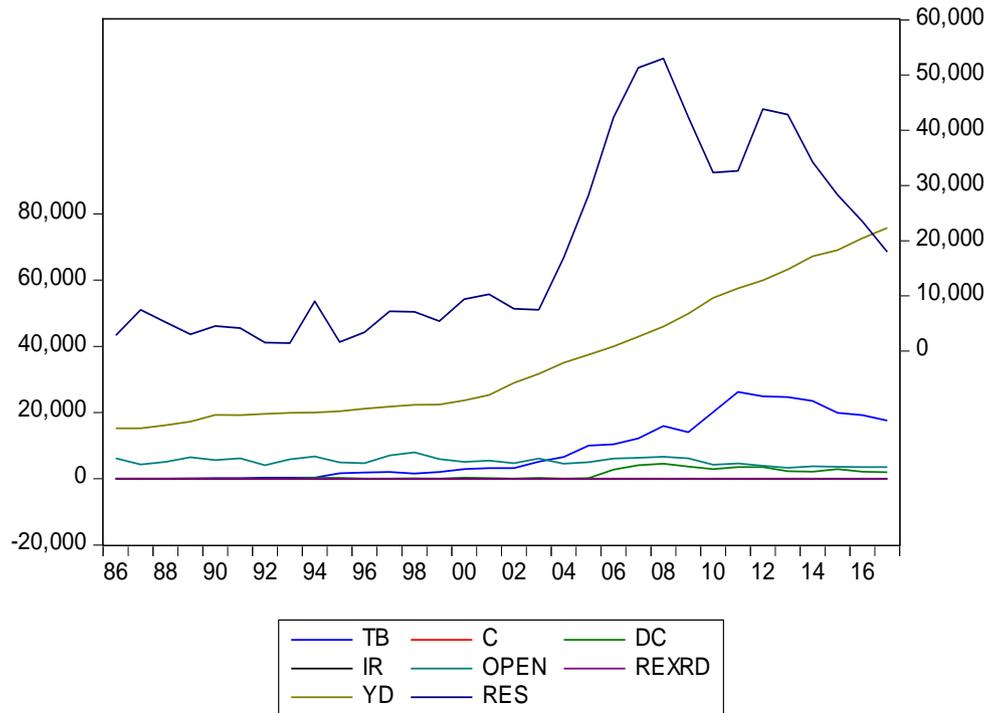


**Figure 1.** Trends in growth of dependent and independent variables.
Source: Computed by the authors.

**Table 1.** Descriptive Statistics.

|  | LOG(TB) | LOG(YD) | LOG(DC) | LOG(OPEN) | RES | IR |
|---|---|---|---|---|---|---|
| Mean | 7.790383 | 10.35333 | 5.422831 | 8.542203 | 18398.79 | 7.403594 |
| Median | 8.083780 | 10.20543 | 5.407885 | 8.537057 | 9197.605 | 4.952500 |
| Maximum | 10.17475 | 11.23529 | 8.418941 | 8.982081 | 53000.36 | 18.80000 |
| Minimum | 2.701361 | 9.631547 | 1.308333 | 8.110821 | 1429.590 | 1.410000 |
| Std. Dev. | 2.166392 | 0.526749 | 2.306792 | 0.231965 | 16731.78 | 5.423479 |

| | | | | | |
|---|---|---|---|---|---|
| Skewness | -0.738546 | 0.305491 | -0.124614 | -0.205135 | 0.723142 | 0.761688 |
| Kurtosis | 2.419888 | 1.629041 | 1.616233 | 2.009047 | 2.056634 | 2.006471 |
| Jarque-Bera | 3.357771 | 3.003769 | 2.635901 | 1.533747 | 3.975570 | 4.410368 |
| Probability | 0.186582 | 0.222710 | 0.267683 | 0.464463 | 0.136999 | 0.110230 |

Source: Computed by the authors

Table 1 shows the descriptive statistics for our estimating variables with the rule that if the computed probability value for the test is greater than 10% (0.10), we do not reject the null hypothesis. Therefore the statistics clearly shows that all our variables are normally distributed and could be good fit estimators. In addition, the result is supported by the skewness and kurtosis statistics for the series as the skewness and kurtosis statistics for all our variables are not substantially different from the 0 and 3 thresholds.

**Table 2.** Summary of Unit-Root test results.

| Augmented Dickey-Fuller (ADF) | | | |
|---|---|---|---|
| | Level | First Difference | I(d) |
| LOG(TB) | -3.57$^a$ | -6.19$^{b***}$ | I(1) |
| LOG(YD) | 0.126$^a$ | -3.45$^{b*}$ | I(1) |
| LOG(DC) | -1.97$^a$ | -7.93$^{b**}$ | I(1) |
| LOG(OPEN) | -2.68a*** | - | I(0) |
| RES | -1.686a | -3.24b** | I(1) |
| IR | 0.98a | -6.2b*** | I(1) |
| REXRD | -4.52a*** | - | I(0) |

Source: Computed by the authors.
Note that ***, ** *and* * implies significance at 1%, 5% and 10% respectively. Also, '*a*' denotes model with constant, '*b*' is for model with constant and trend and '*c*' is the model without constant and trend.

The unit root test result shows TB, YD, DC, RES and IR to be stationary at order 1 while REXRD and OPEN are stationary at levels (I (0)). In a scenario like this, Engle-Granger cointegration test is to be undertaken with a sign of cointegration showing the series in question to be related and therefore can be combined in a linear fashion. The implication of this is that shocks in the short run which may affect movement in the individual series would converge with time (in the long run).

**Table 3.** Result of Estimating Model and Cointegration Test.

| Variables | Coefficient | t- statistics | Prob |
|---|---|---|---|
| LOG(YD) | 2.672234 | 2.949921 | (0.0068) |
| LOG(DC) | 0.157691 | 1.193930 | (0.2437) |
| LOG(OPEN) | 0.655805 | 0.692548 | (0.4950) |
| RES | -2.1805 | -1.109936 | (0.2776) |
| IR | -0.152969 | -3.157321 | (0.0041) |
| REXRD | 0.004647 | 0.514650 | (0.6113) |
| Observations | 32 | | |
| $R^2$ | 0.88 | | |

Source: Computed by the authors.

The coefficient of REXRD shows a weak positive relation to TB with its t-statistics and probability value insignificant. Thus, a 1 percent increase (decrease) in REXRD will lead to approximately 0.4 percent increase (decrease) in TB. This is consistent with economic theory. For IR and RES, 1 percent increase (decrease) in IR and RES will lead to approximately 218 and 15 percent decrease in Trade balance. For YD, DC and OPEN, a 1 unit change in YD, DC and OPEN will lead to a 267, 15 and 65.5 percent change in TB.

In addition, the Engle-Granger test indicates five (5) cointegrating equations at 5% thus rejecting the null hypothesis. Therefore there exists a linear relationship between the dependent and independent variable in the long run. This is consistent with the previous studies that have attempted to study such relationship like: Zeeshan, *el al*. (2016); Ogundipe, Ojeaga, and Ogundipe, (2013) and Alhanom (2016).

## 5. CONCLUSIONS

This paper examines the effects of naira devaluation on trade balance in Nigeria. The study makes use of ex-post facto research design and secondary time series data from 1986 to 2017, obtained from Central Bank of Nigeria (CBN) statistical bulletin 2017. To achieve the study's objectives, preliminary diagnostic tests of the data series were conducted through the use of ADF unit root tests. The unit root test result showed TB, YD, DC, RES and IR were stationary at order 1 while REXRD and OPEN were stationary at levels (I (0)).

Engle-Granger cointegration test was undertaken with a sign of cointegration showing the series in question were related and therefore combined in a linear form. The implication of this is that shocks in the short run which may affect movement in the individual series would converge with time in the long run.

The coefficient of REXRD showed a weak positive relationship with TB with its t-statistics and probability value insignificant. Meaning, a 1 percent increase (decrease) in REXRD will lead to approximately 0.4 percent increase (decrease) in TB. This is consistent with economic theory.

The study therefore concludes that official devaluation of the Nigerian currency do not have significant impact on trade balance for the period under review.

We therefore recommend that government should allow its currency to depreciate freely through market forces and efficient money market system since it had no significant influence on changes in trade balance in Nigeria official devaluation should be discouraged.

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