



## **Analysis of the Impact of Currency Devaluation on Export and Import in Nigeria: Evidence from ARDL**

**Hussaini Abdullahi\*, Y. U. Dantama, Hamisu Muhammad & Yahanazu Ahmad**

Usmanu Danfodio University, Sokoto, Sokoto State–Nigeria

Corresponding Author's E – mail: hussainiabdullahi9@gmail.com

### **Abstract**

*This study explores the impact of currency devaluation on export and import in Nigeria using annual time series dataset over the period 1981-2020. The study employed Autoregressive Distributive lag Model (ARDL) for the analysis. Results from the long run and short run ARDL estimate reveal that there is no association between currency devaluation and exports-imports in Nigeria. This means that currency devaluation had no impact on exports and import in Nigeria both in the short and long run. Interest is positive and statistically significant. Results also indicate that there is both long run and short run relationship between money supply and exports in Nigeria. This implies that the level of money supply in Nigeria influence export performance in the country. The study recommend among other diversification of the economy, from oil to more productive sector such as agriculture so as to enhance export performance of the country.*

**Keywords:** ARDL, ECM, currency devaluation, export, cointegration.

**JELCLASSIFICATION:** C32, D5, P33, C12, C22

**Contribution to/Originality Knowledge:** This study is one of the very few studies that examine the impact of currency devaluation on export and import in Nigeria by applying Autoregressive Distributive Lag model for the estimation of the parameter. Majority of the empirical work explore the impact of exchange rate on trade balance and employed less robust techniques of analysis in their research work.

### **1.0 Introduction**

The concept of currency devaluation has been a subject of discussion among economist ever since the seminal work of Krugman (1978). It has mean while remained a common practice in the midst of developing economies to adjust their domestic currencies after any negative or external shocks on the economy. It has become one of the major policy prescriptions in dealing with growth challenges among several developing and emerging market economies. Available evidence so far on the impact of currency devaluation shows that it could have both expansionary and Contractionary impacts on economic growth of a given country (Yilaci & Hepsag, 2008; Genye, 2011; Shahzad & Afzal, 2013, Draunivudi & Mocevinaka, 2014).

International monetary fund (IMF) and the World Bank promote the idea of currency devaluation as one of the macroeconomic strategies aimed at improving trade balance and achieving short and long-run economic growth (Gossaye, 2015; Yusuf & Bambale, 2016; Akonji, Wakili & Sakiru, 2013). However, countries should only devalue their currencies in the event that other policy alternatives options to amend economic worriment fail to achieve

the desired result (Austin & Fynface, 2016). The impact of currency devaluation normally manifests itself in enhancing the economic performance of a country after a certain time lag. The long run and short run effects of currency devaluation on economic growth of countries vary. At theoretical level currency devaluation worsens trade balance in the short run, but with time it begins to improve thereby producing J-Curve shape (Akonji, *et al*, 2013).

Furthermore, currency devaluation increases the international competitiveness of domestic industries which leads to the diversion of consumption from foreign goods to domestic goods (Ayen, 2014). Currency devaluation is used to boost exports, deject importation and to correct balance of payment deficit by making home goods cheaper to foreign goods in the home country (Abera, 2016, Asif, & Shah, 2016). The appreciations of domestic currency increase the demand for imports and decrease the demand for export. In view of this, to promote exports it is suggested to stabilize the currency devaluation so as to ensure small fluctuation in the exchange rate (Yazidi, 2013). China, United State, Germany, and Japan were the major leading exporters in the world this is possible through their currency manipulation. It is against this background that this study seeks to empirically examine the impact of currency devaluation on exports and import in Nigeria. Nevertheless, the paper is divided into five sections, section one is introduction, section two presents the literature review, section three is methodology, section four deals with results and discussion, and finally, is section five which presents conclusion and policy recommendation.

## **2.0 Literature Review**

### **2.1 Theoretical Literature**

Elasticity theory was advocated by Robison (1947) and Metzger (1948) and popularized by Kreuger (1983). Currency devaluation improves a country's exports and imports when Marshall-Lerner Condition is met when the sum of the total import demand elasticity for imports of the two trading countries exceeds unit (Bahmani & Miteza, 2003). The elasticity theory is based on a relative price of the balance of trade (Husted & Michael, 1995). The objective of currency devaluation is to close a gap between the values of exports and imports of various goods and services. Williamson (1983) high import prices caused by currency devaluation can raise the local performance of non-trade goods.

Hooy and Chan (2008), the J-curve effect occurs when a country depreciates or devalues its currency; the initial effect is trade balance will worsen at the start, but with time consumers and suppliers adjust to real changes in the price of goods. The export commodity becomes cheaper when a country devalues its currency relative to its trading partners this brings a rise in quantity demand, devaluation aimed at improving the trade balance. There is a time lag before the trade starts to improve after devaluation. The devaluation exhibits the different effect. Theoretically, after devaluation trade balance starts to deteriorate but as time goes on it starts to improve until it reaches equilibrium. Following a real devaluation, businessmen take time to recognize the changes in market competitiveness following devaluation, and this may take longer in international markets than in domestic markets.

The purchasing power parity refers to the techniques used to check the parallel price of currencies. The purchasing power parity divulges how much money would be demanded to buy the same goods and services in two different countries, and used to calculate foreign exchange rate. The theory is relying on the principle of the law of one price. According to this theory currency devaluation influence real magnitude largely through real balance effects in the short run but leaves all real variables unchanged in the long run. In the short run, an increase in the exchange rate results to increase in output and hence improve the balance of payment, in the long run, increase in output and enhancement in the balance of payment is acclimate by the rises in price (Austin & Fynface, 2016). This study, therefore, is anchored on the elasticity theory and purchasing power parity. This is because currency devaluation as macroeconomic policy prescription is to close a gap between the values of exports and imports of various goods and services and export commodity becomes cheaper when a country devalues its currency relative to its trading partners this brings a rise in quantity demand, devaluation aimed at improving the trade balance.

## **2.2 Empirical Literature**

Anaraki (2014) investigated the impact of the devaluation of the Euro on Euro-zone exports spanning from 2001-2010. The variables study includes GDP, the openness of the host country, consumer price index, and the parity of Euro against major currencies. Finding reveals that devaluation in the Euro has a statistically significant impact on the export's performance of the Eurozone. Furthermore, Breuer and Klose (2013) conducted a study on nominal devaluation: an empirical assessment of Euro-area exports and imports, for the period 1995 - 2012. Variables controls are exports, imports, real exchange rate, and domestic demand. Findings show that all the variables have the same influence on exports except imports. Other finding reveals that devaluation enhances exports of the eurozone.

Thorbecke and Kato (2012) investigated the effect of devaluation on exports in Germany spanning from 1980-2011 using Johansen and OLS to analysis the parameters. The study used the Consumer Price Index, the real effective exchange rate, and foreign income as control variables. Findings reveal that devaluation encourages the exports of Germany. Other findings reveal the presence of a long-run relationship between Germany's aggregate exports, foreign income, and depreciation. The findings show that German exports to the eurozone are price elastic than German exports outside the eurozone. Moreover, Muhammad (2010) investigated the impact of devaluation on the balance of trade in the USA. Elasticity theory approach was used over the period 2004 - 2009. Findings are an inconsistency with the elasticity approach and conform to the J-curve effect. Results also reveal that devaluation of the USA dollar reduces the trade deficit.

Abera (2016) conducted a study on testing the Marshall-Lerner conditions on Ethiopia economy, from 1980 – 2015. The study includes imports, exports, exchange rate, world income, money supply, real GDP, government expenditure, the term of trade and domestic income. OLS model was employ. Findings indicate currency devaluation does not encourage the imports and exports of Ethiopia. No companionship of Marshall-Lerner condition in Ethiopia economy. Edoun *et al.* (2015) investigated the impact of devaluation on the balance

of trade and marketing in Zimbabwe. The study employs Johansen –Juselius co-integration analysis and VEC model. The study covered a period from 1990-2015. Variables control includes Real Exchange Rate, Domestic Income, and Foreign Income. Results indicate that devaluation encourages a balance of trade and marketing in Zimbabwe. Long run impact exists between devaluation and trade balance in Zimbabwe. The findings met the Marshall -Lerner condition, no existence of J-curve hypotheses in Zimbabwe trade balance.

Gossaye (2015) investigated the effectiveness of devaluation in achieving an internal and external balance of trade in Ethiopia using both descriptive and econometric modelling such as VAR model spanning from 1974 – 2014. The variable use includes inflation rate, real GDP, real exchange rate, trade openness, and interest rate. The result from the descriptive study reveals directional associations between devaluation and inflation. Real exchange rate and inflation rate shows a positive relationship, currency devaluation in cannot result in an inflationary problem rather it will make inflation to decline.

Ayen (2014) assessed the effects of devaluation on the output of Ethiopia, over period 1998-2010. The variables study includes government expenditure, money supply, terms of trade, exchange rate, and real output. Finding reveals that devaluation has a Contractionary consequence on the product in the long-run and impartial in the short-run. The study suggests that government should use import restriction like import quota, and the tariff on some imported goods that can be produced locally to improve the external sector. Therefore, there is a need to transform from the economy from agricultural sector to the industrial sector, so that the economy can become less dependent on the imported raw material.

Sibe *et al.* (2012) examined the impact of the devaluation of the CFA franc on the balance of trade of EMCCA countries using panel data. The study cover period 1980-2006, Double Least Square Method has used to analysis the parameters. Devaluation of the CFA franc encourages trade balance of the EMCCA countries, but the impact was insufficient at bringing competitive advantage or at meeting the set objective. This was due to economic policy and also, because of the fluctuation of the CFA franc with reference to the U.S dollar, the study suggested that the EMCCA countries should change their mode of expenditure that cantered more on the importation of foreign goods and try to improve on their locally produced goods.

Genye (2011) examined the effect of devaluation on GDP per capita growth of Ethiopia spanning from 1980-2010. The variables control includes education, private investment, the openness of the economy (GDP), and the exchange rate. Ordinary least square econometric techniques were used. The result of the finding reveals devaluation has a negative effect on the economic growth of Ethiopia. Sumesh (2010) carried out a study on whether devaluation would have a positive influence on the balance of trade in South Africa. Furthermore, to investigate the presence of J-Curve following devaluation. The variable uses were Trade Balance, South Africa's income, real exchange rate. Results elucidate that devaluation does not support the balance of trade in South Africa and no perseverance of J-Curve in South Africa. Amer (2015) analyze the impact of devaluation on Egypt's trade balance, over the period 2003 and 2013 using an ARDL model. Currency devaluation does not improve the balance of trade in Egypt; the J-curve effect is not present in the Egyptian economy.



Asif and Shah (2016) examine the impact devaluation on money supply growth over the period 1973-2014 using co-integration test and error correction mechanism. The variable study includes the exchange rate, money supply. The results from the findings indicate that money supply is positive and statistically significant in both the short and long run. Furthermore, Shafi *et al.* (2015) employed ANOVA to analyze the impact of an exchange rate, inflation rate, and interest rate on the balance of payment. The variables used are the exchange rate, inflation rate, interest rate and balance of payment. Results from the empirical findings reveal that inflation rate and exchange rate have positive and statistically significant effects on the balance of Payment of Pakistan and India. The interest rate is negative and statistically significant effects on the balance of payment of both India and Pakistan respectively.

In addition, Shelly (2014) survey effects of exchange rate adjustment on trade balance of some selected Caribbean countries of Jamaica, Guyana, Barbados, Trinidad and Tobago, and the Dominican Republic over period 1980 – 2012. Variables use includes trade balance, foreign income, domestic income, exchange rate, and West Texas Intermediate as measure by oil prices, using ARDL to analysis the parameter. Results show that the exchange rate adjusts in the short run and long run. Some regions satisfy the Marshall-Lerner Condition. Furthermore, Vaibhav *et al.* (2014) investigated the effects of rupee devaluation on India economy using ARDL. The study uses real exchange rate, consumer price index, imports, exports, foreign exchange, oil price, and gold price as variants control. The finding shows that depreciation of Indian rupee has a positive impact on the exports and output of India, but has a negative impact on imports.

Nonetheless, Kushneel and Dibyendu (2013) investigate the existence of J-curve disparity in Fiji spanning from 1975 – 2012. Findings support the presence of j-Curve hypotheses in Fiji. Currency devaluation has a significant and positive impact on the trade goods, whereas its impact on services trade sector was statistically significant but negative. The services trade balance exhibits inverse J-curve relationship but is unable to show the favourable effect on the good sector. Also, Raza *et al.* (2013) examined the effect of devaluation on Balances of trade in Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka spanning from 1970-2012. Findings show that export of Bangladesh and India are not influenced by currency depreciation. But the exports of Pakistan and Nepal are significantly influenced by currency depreciation. This shows that the export of Pakistan and Nepal are significantly influenced by currency depreciation. Export of Sri Lanka shows insignificant regression. Other results show that the import of Bangladesh, Nepal, and Pakistan was influenced significantly by currency depreciation. Findings also pomp that imports of India and Sri Lanka are not incited by currency depreciation.

Kanchan (2012) investigated the effects of devaluation on economic growth in Pakistan spanning from 1993 to 2009 using the co-integration test for detecting a long-run relationship, and VEC Model. The empirical result shows that LRGDP Increases, whereas LREER decreases, declining pattern of REER implies devaluation or depreciation of Pakistani currency against the same currencies in which it has trade relation. The result shows that depreciation has expansionary effects in the short-run, with Contractionary in the long-run. Mahesh (2015)

examine the presence of J-Curve hypotheses in the Nepalese economy spanning over the period 1975 – 2013 using Johansen Con-integration, and Vector autoregression model. Findings show that the J-Curve hypothesis does not hold in the Nepalese economy which is contrary to the classical assumption. Currency devaluation does not enhance Nepalese trade balance

Likewise, Shahzad and Afzal (2013) investigated the impact of currency devaluation on exports of three major economies of Pakistan, Bangladesh, and India spanning from 1980-2012, using multiple regression techniques. Control variables are real exchange rate, lending interest rate, government expenditure, and money supply. Results show that the devaluation of exports statistically significant in both Pakistan and Bangladesh. Devaluation does not encourage the exports of India. There is negative and significant connection between interest rate and currency devaluation in both Pakistan and Bangladesh. Result also indicates that government expenditure enhances the exports of Pakistan but does not improve the exports of Bangladesh and India. Money supply aid the export of Pakistan, Bangladesh, and India. Austin and Fynface (2016) investigate the impact of devaluation and economic growth from 1986-2012. Applying the ARDL model and ECM model to assesses the parameters. The variables used for the study embody exchange rate, money supply, and inflation. Results show that devaluation has a negative and insignificant impact on economic growth of Nigeria. Also, other results from the empirical findings show that exchange rate, money supply, and inflation affect economic growth significantly in Nigeria.

In addition, Mujidat and Akinola (2016) investigate the effectiveness of devaluation on manufacturing output in Nigeria. The study Cover period 1980-2014. The variables cover includes output, Inflation, exchange rate, interest rate, export, and import. OLS was used to estimate the parameter, Eagle-Granger to test for causality, co-integration test for a long run relationship. Result revealed that all the variables except imports induce positive effects on output growth of manufacturing in Nigeria. The result shows that devaluation in does not encourage the growth of manufacturing output. Akonji *et al.* (2013) survey existence of the J-curve hypothesis in the Nigerian economy, from 1980-2010. Variables controlled were traded balance, GDP, nominal exchange rate; findings indicate the presence of the J-curve hypothesis.

Furthermore, Loto (2011) analyzes the effects of devaluation of the Nigeria naira on trade balance for period 1998-2008, the study adopts the elasticity approach. The variables control is import, level of real income, import price index domestic price index, exports, world income, and world price index, using OLS for the estimation. Results record that currency devaluation does not encourage trade balance. The study concludes that currency devaluation benefits countries that are export based before the devaluation and depreciation of currency which Nigeria is not. In the same development, Opaluwa *et al.* (2010) examined the effects of exchange rate devaluation on manufacturing sectors. The study uses monetary and traditional flow theory, from 1986 – 2005. Control variables include manufacturing GDP, manufacturing employment rate, manufacturing foreign private investment, and parallel exchange rate. Findings show devaluation affects the manufacturing sector in Nigeria negatively because currency devaluation constrained import leading to declining in output growth.

### 3.0 Data and Methodology

#### 3.1 Data

This study examines the impact of currency devaluation on export and import in Nigeria over the period 1981 to 2020. The data use for this study is secondary data; dataset was source from the statistical bulletin of the Central Bank of Nigeria and World Bank Indicator (WBI). The study employs annual time series dataset for the estimation of the parameters. The data collected cover the period of 40 years.

#### 3.2 Methodology

##### 3.2.1 Model Specification

This study adapts econometric models with modification which is in line with the works of Shahzad and Afzal, (2013) in their investigation of the impact of currency devaluation on the exports of Pakistan, Bangladesh, and India, it is also in line with the work Austin and Fynface (2016).

$$Exp_t = F(EXR, INR, MS, EXP_{t-1}) \quad (22)$$

$$Imp_t = F(EXR, INFR, INR, IMP_{t-1}) \quad (23)$$

Where: EXP = Export, IMP = Import, EXR = Exchange rate, INR = Interest Rate, MS = Money Supply, INFR = Inflation rate, EXP<sub>t-1</sub> = Exports lagged value. The above equation 1 and 2 can be restated in to mathematical equation as follows:

$$Export = \beta_0 + \beta_1 EXP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INR_{t-1} + \beta_5 MS_{t-1} + et \quad (24)$$

$$Import = \beta_0 + \beta_1 IMP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INFR_{t-1} + \beta_5 INR_{t-1} + et \quad (25)$$

Where: EXP<sub>t</sub> = Nigeria exports in the current period, IMP<sub>t</sub> = Nigeria import in the current period, EXP<sub>t-1</sub> = one year lagged value of export, IMP<sub>t-1</sub> = one year lagged value of import, EXR = Exchange Rate, INTR = Interest Rate, MS = Money Supply, e = Disturbance Term or Error Term. A log-linear specification of the model 1and model 2 can be restated for easy estimation process as follows:

$$\ln Export_t = \beta_0 + \beta_1 EXP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INR_{t-1} + + \beta_5 MS_{t-1} e_t \quad (26)$$

$$\ln Import_t = \beta_0 + \beta_1 IMP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INfR_{t-1} + + \beta_5 INR_{t-1} e_t \quad (27)$$

Where: lnExports = logarithm of exports, lnImport = logarithm of imports, lnINTR = logarithm of interest rate, lnEXR = logarithm of real exchange rate, lnMS = logarithm of money supply. The coefficients described the directions and strengths of the relationship between currency devaluation and exports in Nigeria respectively with the factors that used to determine currency devaluation and exports in the model (called Explanatory Variables).  $\epsilon_t$  and  $\mu_t$ , represent the

error term for the models. This is in line with the work of Imimole and Enoma (2011) on the effects of exchange rate depreciation and inflation in Nigeria.

### **3.2.2 Methods of Data Analysis**

This study examined the impact of currency devaluation on exports and import in Nigeria; it determined the nature of relationship that exist between currency devaluation and exports, examine the relationship among other explanatory variables. This study used the following econometric test which includes unit root test to check for the non-stationary of the time series data, and ARDL, to estimate the coefficients of the parameters.

#### **3.2.2.1 Unit Root Test**

Most of the time series data are connected with the problem of non-stationarity as the data set may have time-varying mean or time-varying variance or suffer both. If time series data is non stationary that is having a mean or variance changing over time such data is said to have unit root. Stationary implies that the distribution of a process remains unchanged when shifted in time by an arbitrary value. The standard approach for testing for stationary of time series data is through unit root test. The following are units' root tests Dickey-Fuller Test (DF), Augmented Dickey-Fuller Test (ADF), Philips Perron tests (PPT) because they account for correlation and in addition, they are also widely used in unit root tests (Gujarati, 2004).

##### **3.2.2.1.1 Augmented Dickey-Fuller (ADF) Test**

The ADF is used to know the stationary of the data. This test is carried out to know the order of integration of a variable, that is to say how many times a given variable has to be differenced or not to become stationary. It is used to check for the presence of a unit root in the variable that is having a mean or variance changing over time, (Philips & Perron, 1988). The use of non-stationary variables leads to "spurious regression phenomenon" as discussed by Granger and Newbold (1974), Philips and Perron (1988) have all equally shown that the usual test statistics will not possess standard distributions if some of the variables in the model have unit roots and are thus non stationary, hence, the need for any non-stationary time series to be differenced appropriately to achieve stationary (Granger, 1988). The equation of ADF with constant terms and trend is stated as follow:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{k=1}^m \gamma_k \Delta Y_{t-k} + \mu_t \quad (28)$$

Where:  $\Delta Y_t$  = First difference of  $Y_t$ ,  $Y_{t-1}$  = Lagged value of  $Y_t$ ,  $\delta$  = Test coefficient,  $\mu_t$  = Error term,  $\beta_1$  = Constant,  $\beta_2$  = Coefficient of time variable. This is in line with the work of Oyinbo, Abraham, and Rekwot (2014) on the nexus of exchange rate deregulation and the agricultural share of gross domestic product in Nigeria.

##### **3.2.2.1.2 Phillips Perron Unit Root Test**

The Phillips Perron test (1988) approach makes a correction to the t statistic to account for the serial correlation. In case of a structural break in the series, the ADF test might be biased in

identifying data as being integrated even with structural change. In to overcome this pitfall, Phillips Perron proposes a non-parametric test to evaluate the time series properties in the presence of structural change at the unknown point.

### 3.2.2.2 Autoregressive Distributed Lag Model (ARDL)

The autoregressive distributed lag Model was advocated originally by Pesaran and Shin (2000). This approach has an advantage that it does not require the entire variable to be integrated of the same order I (1). It is applicable if there is a combination of I (0) and I (1). The ARDL is based on the following conditions:

- It applicable even if the series under investigation are stationary at I(0) or I(1) or a mixture of both.
- It provides a robust and high reliable quality result even if the sample size is large or small.
- It takes into consideration the error correction model. The autoregressive distributed lag for both long run and short run model is written as follow:

$$\Delta EXP_t = \theta_0 + \sum_{i=0}^{exp} \theta_1 \Delta EXP_{t-1} + \sum_{i=0}^{exr} \theta_2 \Delta EXR_{t-1} + \sum_{i=0}^{inr} \theta_3 \Delta INR_{t-1} + \sum_{i=0}^{ms} \theta_4 \Delta MS_{t-1} + \beta_1 EXP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INR_{t-1} + \beta_4 MS_{t-1} + \delta_t \quad (29)$$

$$\Delta IMP_t = \theta_0 + \sum_{i=0}^{exp} \theta_1 \Delta EXP_{t-1} + \sum_{i=0}^{exr} \theta_2 \Delta EXR_{t-1} + \sum_{i=0}^{inr} \theta_3 \Delta INR_{t-1} + \sum_{i=0}^{ms} \theta_4 \Delta MS_{t-1} + \beta_1 EXP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INR_{t-1} + \beta_4 MS_{t-1} + \delta_t \quad (30)$$

From the above ARDL model, exp, imp, exr, inr, ms stands for the lag length, the short run effect of currency devaluation on exports and imports in Nigeria are detected by the sign and significance of  $\theta$ s, also the sign and significance of  $\beta_1$  normalized on  $\beta_4$  showing the long run effects in line with work of (Baba & Yazici, 2016).

#### 2.2.2.2.1 Co-integration Bound Test

The most important econometric tools for examining the nature of ARDL long-run relationship that exists among time series variables are the co-integration bound test. The term co-integration test refers to a relationship that exists between a non-stationary series in the unit root processes. The existence of a co-integrating relationship between two variables has the following economic intuition. Firstly, if two series are co-integrated even though both processes are non-stationary it means that there is a long-run equilibrium relationship linking both series so that the relationship is stationary (Gujarati 2004). Secondly, a set of variables are co-integrated if the series is 1 (1).

## 2.2.2.2.2 Error Correction Model (ARDL)

The error correction model measure short run associations that exist among time series variables. The error correction model can be specified as follows:

$$\Delta \ln EXP_t = \beta_0 + \beta_1 \sum_{t=1}^{exr} \Delta \ln EXR_{t-1} + \beta_2 \sum_{t=1}^{inr} \Delta \ln INR_{t-1} + \beta_3 \sum_{t=1}^{ms} \Delta MS_{t-1} + \varepsilon ECM(-1) + \mu_t \quad (31)$$

$$\Delta \ln EXP_t = \beta_0 + \beta_1 \sum_{t=1}^{exr} \Delta \ln EXR_{t-1} + \beta_2 \sum_{t=1}^{inr} \Delta \ln INFR_{t-1} + \beta_3 \sum_{t=1}^{ms} \Delta INR_{t-1} + \varepsilon ECM(-1) + \mu_t \quad (32)$$

Where:  $\Delta$  = Difference or changes capturing short-run impact,  $\varepsilon$  = Capturing long-run impact,  $ECM(-1)$  = Error Correction Term,  $\mu_t$  = Error Term. This ECM model is drawn from the existing literature of Oladapo and Oloyede (2014) with modification. From the above equation the short run impact is addressed via the individual coefficients of the different terms, also the ECM coefficient of the specification contains information about whether the past values of variables affect the current values.

## 4.0 Results and Discussions

### 4.1 Unit Root Test

**Table 4.1:** Augmented Dickey-Fuller and Phillips Perron Unit Root Test Results

Variables	ADF TEST RESULTS		PP TEST RESULTS		Order of integration
	Constant	Trend	Constant	Trend	
$\Delta LEXP$	-5.9987***	-5.0023**	-5.9987***	-6.8562***	1(1)
$\Delta LIMPP$	-6.6600***	-6.6303***	6.6600***	-6.6303***	1(1)
$\Delta CURD$	-4.9900***	-5.2333***	-4.9900***	-5.3034***	1(1)
$\Delta INTR$	-5.1979***	-5.6352***	-6.5570***	-6.8218***	1(1)
$\Delta LMS$	-3.3510*	-2.8543	-3.3695*	-3.2958*	1(1)
$LEXP$	-1.3308	-0.7239	-1.3714	-0.7239	1(0)
$LIMP$	-1.0118	-0.7784	-1.0118	-1.3586	1(0)
$CURD$	-1.7499	-1.3586	-1.8593	-1.4097	1(0)
$INR$	-2.3113	-2.1302	-2.3091	-2.0561	1(0)
$LMS$	-0.9239	-2.3070	-0.1444	-2.1573	1(0)

Source: Eviews 9.5, Significant level at \*\*\* (1%), \*\* (5%), \* (10%)

Table 4.1 shows a result of the unit root test carry out using ADF and PP test respectively, from the result obtained some of the variables were said to be stationary at a level value 1(0) and others after the first difference 1(1). This is good for the model as it will pave way for the use

of ARDL model; co-integration test will be carried out using autoregressive distributed lag model.

#### 4.2 Co-integration Bound Test

Co-integration bound test was conducted in order to see if there exist co-integration among the variables to be investigated this will give way for the estimation of the long and short run examination of ARDL.

**Table 4.2:**Co-integration Bound Test Estimation Results

Test statistic	Value	Sign. Level	Lower Bound I(0)	Upper Bound I(1)
F- statistic	5.3	1%	3.65	4.66
K	4	5%	2.79	3.67
		10%	2.37	3.2

**Source:** Eviews 9.5, Note: k= no of observation, lower bound = 1(0), upper bound = 1(1).

Table 4.2 shows that there is co-integration among the variables. This is because the F-statistics of 5.30 is greater than the critical lower bound value of 3.65 and the upper bound value of 4.66 at 1% level of significant hence there are existences of co-integration among the parameters under study. The number of independent variables is three (3), therefore K=4. Therefore, since the bound test has revealed evidence of long-run co-integration among the variables there is a need to test for the long run relationship of ARDL. Also, from the F calculated value of 5.30, the null hypotheses of no long run co-integration can be rejected and accept the alternative hypothesis that says there is cointegration.

#### 4.3 Long Run Estimation Test (ARDL)

This has been carried out after knowing the level of co-integration among the variables so as to know the nature of relationship in the long run between dependent and independent variables.

**Table 4.3:** ARDL Long Run Co-Efficient Estimation Results

Dependent Variable: EXPORT				
Inde. Variables	Coefficient	Std. Error	T- statistics	P- value
CURD	-0.0019	0.0026	-0.7070	0.4856
INR	0.0579	0.0217	2.6652	0.0128
LMS	1.0054	0.2284	4.4012	0.0002

Eviews 9.5,  $R^2 = 98$ , F- stat. = 277.80(0.000), Adjusted  $R^2 = 0.98$ , AIC = -0.75, SIC = -0.44, HQC = -0.64, DW = 2.00.

**Table 4.4:** ARDL Long Run Co-Efficient Estimation Results

Dependent Variable: IMPORT				
Inde. Variables	Coefficient	Std. Error	T- statistics	P- value
CURD	-3.6553	0.7614	-4.8006	0.1944
INFR	0.5009	0.0624	-8.0299	0.0788*
INR	-0.3455	0.1154	-2.9934	0.9797

Eviews 9.5,  $R^2 = 98$ , F- stat. = 277.80(0.000), Adjusted  $R^2 = 0.98$ , AIC = -0.75, SIC = -0.44, HQC = -0.64, DW = 2.00.

Table 4.3 shows that there is a negative and statistically insignificant relationship between currency devaluation and export in Nigeria throughout the sample period. A 1% increase (decrease) in currency devaluation and currency devaluation will lead to about 0.0019% decrease (increase) in export in Nigeria. The interest rate is positive and statistically significant at the 5% level. Meaning that 1% increase (decrease) in interest will result in about 0.057% increase (decrease) in exports in Nigeria. Money supply is positive and statistically significantly related to exports in Nigeria, at a 1% level.

This implies that a 1% increase in money supply will bring about 0.0054% increase in exports in Nigeria. Results also show that 98% variations in the exports are explained by currency devaluation, interest rate, and money supply. Result also shows that. The results from the long run ARDL reveal that there is a long run relationship between interest rate, money supply and exports in Nigeria, but with no long-run relationship between currency devaluation and exports in Nigeria.

Table 4.4 shows that there is no relationship between currency devaluation, interest rate and import in Nigeria. This implies that currency devaluation and interest have no influence on import in Nigeria of what so ever. Results also indicated there is negative and significant association between inflation rate and import in Nigeria. A 10% increase (decrease) on inflation rate will bring about -0.50% decrease (increase) in import in Nigeria. This implies that there is inverse connection between inflation rate and import in Nigeria

#### **4.4 Short Run Estimation Test ECM (ARDL)**

The error correction model is conducted to detect the short run associations between the dependent variables (exports) and independent variables (currency devaluation, interest rate, and money supply).

**Table 4.5:** Short Run Estimation Results of ARDL (ECM Model)

Dependent Variable: EXPORT				
Inde. Variables	Coefficients	Std. Error	F- statistics	P- value
CURD	-0.0007	0.0011	-0.6399	0.5276
INR	0.0232	0.0075	3.0934	0.0046
LMS	0.4030	0.2296	1.7553	0.0905
ECM	-0.4510	0.0909	-4.9635	0.0000

Eviews 9.5,  $R^2 = 0.36$ , Adjusted  $R^2 = 0.32$ , DW = 1.79, F – stat. = 0.0000.

**Table 4.6:** Short Run Estimation Results of ARDL (ECM Model)

Dependent Variable: EXPORT				
Inde. Variables	Coefficients	Std. Error	F- statistics	P- value
CURD	-0.0007	0.2092	1.3480	0.1933
INFR	0.2820	0.0036	-1.8631	0.0524
INR	0.4030	0.0132	0.0257	0.9797
ECM	-0.0173	0.0083	-2.0834	0.0000

Eviews 9.5,  $R^2 = 0.36$ , Adjusted  $R^2 = 0.32$ , DW = 1.79, F – stat. = 0.0000.



Table 4.5 shows the short run dynamic associations between exports and its explanatory variables was estimated using error correction model (ECM). The error correction model is negative, less than one (-0.45) and statistically significant at 1% level. Currency devaluation is negative and statistically insignificant even at 10%. A 10% increase (decrease) in currency devaluation will lead to about -0.0007% decrease (increase) in exports in Nigeria.

There is a positive and statistically significant relationship between interest rate and exports in Nigeria. A 10% increase (decrease) in interest rate will bring about 0.0232% increase (decrease) in Exports in Nigeria. Money supply has a positive and statistically significant effect on exports in the short run. This means that a 10% rise in the money supply will result in about 0.40% rise in exports in Nigeria. Therefore, there is an existence of a short run relation between interest rate, money supply and exports in Nigeria. There was no short-run relationship between currency devaluation and exports in Nigeria.

Table 4.6 revealed that there is no short run relationship between currency devaluation, interest rate and import in Nigeria. Other result also indicated that there is negative and significant relationship between inflation rate and import in Nigeria in the short run at 5% level of significant. A 1% increase (decrease) in inflation rate will lead to about 28% decrease (increase) in import in Nigeria in the short run.

#### **4.5 Diagnostic Test (Test for Autocorrelation)**

Diagnostic test was carried out to test for presence of autocorrelation in the model using Serial Correlation, Heteroskedasticity, Histogram – Normality Test, and correlogram.

**Table 4.7:** Serial Correlations, Heteroskedasticity, Histogram – Normality Test

<b>Tests</b>	<b>F- stat. Value</b>	<b>Prob. Value</b>
Serial Correlation LM Test	0.3184	0.7302
Heteroskedasticity Test	0.8400	0.5502
Histogram – Normality Test	0.3780	0.8278

**Source:** Eviews 9.5.

Table 4.5 shows the serial correlation, and Histogram – Normality. Serial correlation test (LM) P-Value of 0.7302 which is statistically insignificant, the null hypotheses of no serial correlation will be accepted and alternative hypotheses of there are a serial correlation is rejected this is because the P – value is greater than 5%. Therefore, the model is free from autocorrelation. Heteroskedasticity test P-Value is 0.5502 is statistically insignificant, the null hypotheses of no Heteroskedasticity will be accepted and the alternative hypotheses of there is Heteroskedasticity is rejected because the P-Value is greater than 5%, hence the model is free from autocorrelation and desirable. Histogram – Normality test was also carried out the P-Value is 0.8278 the null hypotheses is accepted and reject the alternative hypotheses because the P-Value is greater than 5%.

## **5.0 Conclusion and policy Recommendation**

### **5.1 Conclusion**

This study examines the impact of currency devaluation on exports and import in Nigeria. Findings from the study show that there is exist no association between currency devaluation and exports in Nigeria in both short and long run. Based on the findings of this work, the following conclusions are hereby drawn: currency devaluation as policy prescription has not been effective in enhancing the exports performance in Nigeria in both the short-run and long-run.

Finally, it is worthy to note that currency devaluation as a policy option cannot be used solely to enhance the export performance in Nigeria. This is because continuous currency devaluation will further deteriorate the export performance of the country.

### **5.2 Policy Recommendations**

In view of the above findings, the following recommendation was suggested: first there is a need for government at all levels to improve the real or productive sector of the economy so as to increase the domestic production of exports which are currently insufficient. Exportation in the non-oil sector should be motivated through the acquisition of improved technological known how and means of production whereas a high level of consumable items should be discouraged.

Secondly, the policymaker should take currency devaluation as the last result whenever there is an imbalance in the economy. Thirdly, Policy measure toward stabilization of the exchange rate should be enhanced.

## **Reference**

- Abera, (2016). Devaluation in developing countries: Expansionary or Contractionary? *Journal of Economic and Social Research*, 2(1), 59-65.
- Ayen, W.Y. (2014). Effects of currency devaluation on output: The case of Ethiopia economy. *Journal of Economics and International Finance*, 6(5).
- Austin, A.M., & Fynface, N.A. (2016). Impact of currency devaluation on economic growth of Nigeria. *International Journal of arts and humanities (IJAH)*, 5(1).
- Akonji, R.D, Wakili A.M & Sakiru O.K. (2013). Dynamics of the trade balance: An empirical investigation of Nigeria J-curve hypothesis. *Journal of humanities and social Science*, 7(4), 51-52.
- Asif, M. & Shah, Q.S. (2016). Devaluation and its impact on money supply growth. *Journal of Social and Organization Analysis*.
- Anaraki, K.N. (2014). Effects of euro devaluation on eurozone exports. *International Journal of Economics and Finance*. 6(2), 1916-9728.

- Amer Z.W. (2015). CBE and FX devaluation: Bitter enemies or is it just a matter of time? analyzing the impact of an Egypt devaluation on trade balance. *Topics in Middle Eastern and African Economies*, 16(2).
- Bahmani, M., & Miteza, L. (2003). Are devaluation expansionary or Contractionary? A Survey Article. *Economic Issues*.
- Baba, A.k., & Yazici, M. (2016). The J-curve hypothesis: An investigation of bilateral trade between Nigeria and European Union. *Journal of International and Global Economic Studies*.
- Breuer, S. & Klose, J. (2013). Who gain from nominal devaluation: An empirical assessment of Euro area exports and imports. *Working Paper*.
- Draunivudi & Mocevinaka (2014). Effects of currency devaluation on economic growth of Fiji. *Research Gate*, 1(10).
- Edoun, E.I., Mofundisi, T., & Mbohwa, C. (2015). Assessment of impact devaluation on trade balance and marketing in Zimbabwe (1990-2005). *Innovative Marketing*, 11(1).
- Granger, C.W.J. (1988). Some recent developments in a concept of causality. *Journal of Econometrics*, 39, 199-211.
- Granger, C.W.J., & Newbold, P. (1974). Spurious regression in econometrics. *Journal of Econometrics*, 2, 111-120.
- Gujarati, D.N. (2004). *Basic econometrics, 4th edition*. USA: United States Military Academy, West Point. Online book.
- Genye, T. (2011). Currency devaluation and economic Growth the case of Ethiopia. Master thesis Department of Economics, Stockholm University.
- Gossaye, T. (2015). Effectiveness of devaluation in achieving internal and external balance: The Case of Ethiopia.
- Husted, A., & Micheal, M. (1995). *International Economics" 3rd Edition*. Harper Collins. College Publisher, 422.
- Hooy, C-W., & Chan, T. H. (2008). Examining exchange rates exposure, j-curve and the marshall-lerner condition for high frequency trade series between China and Malaysia. *Munich Personal RePEc Archive*, (10916)
- Krugman, P., & Taylor, L. (1978). Contraction effects of devaluation. *Journal of international Economics*, 8, 445-456.
- Kachan, D. (2012). Relationship between currency depreciation and output growth in Pakistan a time series study. *International Science Press*. 5(1), 81-92.

- Kushneel & Dibyendu (2013). Investigate the existence of J-curve disparity in Fiji. Conference Paper. School of Economics. The University of the South Pacific. Laucala Campus, Suva, Fiji.
- Krueger, A. (1983). Exchange rate determination. Cambridge University Press.
- Loto, M.A (2011). Does devaluation improve the trade balance of Nigeria? A test of marshallerner condition. *Journal of Economics and International Finance*, 3(11), 624-633.
- Mahesh (2015). On the presence of J-Curve hypotheses in the Nepalese economy. Nepal Rastra Bank. IDEA.
- Metzer, L. (1948). Theory of international trade. *A Survey of Contemporary Economics*, Philadelphia Blackstone.
- Mohammad, I.H. (2010). Can a depreciation of dollars close US trade deficit? RCAPS. *Working Paper*, 10-2.
- Mujidat, A. & Akinola, F. (2016). Currency devaluation and manufacturing output growth in Nigeria. *Journal of Economics and Sustainable Development*, 7(8).
- Oladapo & Oloyede (2014). Foreign exchange rate management and the Nigerian economic growth. *European Journal of Business and Innovation Research*, 2(2), 19-27.
- Oyinbo, Abraham, & Rekwot (2014). Nexus of exchange rate deregulation and agricultural share of domestic product in Nigeria. *CNB Journal Applied Statistics*, 5(2).
- Opaluwa, D. *et al.* (2010). The effects of exchange rate fluctuations on the Nigerian manufacturing sector. *African Journal of Business Management*, 4(14).
- Pesaran, M.H., Shin Y. & Smith R.J. (2000). Structural analysis of vector error correction models with exogenous I (1) variables. *Journal of Econometrics*. 97(2), 293- 343.
- Phillips, P.C.B. & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrical*, 75(2), 335-346.
- Robison, J. (1947). The foreign exchange essays in the theory of employment. Oxford Blackwell, 24-53.
- Raza ,A. (2013). Effects of currency depreciation on trade balances of developing economies: A comprehensive study on South Asian countries. *Journal of Humanities and Social Science (IOSR-JHSS)*, 14(6).
- Shafi, K.(2015). Impact of exchange rate, inflation rate, and interest rate on balance of payment. A Study from India and Pakistan. *American Journal of Business and Management*. 3(1), 9-13.

- Shahzad, I., & Afzal, Y. M. (2013). Impact of currency devaluation on exports: Comparative study on Pakistan, Bangladesh and India. *A Research Journal of Commerce, Economics and Social Sciences*, 7(1), 20-21.
- Sumesh, M. (2010). An estimation of the J-Curve effect between South Africa and the BRIC countries. A research report submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.
- Shelly-Ann, Wilson, S.A., & Mclean E. (2014). Understanding the impact of exchange rate adjustment on the trade balance of selected Caribbean countries.
- Sibe, Jacob, & Pegou (2012). The impact of the devaluation of the CFA Franc on the trade balance of EMCCA countries. *International Journal of Advance In Management And Economic*, 1(4).
- Thorbecke W., & Kato A. (2012). Effect of exchange rate changes on Japanese consumption exports. *Japan and the World Economy*, 24(1), 64-71.
- Williamson, J. (1983). The exchange rate system: Washington DC, Institute for International Economics.
- Yilanci, V. & Hepsag, A. (2008). Contraction and expansionary effects of devaluation. *Journal Economic cooperation and Development*, 19-23.
- Yusuf, U.A., & Bambale, J.A. (2016). Effects of currency devaluation on the performance of business in the North-Western Nigeria: A conceptual model. *International Journal of Management and Commerce Innovation*, 4, 84-87.
- Yazidi, J. (2013). The impact of exchange rate on trade balance. A Dissertation Submitted to the Department Economics University of Tanzania.

