



Re- Evaluation of the Effectiveness of Exchange Rate Depreciation on Import Demand in Nigeria

Atuma Emeka¹; Bright S. Ebuka²; Nwibo N. Fidelia³; Nkwagu C. Christain⁴; Udenta B. Nancy⁵; Njim S. Robert⁶; Ogbonna J. Nkendirim⁷ and Uwaeke G. Uchekukwu⁸

1,2, 3, 4, 5, 6, 7, & 8 Department of Economics, Ebonyi State University, P.M.B. 053 Abakaliki, Ebonyi State, Nigeria

Corresponding author's E-mail: atumaemeka9@gmail.com

Abstract

The study investigated the impact of exchange rate depreciation on import demand in Nigeria from 1986 to 2021. The data used was sourced from Central Bank of Nigeria. Ex-post facto research design was adopted in the investigation. Multiple regression analysis was employed, in which Auto-Regressive Distributed Lag (ARDL) model as the method of analysis was utilized in the research. The ARDL model evaluates short-run and long-run interactions among the specified variables. The unit root tests conducted using Augmented Dickey-Fuller (ADF) revealed that the time series variables used were stationary at level and the first difference, but none of the variables was stationary at the second difference. The ARDL – Bound test analysis revealed the existence of long-run equilibrium relationship between exchange rate depreciation and import demand in Nigeria within the period of the study. The coefficient of error correction mechanism was statistically significant and also negatively signed. The results equally found that exchange rate depreciation is statistically not significant and negatively impacted on import demand in Nigeria in the short-run. However, in the long-run, exchange rate depreciation is negatively impacted to import demand and statistically significant. Causal relationship does exist between exchange rate depreciation and import demand in Nigeria with causation running from import demand to exchange rate depreciation. On the basis of the findings, the researcher made the following recommendations among others: Government should consider inward looking to strengthen the imports substitution policies that ensure massive production of goods and services.

Keywords: Exchange Rate Depreciation, Import Demand, Autoregressive Distributed Lag Mode, Nigeria

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Introduction

The exchange rate of an economy plays a critical role in the promotion of growth and development of the economy. This is simply because, it has a direct impact on all macroeconomic variables, including domestic price indicators, profitability of traded goods and services, resource allocation, and investment decisions like exports and imports, which explains why monetary authorities and private sectors strive for stability in these variables (Ajakaiye, 2001; Akpomi & Kayii, 2021). It is a crucial macroeconomic variable in the formulation of economic policies in general and economic reform programs in particular, in which these policies aid in the acceleration of macroeconomic goals. In Nigeria, these goals include obtaining and maintaining price stability; achieving and maintaining balance of payment equilibrium; full employment; equitable income distribution; economic growth; and development.

Conceptually, exchange rate is defined as the rate at which one country's currency is exchanged for another currency. That is, exchange rate is a price of one currency in relation to another currency. Whether appreciated or depreciated, exchange rate has direct effect on the level of economic growth and development of nations; especially the developing nations like Nigeria, where there is persistent exchange rate depreciation overtime (Akpomi and Kayii, 2021). Hence, appreciation of exchange rate entails when a nation's exchange rate gained more value against a foreign currency of another country. On the other hand, depreciation of exchange rate occurs when the currency of a country lost value relative to other countries of the world in the foreign exchange market (Celina, Eze and Atuma, 2018).

The demand for and supply of foreign currency determines the rate of exchange of a country. If the demand for foreign exchange exceeds the supply of the foreign exchange, it results in exchange rate depreciation and vice-versa. Hence, depreciation in exchange rate brings about improvement in the volume of exports and decreases imports volume, while appreciation in exchange rate leads to increase in imports volume and declines exports volume of a nation. Hence, exchange rate plays a dominant role in the growth and development of every economy, both developed and developing economies. Whether appreciated or depreciated, exchange rate



has direct effect on the level of economic growth and development of nations; especially the developing nations like Nigeria, where there is persistent exchange rate depreciation overtime (Akpomi & Kayii, 2021). Appreciation of exchange rate entails when a nation's exchange rate gained more value against a foreign currency of another country. On the other hand, depreciation of exchange rate occurs when the currency of a country lost value relative to other countries of the world in the foreign exchange market (Celina, Eze & Atuma, 2018; Akpomi & Kayii, 2021).

According to Marshall-Lerner theory, exchange rate depreciation has a positive association with exports and negative relationship with imports in an economy. Consequently, using trend analysis, we observed that the naira exchange rate against US dollar depreciated from ₦0.6702 in 1982 to ₦19.6609 in 1992; and in 2002, the exchange rate depreciated further to ₦120.9793. By 2012 and 2018, the naira exchange rate against the US dollar again depreciated to ₦155.9402 and ₦306.7095 respectively. On the other hand, the export performance recorded a negative growth rate of 25% in 1982; and by 1992, the growth rate of export performance increased to 69.2%. In 2002, the export performance again recorded a negative growth rate of 6.6%. Furthermore, the export performance of Nigeria also had a negative growth rate of 0.64% in 2012 and a positive growth rate of 37.8% in 2018. Similarly, between 2019 to 2020, when the exchange rate depreciated again to ₦381.00, the exports and imports recorded positive growth rates of 6.4% and 52.1%, respectively (CBN, 2020). The facts above suggest that exchange rate depreciation in Nigeria appears to have deviated from economic postulation that depreciation in exchange rate of a country brings about improved export performance (trade balance) by increasing foreign aggregate demand for export products, export volume, export revenue, stimulates investment in the export sector, generates employment, ensures balance of payments and above all improves economic growth of the nation. The economic implication of this persistent exchange rate depreciation in Nigeria is high prices on goods and food import, high cost of acquiring foreign education, high cost of acquiring development materials,; and all these lead to reduced living standard by increasing cost of living. Hence, this research work is to examine the impact of exchange rate depreciation on import demand in Nigeria.



Literature Review

Several attempts have been made to empirically investigate the relationship existing between exchange rate fluctuations and foreign trade. Some of these studies include:

Ewubare and Ushang (2022) examined the relationship between exchange rate and economic growth in Nigeria between 1981 and 2020. The data on the variables were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and World Development Indicators, and analyzed using descriptive statistics, unit root as well as bounds cointegration tests and ARDL model. The unit root test results showed that the variables are mixed integrated. The bounds cointegration test showed that long run relationship exists between GDP growth and the underlying explanatory variables. The findings showed that exchange rate and inflation negatively impacted on economic growth.

Eyung, Agbor and Orajekwe (2021) investigated the effect of exchange rate fluctuation on economic growth of Nigeria: 1996 – 2016. The research adopted Rudi Dornbusch Exchange rate overshooting model as the main theoretical framework. The study employed multiple regression analysis with Ordinary Least Square (OLS) econometric technique to examine the effect of exchange rate fluctuation on the economic growth in Nigeria. The result showed that exchange rate has significant positive effect on economic growth in Nigeria. It therefore suggests strict foreign control policies in order to determine appropriate exchange rate value in Nigeria.

Dania and Ogedengbe (2019) did an empirical work on the impact of exchange volatility on non-oil export performance in Nigeria for the period 1981-2017, using Augmented Dickey-Fuller (ADF) unit root test, Johansen cointegration test, Arch test used to test for volatility, and error correction model (ECM) employed to investigate the speed of adjustment. The results of the unit root test indicated at level, none of the variable was stationary; however, all the variables became stationary at first differencing. The estimation results also revealed that exchange rate volatility had negative and significant effect on non-oil export performance in Nigeria. More so, the results



indicated that interest rate and foreign direct investment had negative and significant influence on non-oil export while total government expenditure had positive and insignificant impact on non-oil export in the economy.

Akinniran and Olatunji (2018) evaluated in comparative terms, the effects of exchange rate on agricultural exports in Nigeria for the period covering 2002 and 2013, using quarterly data. The variables utilized in the investigation were agricultural gross domestic product, foreign direct investment, inflation, land, exchange rate, import rate, government expenditure, agricultural terms of trade, and crude oil. The analytical methods used in the research were the unit root test and regression analysis, which were employed to evaluate the trend in agricultural export in Nigeria. The unit root test indicated mixed order of integration, with order of integration achieved at both order zero and order one. The results of the regression analysis revealed that exchange rate devaluation had a significant and positive influence on agricultural export.

Akinbode and Ojo (2018) investigated the effect of exchange rate volatility on Nigeria's agricultural export performance for the period 1980-2015 using unit root test and the Generalized Autoregressive Conditional Heteroscedasticity (GARCH-1,1) model to generate the exchange rate volatility series which was subsequently incorporated into the Autoregressive Distributed Lag (ARDL) Model in determining the factors affecting agricultural exports. The model of the study was specified using the variables such as agricultural exports, real exchange rate, real gross domestic product, inflation rate, agricultural export domestic price, exchange rate volatility, and world market. The results of the unit root test showed mixed order of integration with integration achieved at order zero $I(0)$ and order one $I(1)$. From the estimation, the results revealed evidence of long-run relationship among variables employed in the investigation. The results also indicated that exchange rate volatility had insignificantly effect on exports both in the short-run and the long-run.

Alegwu, Aye, and Asogwa (2018) examined the effects of real exchange rate volatility on agricultural products export in Nigeria for the period from 1970 to 2013, using Augmented



Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, Johansen cointegration test, vector error correction model (VECM), Granger causality test. The variables analyzed were exports, real exchange rate volatility, inflation rate, interest rate, and trade openness. The results revealed that exchange rate volatility had negative long-run effect on all agricultural exports. The results based on Vector Error Correction Model (VECM) showed evidence of negative and insignificant short-run effects of real exchange rate volatility on agricultural export. From the Granger causality test, there exists bidirectional causality between agricultural exports and real exchange rate volatility.

Theoretical Framework

The study was anchored on Marshal-Lerner Theory of Exchange Rate. This theory was propounded by Alfred marshal and Abba Lerner. The Marshall-Lerner condition is a criterion that determines whether a country's balance of trade will improve or worsen in response to a change in the exchange rate. It is based on the idea that a depreciation of the currency (a decrease in the exchange rate) will lead to an improvement in the balance of trade if the sum of the price elasticity of demand for the country's exports and imports is greater than one. In other words, if the demand for a country's exports and imports is more sensitive to changes in price than the supply of these goods, the balance of trade will improve after the currency depreciates (Bahmani and Ratha, 2004).

Export-Led Growth Hypothesis

This Export-led growth hypothesis is traceable to David Ricardo's and Smith's classical theories of trade (Ram, 1987). In this view, among modern economists, Beckerman in his postulation in 1965 opined that favourable exports contribute to gains resulting from efficiency production that stem from improved allocation of resources. Haberlar (1959) in his own argument conceived the importance of dynamic benefits, which include an increase in foreign capital availability and technology by loosening constraints to balance of payments in the economy. Vernon (1966) on the other hand, dealt with the opposite causality direction for which he postulated that self-



induced growth in any economy brings about increase in competitiveness and hence, expansion in the exports of the nations. In a follow-up, endogenous theories of growth analyses gain that stem from export activities, using a model that is dominated by managerial, increasing returns to scale and effects of technological spill-over towards across all sectors of the economy (Fedor 1982).

Methodology

Research design constitutes the blueprint for the collection, measurement, and analysis of data. Since this research work explores causes and effect relationships, by examining the effect of exchange rate depreciation on import demand, where causes already existed and cannot be manipulated, Ex Post Facto Research Design was adopted. The series of the variables were subjected to unit root test; for the stationarity of the data so as to avoid spurious results. In broad terms, the model was equally subjected to autoregressive distributive lag model (ARDL) and granger causality test; for effect examination of both short and long run impact and direction of causation among the variables-for efficient and effective policy formulations. The estimation covers the period between 1986 and 2021 while secondary data obtained were analyzed using E-view 9. The model for this study is presented in a functional form as:

$$\text{IMP} = f(\text{EXR}, \text{GDP}, \text{INR}, \text{TOP}) \quad 1$$

Where; IMP = Import Demand; EXR = Exchange Rate Fluctuation; GDP = Gross Domestic Product; INR = Interest Rate; TOP = Trade Openness. In a linear function, it is represented as thus:

$$\text{IMP} = b_0 + b_1\text{EXR} + b_2\text{GDP} + b_3\text{INR} + b_4\text{TOP} + U_t \quad 2$$

Where; b_0 = Constant Term, b_1 = Regression coefficient of exchange rate fluctuation, b_2 = Regression coefficient of gross domestic product, b_3 = Regression coefficient of interest rate supply, b_4 = Regression coefficient of trade openness and U_t = Error Term.

Standard econometric techniques were engaged in the study with the aim of estimating results on the impact of exchange rate fluctuation on import demand in Nigeria. These econometric methods include the unit root test through the ADF stationarity test and the method of the Auto-



Regressive Distributed Lag (ARDL) model and Granger Causality Test. The estimation of the econometric techniques is discussed below.

The time series properties of data were examined in order to avoid spurious result emanating from the non stationarity of the data and to analyze the dynamic structure of the relationship. The estimation begins with a unit root test to confirm the stationarity state of the variables that enter the model using Augmented Dickey Fuller (ADF). The ADF test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favour of the alternative hypothesis of stationarity. For instance, if the computed absolute value of the tau statistic $|\tau|$ exceeds the ADF critical tau value, then reject the null hypothesis that $\alpha = 0$, in which the time series is stationary. But if the computed tau statistic $|\tau|$ value is less than the critical tau value, then do not reject the null hypothesis and therefore conclude that the time series is stationary. Therefore, it is of great importance to test the stationary state of each time series variable.

ADF unit root test is generally specified below as:

$$\Delta \log Y_t = \alpha_0 + \log Y_{t-1} + \sum_{i=1}^n \alpha_i \Delta \log Y_{t-i} + \delta_t + \epsilon_t \quad 3$$

Where, Y is a time series, t is a linear time trend, Δ is the first difference operator, ϵ_t is a pure white noise error term, α_0 is a constant, log is logarithm and n is the optimum number of lags in the dependent variable.

Consequently, conducting the tests with and devoid of a deterministic trend (t) for all the series and comparing P-Values with the critical values at 5% significance level, we observed that the series have mixed order of integration, we will adopt Auto-regressive distributed lag (ARDL) model. The use of the ARDL model followed the outcome of the unit root test. The model is most appropriate in a situation in which the results of the stationarity test indicated mixed order of integration among the variables employed in the research, especially when the mixtures involve I(1) and I(0). To determine order of integrations, several models of unit roots and co-integration have been developed by scholars mainly to investigate the long-run properties of the



time series engaged in the study. One of the popular models involve the ARDL model propounded by Engle and Granger (1987) who developed residual-based EG model; Johansen and Juselius (1990) maximum likelihood-based technique (JML); and Pesaran, Shin and Smith (2001), among others.

The ARDL model is necessary when the outcome of the unit root test indicated mixed order of integration. Meanwhile, to determine the short-run and long-run coefficients of the series, the ARDL model is applied in the analysis.

This is used to check for causality between two variables. In this case our aim is to test for a causal relationship between exchange rate depreciation and import demand. The rule states that if the probability value is less than 0.05 at 5% level of significance, there is a causal relationship.

Results

Table 1: Results of Augmented Dickey-Fuller Unit Root Test

| Variables | Level | | | First Difference | | | Remark |
|-----------|--------------|-------------------|---------|------------------|-------------------|---------|--------|
| | t-Statistics | 5% critical value | p-value | t-statistics | 5%-critical value | p-value | |
| LIMP | -2.688053 | -2.688053 | 0.0852 | -7.474258 | -2.938987 | 0.0000 | I(1) |
| LEXR | -2.356464 | -2.936942 | 0.1602 | -6.223238 | -2.938987 | 0.0000 | I(1) |
| LGDP | -2.242998 | -2.936942 | 0.1950 | -3.591607 | -2.938987 | 0.0105 | I(1) |
| INT | -3.247114 | -2.936942 | 0.0244 | ----- | ----- | ----- | I(0) |
| TOP | -2.455384 | -3.605593 | 0.1338 | -8.235588 | -2.938987 | 0.0000 | I(1) |

Sources: Researcher's computation from E-view 9

The Augmented Dickey Fuller (ADF) unit root test presented in table 1, revealed that interest rate (INT) was stationary at level whereas imports (IMP), exchange rate (EXR), gross domestic product (GDP) and trade openness (TOP) were stationary at first difference. This unit root test result therefore revealed the existence of a mixed order of integration among the variables of the study.

**Table 2: ARDL Bounds Test**

| Null Hypothesis: No long-run relationships exist | | |
|--|----------|----------|
| Test Statistic | Value | k |
| F-statistic | 4.743166 | 4 |
| Critical Value Bounds | | |
| Significance | I0 Bound | I1 Bound |
| 10% | 2.45 | 3.52 |
| 5% | 2.86 | 4.01 |
| 2.5% | 3.25 | 4.49 |
| 1% | 3.74 | 5.06 |

The results of the ARDL bounds test presented in Table 2 above shows that a long-run relationship exists among the variables. The result disclosed that the computed *F*-statistic (4.743166) exceeds the upper critical value (4.01) at 5% level of significance, which implies that exchange rate depreciation and import demand in Nigeria are co integrated in the long run.

Table 3: ARDL Short-run Coefficients Test

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-------------|-------------|------------|-------------|--------|
| D(LEXR) | -0.215285 | 0.107733 | 1.998323 | 0.0545 |
| D(LGDP) | 0.599713 | 0.125643 | 4.773155 | 0.0000 |
| D(INT) | 0.001389 | 0.011206 | 0.123912 | 0.9022 |
| D(INT(-1)) | -0.031531 | 0.012817 | -2.460143 | 0.0197 |
| D(TOP) | 0.013311 | 0.003759 | 3.541262 | 0.0013 |
| CointEq(-1) | -0.702748 | 0.126121 | -5.572028 | 0.0000 |

Sources: Researcher's computation from E-view 9.0

$R^2 = 0.995888$, $F\text{-stat} = 1072.627$, and $\text{Prob} (F\text{-stat}) = 0.000000$, $DW\ \text{stat} = 1.796734$

In table 3, the results indicated that exchange rate depreciation has a negative and insignificant effect on imports. The results also revealed that gross domestic product and trade openness have positive and significant effect on imports whereas interest rate at lag one has a negative and significant impact on imports of Nigeria. These claims are supported by the p-values and the coefficients of the variables estimated in the regression equations. From the results, the coefficients of LEXR, LGDP, INR(-1), and LTOP are 0.215285, 0.599713, -0.031531 and



0.013311 respectively; while their p-values include 0.0545, 0.0000, 0.0197 and 0.0013 respectively.

The results also indicated a coefficient of multiple determination (R^2) value of 0.995888, which entails that 99.6 percent of the variations in the dependent variable are accounted by changes in the specified independent variables. The results above indicate that the explanatory variables are very good predictors of the explained variable and therefore, represents a measure of goodness of fit of the model. Equally, the value of F-statistic as can be discerned from the model is 1072.627 with Prob (F-statistic) of 0.000000, which is less than 0.05 critical value indicates that the explanatory variables exert significant joint influence on the explained variable when considered at 5 percent level of significance. The Durbin-Watson stat revealed in the estimation results is 1.796734 which is approximately two digits, shows the absence of serial auto correlation in the model.

Table 4: ARDL Long-run Coefficients Test

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| LEXR | -0.306347 | 0.134290 | 2.281237 | 0.0296 |
| LGDP | 0.853382 | 0.092002 | 9.275729 | 0.0000 |
| INT | 0.024653 | 0.020877 | 1.180872 | 0.2466 |
| TOP | 0.018941 | 0.005370 | 3.527133 | 0.0013 |
| C | -2.961889 | 0.617159 | -4.799235 | 0.0000 |

Sources: Researcher's computation from E-view 9.0

Table 4 above reveals the long-run coefficients test results of the ARDL model for which the variables under consideration were estimated. From the results, exchange rate has a negative and significant effect on import. The results also revealed that gross domestic product and trade openness have positive and significant effect on import whereas interest rate has a positive and insignificant impact on import in Nigeria. In the same vein, these claims are supported by the p-values and coefficients of the variables estimated from the ARDL long-run coefficients test. From the results, the coefficients of LEXR, LGDP, INT and TOP are 0.306347, 0.853 382, 0.024653 and 0.018941 respectively and their p-values include 0.0296, 0.0000, 0.2466 and 0.0013 respectively.

**Table 5: VAR Granger causality Test**

Dependent variable: LEXR

| Excluded | Chi-sq | df | Prob. |
|----------|----------|----|--------|
| LIMP | 9.758268 | 2 | 0.0076 |
| LGDP | 2.006670 | 2 | 0.3667 |
| TOP | 1.733721 | 2 | 0.4203 |
| INT | 10.48578 | 2 | 0.0053 |
| All | 29.13431 | 10 | 0.0012 |

Source: Researcher's compilation from E-view 9.0

Table 5 represents the results of causality test between exchange rate depreciation and import demand in Nigeria. The test rejects the null hypothesis of no significant causal relationship between the variables, if the corresponding p-value of the variable is statistically insignificant at 5 percent level of significance. From the estimation results, the Chi-square values of LIMP, LGDP, TOP and INT are 9.758268, 2.006670, 1.733721 and 10.48578 respectively while the associated p-values include; 0.0076, 0.3667, 0.4203 and 0.0053 respectively. These results imply that import has a significant causal relationship with exchange rate depreciation in Nigeria, with significant causality running from LIMP to EXR.

Conclusion

The study empirically investigated the impact of exchange rate depreciation on import demand in Nigeria for the period 1986-2021. Unit root test, ARDL method of analysis and causality test were employed in the analysis. The employed variables have different order of integration ranging from zero and one, which led to the application of ARDL. The results showed the presence of equilibrium long-run cointegrating equations of the variables used in the research. Hence, the estimated results showed that exchange rate depreciation has a negative and significant effect on import demand in Nigeria in the long-run. Lastly, the results revealed that import granger cause exchange rate in Nigeria within the period of the study.



Recommendations

Based on the findings, the study recommends that:

1. Monetary authority should intensify its policy measures in re-formulating and implementing exchange rate policies that target at reducing import and improve exports of the nation
2. Government should consider inward looking to strengthen the imports substitution policies that ensure massive production of goods and services.
3. Government should as a matter of urgency, encouraging refining of oil in the country so as to emasculate its heavy importation

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