THE DEVALUATION OF THE NAIRA AND THE STATE OF THE NIGERIAN ECONOMY 1985–2015 (AN ECONOMETRIC ANALYSIS)

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ABSTRACT

The paper investigated the impact of devaluation on the Nigerian economy from 1985–2016. Currency devaluation as a macroeconomic policy could have favorable as well as the unfavorable impact on any economy. The Nigerian government has demonstrated frequent implementation of this policy from 1986 till date, evidenced by the naira exchange rate to the dollar of between 450 and 480 naira at the time of this study. Hence, the need for a thorough examination of the impact (whether positive or negative) of currency devaluation on the Nigerian economy. To analyze the influence of devaluation as a policy on the Nigerian economy this study adopts the elasticity approach by using the import and export demand equation. The study used secondary time series data. For the analysis, Ordinary Least Squares (OLS) regression was adopted, with initial stationarity and stability tests. The result of the unit root test showed that the variables were of the same order of iteration being stationary at first difference. This gave room for the co-integration and error-correction tests. The overall result showed that even at this period, devaluation is yet to provide a solution for the Nigerian economy. This was because the sum of the relative prices of import and export coefficients stood at less than 1. This confirms again that devaluation is not the right policy for the Nigerian economy.

1. INTRODUCTION

Devaluation of a country's currency is a condition whereby the value of that currency is reduced as compared to other countries'

currencies. Devaluation is a policy that could for strengthening or correcting an imbalance in the trade position with other countries. The policy aims at making the exports of the devaluing country cheaper relative to other countries' imports.

Since devaluation is one of the economic policies used to stabilize or correct the shock in the trade balance of a nation, it could be used to solve many macroeconomic problems by reducing external imbalance, correcting perceived over-valuation of a currency, stabilizing competitive price and enhancing international competitiveness, as well as export expansion and earning of foreign currencies.

Many nations however avoid devaluation even though the International Monetary Fund supports devaluation when it is necessary and needed. Gafar (1981) endorsed devaluation as a policy of last resort. Wolf (2014) noted that changes in the official exchange rate may help to attain both internal and external balance, although the negative impact of exchange rate changes was also identified as having unwelcome impact on the domestic economy.

A country that engages in trade with other countries and can also expand exports will benefit from devaluation policy. The policy is actually good for countries that export many products to other countries of which the demand is elastic. According to Geoffrey (1981), when a nation requires goods and services from other countries, that nation must be able to make adequate arrangement for payment. To do this is by exporting goods and services to these other nations. The prices of the goods to be exported must be very competitive and attractive to the customers. In as much as a country could experience an imbalance in either the balance of payment or balance of trade positions, it is normal when the imbalance is a temporary one. But, when it becomes permanent from year to year, a stricter measure such as devaluation could be used to correct the imbalances.

The impact of the devaluation itself could be analyzed in different ways. These could be through the elasticity approach, absorption approach, monetary approach and asset demand approach. Change in the exchange rate as a policy to stabilize the economy is being used all over the world. Wolf (2014) believed it is useful in helping to attain both internal and external balance, even though it was also noted that there is always an unwelcome inflationary impact of devaluation. This means that a nation needs to be more careful in adopting the policy. The aim of the study is to investigate the

empirical literature on the relationship between currency devaluation and economic activity in Nigeria. Further, this study aimed at analyzing the impact of devaluing the Nigerian Naira on the oil-rich Nigerian economy for the period 1985–2015 using the elasticity approach.

2. LITERATURE REVIEW

Devaluation is a policy of stabilization of an economy. When devaluation is used as a policy in a country, especially for a long time, it will be easier to judge whether the devaluation is the right policy or not. Devaluation is also sometimes considered as a rather blunt economic tool applied when the specific policy goal is to assist particular disadvantaged industries; it could have repercussion especially when the target is to particular disadvantaged industries.

Vasylenko and Bazhenova (2014) examined the causal macroeconomic model of devaluation and inflation with respect to economic impact on the Ukraine and found that both devaluation and inflation always reduces real Gross Domestic Product (GDP). The study also established a relationship among emission, devaluation and inflation in the Ukrainian economy.

Wolf (2014) investigated the simultaneity of the effects of devaluation implications for modified planned economies (MPEs). The findings showed that the existing empirical estimates of trade elasticities in MPEs may be downwardly biased and that extreme pessimistic assessments of the devaluation effect may not be entirely internally consistent. It stressed further that trade elasticities in MPEs probably are lower than in market economies.

Reinhart (1997) investigated the devaluation effect on trade balance. The study investigated how relative price can affect the trade position of a country. He noted that relative price is a major factor and a major determinant to be considered. The study also revealed that relative prices have an impact on trade-able goods on a nation and this depends on the demand for these goods.

Zaidan (1999) and Reinhart (1994) in their analysis also suggested that large relative prices swings are necessary and required for there to be appreciable impact on trade position. Reinhart (1994) found that income and relative prices are both necessary and sufficient to pin down steady state trade flows, also in the developed country's income elasticity is much larger than that of the developing

countries. This signified that if countries all operate under the balanced growth hypothesis, the developing countries trade balance should improve with an exception to African countries due to the dominance of primary products in their trade content. Zaidan (1999) had a different opinion about the result because he believed this type of result might not hold for African countries based on the fact that their exports have high primary commodity content.

Al-Abdelrazag (1997) analyzed the Jordanian economy which was centred on the devaluation of the Jordanian currency for the period 1969–1994 and established that for the Jordanian economy, currency devaluation could not improve the economic position. He attributed this to the sum of demand for import and exports coefficients being less than one. For improvement to be realized, this sum must be greater than one. If, for example, this sum is equal to one, the balance of trade will remain at the same level.

The Cameroon economy was studied by Navaretti, Tybout, and De Melo (1997). Their findings were that devaluation had a major impact; in particular firms already involved in trade will benefit. Firms increased their exports, while non-exporting firms were reluctant to incur the substantial costs needed to enter the international market. Cost according to them increased especially for import-dependent firms, that is, those firms depending heavily on imported raw material and capital goods. For the Nigerian economy, the literature on the naira devaluation is extensive. One of the authors, Akinlo (1996) investigated the devaluation effect on the Nigerian economy. He discovered that a large devaluation of the naira as a policy adjustment during the structural adjustment program for the Nigeria economy worsened the economic situation and had a very terrible effect on the productive sector. According to Akinlo, the higher the exchange rate devaluation, the lower the rate of profit, and vice versa.

A nation that devalues must be able to compare where it started from, where it is, and where it is going. There must be a period of testing the impact of devaluation on the economy. Loto (2011) analyzed devaluation impact without oil on the Nigerian economy from 1986–2008. The study revealed that devaluation has no impact on the state of the Nigerian economy during the period analyzed.

Momodu and Akanni (2016) examined the impact of devaluation on economic growth in Nigeria from 1986 to 2012, using the Johansen co-integration technique and auto regressive distributed lagged model for the error correction mechanism. The study found that short term changes in the economy were sufficiently explained

by the currency devaluation policy, since the study revealed a positive relationship between currency devaluation and economic growth. In the long run price increases overshadow and neutralize the positive effect of devaluation. The study recommended that the Central Bank of Nigeria (CBN) should ensure that they stem down price changes while implementing currency devaluation and that the Nigerian government should consider currency devaluation only as a last resort.

Osundina and Osundina (2016) investigated the effectiveness of naira devaluation on economic growth in Nigeria using the ordinary least squares regression technique. They found that inflation and unemployment are the short run side effects of the devaluation policy and that although devaluation is not a bad idea for Nigeria, discretionary monetary policy measures should be put in place to curb the associated inflation.

Okoroafor and Adeniji (2017) investigated currency devaluation and macroeconomic variable responses in Nigeria using a vector error correction modelling approach on time series data from 1986 to 2016. The study reported a positive statistically significant relationship between devaluation and the macroeconomic variables employed in the model including economic growth; exchange rate devaluation had a progressive and noteworthy impact on balance of payment while having a negative impact on non-oil exports.

The Nigerian government has carried out currency devaluation exercise from 1986 to date as a form of policy option to stabilize the Nigerian economy. The economic performance for the period under study fluctuates, our trade deficit without oil is huge and with oil is still large, especially recently between 2013 to the present time. Does that mean that devaluation is the right option for the Nigerian economy during this period?

2.1 DEVALUATION AND ELASTICITY APPROACH

To test the impact of devaluation on an economy, the elasticity approach is one of the approaches used. The elasticity approach was used by Loto (2011) for the period 1986–1998 for the Nigerian economy. That was when noticeable devaluation as a policy was implemented. Between that time and 2018, a high degree of devaluation has been effected. What has been the significant impact of that degree of devaluation on the Nigerian economy? This present study will analyze this impact and compare the result with 1985-

1998 by Loto using the elasticity approach, which focuses on the impact of relative prices on the economy.

3. THEORETICAL FRAMEWORK AND MODEL SPECIFICATION

The theoretical framework for this study is the import-export demand function as used by Goldstein and Khan (1978) and Uz (2010) which assumes two independent models of export and import which can be solved simultaneously in order to evaluate the impact of currency devaluation on the Nigerian economy.

The import function relates the quantity of import demand to the real income level and the relative prices of import that is, the ratio of the price index of import to the domestic price index.

(1) $Imp = f(Y, Pm/Pyn)$

where

Imp = Import
Y = Real income level
Pm/Pyn = Ratio of price index of import to the domestic
            price index

Mathematically stated in the form:

(2) $Imp = a_0 + a_1 Y + a_2 (Pm/Pyn)$

The econometric form of equation (2) is as presented below with the inclusion of the error term:

(3) $Imp = a_0 + a_1 Y + a_2 (Pm/Pyn) + \varepsilon$

Due to the assumption of effective demand for domestic goods and services it is expected that the relationship between income level and imports would be positive while a negative relationship is anticipated between the relative price of imports and imports. This is due to the fact that devaluation will lead to increases in the prices of imported goods; thus the value of imports for imported consumer goods while the increased prices of imported inputs will result in increased costs of production for locally produced goods which is eventually transferred to the final consumers through inflation.

In the natural logarithmic form equation (3) becomes:

(4) $Ln\ Imp = a_0 + a_1 LnY + a_2 Ln(Pm/Pyn) + \varepsilon$

where

a_1 = Income elasticity of imports
a_2 = Relative price elasticity of imports
ε = The stochastic error term

While for the export demand function, the export function relates the quantity of export demand to the growth rate of world income and the relative prices of export that is, the ratio of the price index of export to the world price index.

The export demand function could be written as:

(5) $Exp = f(Y_m, Pe/Pw)$

where

Exp = Export
Y_m = Growth of world income
Pe/Pw = Ratio of price index of export to world price index

Mathematically stated in the form:

(6) $Exp = \beta_0 + \beta_1 Y_m + \beta_2 (Pe/Pw)$

Equation (6) can be presented in econometric form as presented below with the inclusion of the error term:

(7) $Exp = \beta_0 + \beta_1 Y_m + \beta_2 (Pe/Pw) + \mu$

Re-writing equation (7) in the natural logarithmic form will yield equation (8).

(8) $Ln\ Exp = \beta_0 LnY_m + \beta_2 Ln(Pe/Pw) + \mu$

where

β_1 = Foreign income elasticity of export demand function
β_2 = Relative price elasticity of export demand function
μ = Stochastic error term
$\beta_1 > 0, \beta_2 < 0$

It is expected that the relationship between the world income growth and export would be positive, while a negative relationship is anticipated between the ratio of price index of export to world price index and export.

To understand the impact of currency devaluation on the Nigerian economy, the relative prices of import and export would be added in absolute terms, that is $(a_2 + \beta_2)$.

If this addition is greater than unity, it implies that devaluation has a positive result on the Nigerian economy. On the other hand, if the addition is less than unity, then devaluation has a negative effect. However, if the addition is equal to unity, then devaluation has a neutral effect on the Nigerian economy.

3.1 DATA AND METHODOLOGY

In this section, information is provided with respect to the variables used in the study for measuring the impact of devaluation on economic activity in Nigeria. The main reason for devaluation as a policy option is to make exports cheaper and imports dearer. The elasticity approach adopted in the study relies on the sum of the import and export coefficients which by interpretation must be greater than unity for it to have a positive impact on a nation's economic activity.

The data employed in this study are of two types: one that fits into the import demand function such as the level of import, real income and price index of import, and domestic price index. Measurement of variables and data source is as presented in the Table 1. The second type of data is one that fits into the export demand function such as the real value of export, the growth rate of world income, price index of export and the world price index. Measurement of variables and data source is as presented in Table 2.

Table 1 presents the variables employed in the import demand function equation to be estimated in this study. The natural logarithm of the variables was used in order to bring the variables to the same level by linearizing the expression as presented in equation

2. The real value of import level represents the dependent variable while the real income, price index of imports and the domestic price index are the explanatory variables as expressed in equations (1) and (2). It is expected that the coefficient of income to import be positive, while that of the ratio of relative price to import should be negative.

TABLE 1

Import Demand Function Variables and their Description

Variable	Description	Source
Imp	The real value of import level	CBN Annual reports and accounts
Y	Real income measured by the real gross domestic product	CBN Statistical Bulletin
P_m	Price index of imports	CBN Annual reports and accounts
P_{yn}	Domestic price index	CBN statistical Bulletin

Source Author's compilation, 2016

Table 2 contained the variables employed in the export demand function equation to be estimated in this study. The natural logarithm of the variables were taken in order to bring the variables to the same level by linearizing the expression as presented in equation (4) above. The real value of Nigeria's export represents the dependent variable while the growth rate of world income and the ratio of price index of exports relative to the world price index (Pe/Pw) are the explanatory variables as expressed in the equations (3) and (4) above.

The study made use of import and export demand functions fitted into the ordinary least square model, preceded by the unit root test conducted using the Augmented Dickey-Fuller test, followed by a Co-integration test to determine the existence or otherwise of long-run relationship among the variables of interest and the error correction mechanism which is to determine the speed of adjustment between long run and short run period. The data used for the study were sourced from the Central Bank of Nigeria (CBN) annual reports and statement of accounts, CBN statistical bulletin, International Financial Statistics (IFS) yearbook and the World Development Indicator (WDI).

TABLE 2

Export Function Variable Descriptions

Variable	Description of variable	Source
Exp	The real value of Nigerian exports	CBN Annual reports and accounts
Y_m	The growth rate of world income	International Financial Statistics (IFS)
P_E	Price index of export	CBN Annual reports and accounts
Pw	World price index (1986 = 100)	International Financial Statistics (IFS)

Source Author's compilation, 2016

4. FINDINGS

This study investigated devaluation and the state of the economy. The study analyzed devaluation as a policy of stabilization to drive the economy. To do this, the study made use of the import and export demand functions. To test for the stability of the variables used, the unit root test was performed as presented in Table 3.

4.1 IMPORT FUNCTIONS

The result of the unit root test presented in Table 3 revealed that the variables employed in this study are of the same order of integration, that is, order (1) implying that the variables were stationary at first difference.

TABLE 3

ADF Unit Root Test results

	Adf Critical Value	Mackinnon Critical value	Order of Integration	Probabilities
D(Ln Imp)	-7.911	3.58	1(1)	0.000
Ln Y	-4.970	3.58	1(1)	0.002
D(Ln(Pm/Pyn))	-5.870	3.58	1(1)	0.000

Source: Author's computation, 2016.

Since the variables showed no evidence of unit root in the data, and the variables are integrated of order (1) it is essential to test for the existence or otherwise of co-integration among the variables. This is depicted in Table 4 which presented the Johansen Co-integration test results.

TABLE 4
Johansen co-integrating test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
None	0.535	38.450	29.797	0.004
At most 1	0.343	16.989	15.495	0.029
At most 2	0.169	5.204	3.841	0.022

Source: Author's computation, 2016.
Note: Test indicates 2 co-integrating equation(s) at the 0.05 critical level

The Johansen co-integration test was performed to test for the number of co-integrating vector, the likelihood ratio and comparison of critical values at 5%. It was established that there are two co-integrating vectors and as a result, the hypothesis of no co-integration, or the existence of at most one co-integrating vector was rejected. This results presented in Table 4 revealed the possibility of a long-run relationship among the variables of interest. Hence, the need to determine the possibility or otherwise of a short run relationship as well as the speed of adjustment between the short run and the long run macroeconomic fluctuations. This is depicted in Table 5.

The error correction model analyzed in Table 5 revealed the existence of a short run relationship between the dependent and the independent variables employed in the model. The error correction term ECM (-1) is negative and statistically significant at the 1% level of significance. This result also follows the a priori expectation on the hypothesized negative relationship between import and the elasticity of relative prices of import (-0.410) as well as the presence of a positive relationship between import and import elasticity of income (0.340). All independent variables are statistically significant at the 1% level of significance. The coefficient of R squared (0.648) revealed that the independent variables employed in the model significantly explained 65% of variations in the dependent variable. The f-statistic (11.679) is also statistically significant at the 1%

significance level of, while the Durbin-Watson value (2.036) implies the absence of serial correlation among the variables of interest.

TABLE 5
Parsimonious ECM Model

Variable	Coefficient	Standard Error	*t*- Statistics	Probabilities
C	0.209	0.058	3.580	0.000
D(Ln Y(-1))	0.340	0.196	-1.730	0.001
D(LnPm/Pyn(-1))	-0.410	0.690	-2.420	0.000
ECM(-1)	-0.293	0.084	-3.456	0.000
R^2		0.648	Mean dependent	0.209
Adjusted R^2		0.548	Dependent variable	0.276
Standard Error		0.243	Akaike info. criterion	0.310
Sum of square residual		0.827	Schwarz criterion	0.846
Log likelihood		7.122	Hannan-Quinn criterion	0.458
f-Stat		11.697	Durbin-Watson stat	2.036

Source: Author's computation, 2016.
Note: Dependent variable D(Ln IMP)

4.2 EXPORT FUNCTION

The unit root result in Table 6 shows that the variables are all of the same order of integration I(1) that is, they became stationary at first difference. The result shows a need for the co-integration test, in order to determine whether or not the variables employed in the model have the possibility of long run relationship. This was performed using the Johansen co-integration test and the result is as presented in the Table 7.

TABLE 6
ADF Unit Root Test 5%

	Adf Critical Value	Mackinnon Critical value	Order of Integration	Probabilities
D(PE/Pw)	-4.734	-3.622	1(1)	0.005
D(Ym)	-6.429	3.622	1(1)	0.002
D(Ln EXP)	-7.990	3.622	1(1)	0.000

Source: Author's computation, 2016.

TABLE 7
Johansen Co-integration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probabilities
None	0.609	21.590	21.132	0.004
At most 1	0.324	8.989	14.265	0.029
At most 2	0.907	2.187	3.841	0.140

Source: Author's computation, 2016.

In the co-integration test, the Trace statistics and the Max Eigenvalue revealed the existence of two co-integrating vectors, suggesting that the hypothesis of no co-integration or the existence of at most one co-integrating vector is rejected.

This outcome implies the presence of a long run relationship among the variables in the model. It gave room for performing error correction analysis in order to determine the possibility of the existence of a short run relationship among the variables and to determine the speed of adjusted between short run and long run disequilibrium. This is depicted in Table 8.

TABLE 8
Parsimonious ECM Model

Variables	Coefficients	Standard Errors	t-Statistics	Probabilities
C	0.3790	0.0580	6.530	0.0000
D (PE/Pw(-1))	-0.1008	0.0354	-2.847	0.0000
D(Ln Y_m(-1))	0.7960	0.1504	5.297	0.0000
ECM(-1)	-0.1220	0.0127	-9.900	0.0000
R^2		0.635	Mean dependent	0.144
Adjusted R^2		0.580	S.D. dependent variable	0.768
S.E. of regression		0.799	Akaike info. criterion	2.600
Sum of square resd		10.220	Schwarz criterion	2.840
Log likelihood		22.236	Hannan-Quinn criterion	2.647
f-Stat		10.697	Durbin-Watson stat	2.080

Source: Author's computation, 2016.
Note: Dependent Variable: D(Ln EXP)

In Table 8, the error correction term ECM(-1)=(-0.122) is negative and statistically significant at the 1% level of significance, indicating presence of short run relationship among the variables employed in the model. Also the coefficient of world income growth or the foreign income elasticity of export demand function is positive and statistically significant at the 1% level of significance in conformity with the a priori expectations, while the coefficient of the ratio of price index of export to world price index or the relative price elasticity of export demand function is negative and statistically significant at the 1% level of significance. The coefficient of R^2-squared (0.635) implies that the explanatory variables (jointly) significantly explained 64% of variations in the dependent variable. The *f*-statistic (10.697) is also statistically significant at the 1% level of significance and the Durbin-Watson value of 2.08 implies the absence of serial correlation among the variables employed in this study.

The estimated import function from equation (4) above for the Nigerian economy is as stated below:

$$(9) \qquad LnImp = -0.209 + 0.34LnY - 0.410Pm/Pyn$$

While the estimated export function from equation (8) above for the Nigerian economy is as stated below:

$$(10) \qquad LnExp = -0.379 + 0.1008Pe/Pw + 0.796LnY_m$$

4.3 INTERPRETATIONS AND DISCUSSION OF RESULTS

The results show that the income coefficient is positive and statistically significant. It follows the a priori expectation. The income elasticity of import coefficient stood at 0.340. This means that if there is an increase in income, it is expected that there will be an increase in the import volume.

The income elasticity of export coefficient stood at 0.796. This shows that the importance of world income coefficient stipulates that if there is an increase in world income, there is every possibility that the demand for other countries' exports will increase. The coefficient of relative price is negative and is also statistically significant.

The major focus is to analyze devaluation and how it affects the nation as a whole using the elasticity approach. Findings show that the absolute values of the coefficients of the relative price of import and that of export summed up to be 0.5108. This is less than

unity. The elasticity approach stated that for devaluation to be a potent policy for stabilizing an economy, the import and export coefficients must sum up to above unity. The devaluation policy analyzed for the Nigerian economy in this period could be said to be a wrong policy option. In fact, the latest devaluation exercise escalated domestic prices and also reduced the production levels of firms and at the same time increased the import bill.

5. SUMMARY, CONCLUSION AND RECOMMENDATION

The study investigated the devaluation of the Nigerian naira and how it affects the Nigerian economy by using secondary data spanning from 1986 to 2016. Data were collected on import, export, domestic income, domestic price, foreign price, and foreign income. The variables were fitted into an OLS regression. The outcome was subjected to a unit root test and co-integration test. Error correction model was set up to test the long-run relationships of the variables used. The results obtained were not too different from that of Loto (2011). The results showed that the income coefficient has the correct sign. It is positive and statistically significant, while the relative price coefficient is negative and statistically significant. The coefficient for the world income is positively related to that of export. The price relative coefficient to export is negative and significant. To actually achieve the main focus of the study is to analyze the impact of devaluation on the economy; this was achieved by the addition of the relative prices of import and export coefficients in absolute terms. This yielded a result less than unity $(0.1008 + 0.410 = 0.5108)$. This result implies that devaluation has a negative effect on the Nigerian economy. If devaluation were to be of positive influence this ratio has to be greater than unity, while if it is equal to unity the impact would be neutral. Thus devaluation as a policy of economic stabilization is impotent in the Nigerian case.

The outcome of this study showed that devaluation as a policy stabilizing mechanism does not work out well for the Nigerian economy. This might partly be due to the structure of the economy; a structure very highly dependent on imported raw materials and capital goods. It could be recommended that concentrating on devaluation as a single policy cannot be a potent policy. A mixture of policies will likely work better than devaluation as a single policy measure. Also instead of a major reduction in the value of the naira as a currency, it would have been better to try the option of depreciation that is a gradual decrease in the value of the naira.

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