Effect of Currency Devaluation in an Era of Economic Downturn in Nigeria

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ABSTRACT

The primary aim of the study is to estimate the long run relationship between economic growth (RGDP) and currency devaluation. This study investigated the effect of currency devaluation in an era of economic downturn in Nigeria. In order to generate the necessary data for this study, the Central Bank of Nigeria Statistical Bulletin and publications of the National Bureau of Statistics were used for the period of 2000 to 2014. The Johansen Co-integration method was used for this analysis because the study involves the use of multivariate estimations. The result from the multivariate co-integration test shows that there is at least one co-integrating vector in the relationship between economic growth and the independent variables. This implies that a long run relationship exists among these variables. Thus, we cannot reject the hypothesis of a significant short term relationship between economic growth and currency devaluation. The study shows that in the short run currency devaluation leads to increase in output and improves the balance of payments but in the long run the monetary consequence of the devaluation ensures that the increase in output and improvement in the balance of payment is neutralized by the rise in prices. Based on the above it is recommended that the Nigerian government should consider devaluation of currency as the last resort to the economic imbalance.

KEY WORD: *effect, currency, devaluation, economic downturn.*

INTRODUCTION

Currency devaluation is one of the most dramatic events and traumatic measures of economic policy that a government may undertake (Momodu and Akani, 2016). For these reasons alone, governments are reluctant to devalue their currencies. Yet under the present rules of the international monetary system, laid down in the articles of agreement of the International Monetary Fund (IMF), devaluation is encouraged whenever a country's international payment position is in "fundamental disequilibrium", whether that disequilibrium is brought about by factors outside the country or by indigenous development. Due to the associated trauma, which arises because so many economic adjustments to a discrete change in the exchange rate are crowded into a relatively short period, currency devaluation has come to be regarded as a

measure of last resort. Nigeria's foreign exchange reserves suddenly drop in 1982. The trend since then has been progressively downwards and if left uncorrected would deplete the Nations foreign exchange resource in no distant future.

Nigeria devalued her currency by 10% in 1973 for the first time in respect to U.S.A devaluation of the same year and the same amount (Don, 1984). Thus, the effect of the devaluation in the preceding year was salutary in enhancing the foreign exchange asset position of the growth of Nigeria's foreign exchange in1974 amongst which is the increased export of oil as a result of the 1973 Arab – Israeli war and the increased oil price negotiated by OPEC of which Nigeria is a member (Ozumba, 1978).

The effect of currency devaluation on the economy has long been recognized in the literature. Traditionalist argued that devaluation would promote trade balance, alleviate balance of payments difficulties and accordingly expand output and employment provided the Marshall-Lernar conditions are met. The Marshall-Lerner condition states that devaluation would lead to expansion in output if the sum of price elasticity of demand for export and the price elasticity of demand for imports is greater than unity. The mechanism behind these positive effects, according to Imimole & Enoma (2011) is that devaluation switches demand from imports to domestically produced goods by increasing the relative prices of imports and making export industries more competitive in international markets thus stimulating domestic production of tradable goods and inducing domestic industries to use more domestic inputs.

The monetarists on the other hand argued that devaluation has no effect on real variables in the long run. The monetarist view is that exchange rate devaluation affects real magnitudes mainly through real balance effect in the short run but leaves all real variables unchanged in the long run. This approach is based on the assumption that the Purchasing Power Parity (PPP) holds. It predicts that in the short run an increase in the exchange rate leads to increase in output and improves the balance of payments but in the long run the monetary consequence of the devaluation ensures that the increase in output and improvement in the balance of payment is neutralized by the rise in prices. These arguments are contentious and therefore require further investigations.

In line with the recent fall in oil price and the increase in foreign exchange demand, the study attempt to bridge the existing gap by carrying out this research to ascertain if currency devaluation will be a last resort in this era of economic downtown in Nigeria.

CONCEPTUAL FRAMEWORK.

According to Don (1984), devaluation refers to as official lowering of the value of country's currency within a fixed exchange rate system, by which the monetary authority formally sets a new fiscal rate with respect to a foreign reference currency. Devaluation of currency is a macro-economic fiscal policy that bothers on deliberate reduction in the value of home currency with the aim of maximizing gain in tradable items (Aiya, 2014). Akindiya, & Olawole (2015), remarked that African extraction has a bias for the fact that devaluation is an instrument being employed by the International Monetary Fund (IMF) and World Bank for fiscal equalization and stability. Quoting Aiya(2014) in Akindiya & Olawole (2015), devaluation of currency became popular in Nigeria when Babangida led administration in 1986 instituted the structural adjustment programme as a policy designed to achieve a realistic exchange rate for the Naira that was over-valued.

Weldon, (1981) viewed devaluation as a reduction in the value of a currency with respect to other monetary units. In the work of Todaro,(1982), currency devaluation is when a country's

currency is depreciated and the official rate at which its central bank is prepared to exchange the local currency for dollar is increased. Compbell (2004) stated that currency devaluation is a deliberate downward adjustment in the official exchange rate established by a government against specified standard or another currency.

THEORETICAL FRAMEWORK.

The standard analysis of currency devaluation, which has advanced substantially during this period and is still being transformed and further refined, fails to take into account many of the features that are typical of developing a country today, and which influence the effect of currency devaluation on their economies and on their payments positions. Cooper,(1971).

For the purpose of this study, monetary approach introduced by Kreinin (1983) is adopted as a theoretical function. This is because, the theory advances possible reasons why devaluation is equivalent to a decline in the money supply and in the value of other financial assets denominated in local currency, when measured in foreign currency. The monetary approach to devaluation focuses on the demand for money balances and the fact that an excess demand for goods, services and securities, resulting in a payment deficit, reflects an excess supply of money. Flanders (1971), stated that, the real value of the money supply will be reduced by devaluation, because the local prices of traded goods and services, vs non-traded goods and services to which demand is diverted, will rise. He stated further that the public will accordingly reduce its spending in order to restore the real value of its holdings of money and other financial assets, which reduction in expenditure will produce the required improvement in the balance of payments. Adding that to restore lost reserves, the country must devalue by more than that amount, in order to achieve a surplus. But once the public has retained its desired financial holdings, expenditure will rise and following devaluation to satisfy the new demand for money, the effects of the devaluation on international payments will be undermined. Flanders,(1971).

EMPIRICAL REVIEW:

Don (1984), in Economic Consideration for Nigeria Currency Devaluation, stated that Nigeria is basically a mono-product economy, whereby 90% of her exports is made up of oil and 10% non oil product. The implication is that trade position may not be improved and the effect of devaluation would be to worsen the term of terms. He used the elasticity's approach to demonstrate how inflationary consequences of devaluation can be mitigated by the use of additional fiscal and monetary controls to mop up domestic liquidity. Suggesting that the statutory effect of the 1973 Nigeria devaluation can be repeated to correct the worsening trend in the Nation's external asset position.

Sule (2016) opined that devaluation and any of its elements is a defeatist position. Adding that government should not only kick against it but also take appropriate measures to revaluate the currency. Stating that the extreme case of devaluation will cause indebtedness, import dependency, unemployment, loss of patriotism, disrespect of constituted authorities and triggering on large scale poverty, insecurity, low literacy level and diseases. Suggesting that the government should be extremely cautious in order not to be cajoled by the creditors.

Loto (2011), adopted the elasticity approach to the balance of payments adjustment for the period 1986 – 2008, the study investigates the effect of exchange rate devaluation as a policy on the Nigerian economy. Ordinary Least Square (OLS) method was used to estimate the import and export demand functions. The empirical result shows that devaluation/depreciation does not improve the trade balance. Suggesting that Government must provide infrastructures in order to

reduce the burden of export sector, and also to promote efficiency in the sub-sector. Akindiyo & Olawole, (2015), in their study of devaluation of Nigerian Naira, Bane or Panacea revealed that macroeconomic policy is the best option to address urgent national issue. The paper relied on secondary data. Findings revealed that devaluation does more harm than good as far as Nigeria is concerned. Suggesting that devaluation should not be seen as a last resort each time there is global financial problem. Watter, (2015) in his study stated that effect of the naira devaluation would have been milder if construction materials are produced locally thereby cutting cost.

Kenneth, (2016) opined that the challenges currently facing the Nigerian economy require the solution devaluation can help provide. Adding that government can use devaluation to boost aggregate demand in the economy in an effect to fight unemployment, suggesting that government should seize this opportunity to invest in other sectors of the economy and in that way diversify the Nigerian economy. This will give the economy a better structure and make it more able to withstand global shocks that may arise from time to time. Cooper (1971) opined that managing devaluation through the transition phase, requires both judgment and delicacy in handling.

In spite of increasing research attention on currency devaluation, studies have not rarely explored the effect of currency devaluation in this era of economic downturn in Nigeria using survey design. The reasons are that, the study attempts to bridge the existing gap, by evaluating the effect of currency devaluation in this era of economic downturn in Nigeria, using the opinion of the representations of the public and private sector organization in Niger State.

METHODOLOGY

The study makes use of secondary data. The time series data on real gross domestic product, exchange rate, interest rate and money supply. The study utilized the central bank of Nigeria statistical bulletin vol. 25, 2014.

MODEL SPECIFICATION

Thus, the model is specified as

RGDP = F (MS, INT, EXCH)

Where;

RGDP = Real gross domestic product

MS - Money supply

INT - Interest Rate

Exch - Exchange Rate

Our model can be restated in an econometric form as;

$RGDP = b_0 + b_1 MS + b_2 INT + b_3 EXCH + \mu$

Where

$b_0 - b_3$ = being the coefficient of the variable

μ = Stochastic variable or error term

METHOD OF EVALUATION

EVALUATION BASED ON ECONOMIC CRITERIA (A'PRIORI EXPECTATIONS)

This is based on the principle of economic theory. Here, our results can be checked for their reliability with both the size and sign of economic a' priori expectation.

EVALUATION BASED ON STATISTICAL CRITERIA (FIRST ORDER TEST)

i. Coefficient of multiple regressions (R^2);

This is the summary measure that tells how well the sample regression line fits the data.

ii. T - Statistics

This test the significance of the parameter estimates.

iii. F – Statistics

This measures the overall joint significance of the entire regression plane.

EVALUATION BASED ON ECONOMETRIC CRITERIA.

i. Auto correlation test

Auto correlation can be caused by several factors such as specification bias (excluded variable cases) manipulation of data, data transformation and non-stationary of data. The most celebrated test for detecting autocorrelation is that developed by statistician Durbin-Watson d-statistics.

ii. Co-integration tests

Engle granger (EG) and augmented Engle granger tests are used for testing co-integration. Co-integration deals with the relationship amongst a group of variables (unconditionally) where each variable has a unit root.

iii. Error correction mechanism

The error correction model was first used by Saragan and later popularized by Engle and granger. It corrects for disequilibrium. Granger representation theory states that if two variables (x and y) are co-integration, the relationship between them can be expressed as an error correction mechanism. The analysis makes use of computer based package, econometric view (E-view) version 7.1.

Presentation and Analysis of Regression Result

Unit Root

Table 4.1 unit rot result

Variable	ADF	Integration	Significance
RGDP	-2.945363	I(2)	1%
MS	- 15.59604	I(2)	1%
INT	-4.405298	I(1)	1%
EXCH	-3.540291	I(1)	1%

Source: Author's computation using e-view version 8.1

From the table above it was observed that on the application of ADF test on the level series none of the variables were found to be stationary. But real gross domestic product and money supply were stationary at second difference,

Testing for Cointegration

Unrestricted co-integration Rank Test (Trace)

Hypothesized		Trace	0.05	
No of CE(5)	Eigen value	Statistic	critical .v	Prob
None*	0.916247	51.26116	40.17493	0.0027
At most 1	0.710970	19.02264	24.27596	0.1993
At most 2	0.198527	2.886701	12.32090	0.8616
At most 3	0.000749	0.009746	4.129906	0.9357

Source: Author's Computation using e-view version 8.

Trace test Indicates 1 co-integrating equation (s) at the 0.05 level denotes rejection of the hypothesis at the 0.05 level mackinn on – Haug – michelis (1999) p- values.

Unrestricted co-integration Rank Test (maximum Eigen value)

Hypothesized		Max Eigen	0.05	
No of CE(5)	Eigen value	Statistic	critical .v	Prob
None*	0.916247	32.23852	24.15921	0.0032
At most 1	0.710970	16.13594	17.79730	0.0873
At most 2	0.198527	2.876955	11.22480	0.8065
At most 3	0.000749	0.009746	4.129906	0.9357

Source: Author's Computation using e-view version 8.

Max- (s) at the 0.05 level denotes rejection of the hypothesis at the 0.05 level mackinnon-Haug – Michelis (1999) p- values

The result of the Johansen's co-integration test as show in table 4.2 above uses two test statistics namely the trace statistics and the maximum Eigen value proposed by Johansen and Juselius. The co-integration result indicates one co -integrating equations as the trace statistics rejects the null hypothesis of no-co-integrating vector at 5 percent significance and accepts the alternative hypothesis of more than zero co-integrating equation, which indicates existence of long-run equilibrium relationship between the dependent and independent variables.

Presentation of the Regression Result

RGDP as the Dependent Variable

Variable	Coefficient	Std Error	t- statistics	Prob
C	9.412374	0.228587	41.17629	0.0000
EXCH	0.270900	0.023011	11.77252	0.0000
INT	-0.000359	0.004204	-0.085274	0.9339
LMS	-0.001132	0.001501	-0.754447	0.4699
ECM(-1)	-0.357970	0.426413	-0.839491	0.4229

Source: Author's Computation using E-view version 8.

R- Squared 0.989301
Adjusted R- Squared 0.984547
F- Statistics 208.0598
Prob (F-statistics) 0.000000
Durbin – Watson 2.146368

Interpretation of the Result

The R- squared which is the coefficient of determination or the measure of goodness of fit of the model, tests the explanatory power of the independent variables in any regression model. It tests for the goodness of fit of the model. From our result in table 4.3 above, R^2= 98%, this shows that our model has a good fit, because the closer R^2 is to 100%, the higher the goodness of fit of the model. Hence the explanatory variables can explain up to 98% out of the expected 100% leaving the remaining 2% which would the accounted for by the other variables outside the model which will be captured by the error term.

The adjusted R^2 is 98%, meaning that even with an adjustment in the independent variables it can still accounted for about 56% of the change in the independent variables.

The F-statistics measure the overall significant of the parameter estimates in the model. From table 4.3 above, the calculated value of F- statistics is 208.0598, while its probability is 0.000000, since 0.000018 is less than the desired 0.05 level of significant, we accept and state

that there is a significant relationship between the variables; this means that the parameter estimates are statistically significant in explaining the relationship in the dependent variables.

The a' priori criteria is determined by the existing economic theory and states the signs and magnitude of the variables. From the results reported in table 4.2 above, and from the coefficient column we discovered that money supply has a positive sign given its value as 0.270900. This implies that decrease in exchange rate will increase the manufacturing sector by 27%, this suggest that it conform to a' priori expectation.

Followed by interest rate which has negative sign given its value as -0.000359, this implies that increase in INT will increase RGDP by 35%, this does not conform to a' priori expectation. Exchange rate has negative sign given its value 0.001132; this implies that increase RGDP will increase the mgdp by 0.11%. This satisfies the condition of a'priori criteria

The T- statistics help in measuring the individual statistical significance of the parameter in the model from the result report in table 4.3 above, money supply is 11.77252, and is statistically significant at 10% level of significant. This implies that it contributed to the growth of manufacturing sector in Nigeria. Interest rate is statistically insignificant given its value as -0.085274. Exchange rate is -0.754447, which is statistically insignificant-

Durbin – Watson statistics is used to test the presence or otherwise of auto-correlation in our model. Whenever the value of Durbin Watson is closer or little bit above (2), it means the absence of auto-correlation. From our model it is observed that our Durbin Watson is (2.14) this implies the absence of auto-correlation in our model.

Finally the negative coefficient of the ECM (-1) confirms the assertion that the variables in the model are co-integrated and indication of stable Long-run equilibrium relationship between the variables. It shows the coefficients of the ECM as -0.770520 and is the speed of adjustment and it show that 35% of the previous year's shock adjusts the equilibrium in the current year.

Hypothesis Testing

Ho: Currency devaluation has no significant effect on the Nigerian economy.

Hi: Currency devaluation has a significant effect on the Nigerian economy.

Drawing inference from our regression result in table 4.3, we found that the value of exchange rate is -0.085274, while its probability is 0.9339. This show that exchange rate is statistically insignificant. Furthermore since its probability (0.9339) is greater than 0.05% level of significance, we reject the alternative hypothesis (H0) and accept the null hypothesis (H1) which says that exchange rate has no significant impact on currency devaluation in Nigeria.

CONCLUSION

The paper concluded that devaluation though an economic recovery panacea always recommended by the International Monetary Fund and the World Bank had never helped any Nation to recover and so Nigeria will not be an exception. Although currency devaluation would promote trade balance, alleviate balance of payments difficulties and accordingly expand output and employment it switches demand from imports to domestically produced goods by increasing the relative prices of imports and making export industries more competitive in international markets thus stimulating domestic production of tradable goods and inducing domestic industries to use more domestic inputs. The result of our analysis shows that although money supply, interest and exchange rate affect economic growth significantly, currency devaluation has a negative and insignificant impact on economic growth of Nigeria during the period under review.

RECOMMENDATION

The paper recommends that Nigeria should diversify her economic base, create an enabling environment for export oriented manufacturing to grow and instead of devaluation, trade restriction, ban on some selected imports and other monetary measures should be introduced to address the country's balance of payment position.

Monetary authorities should do what they can to reduce the temporary increase in prices lest it become permanent. Timing at this point becomes very crucial. More so, the Nigerian government should consider devaluation of currency as the last resort to the economic imbalance.

REFERENCES

Akindiyo, O.& Olawole, A. (2015). Devaluation of Nigerian naira: bane or danacea. Journal of public administration and management 5 (8), 25-31.

Aiya, f. (2004) people's perception of the impact of currency devaluation of the impact of currency devaluation on the per4formatice of poverty programmes in Nigeria, developing country studies 4(10), 7-16

Cooper, R.N(1971) currency devaluation in developing countries. International finance. (pp 25-37). Penguin publishers.

Don, N.I.(1984). Some Economic Considerations for Nigeria currency devaluation. The Indian Journal of Economics Retrieved from https://www.econbiz.devaluation–ike–don/10003072262

Evborokhai,J.A.(2003). A practical guide to research writing for Polytechnics and Universities. Bida JUBE-EVANS Books and publications.

Loto, M.A.(2011,Oct7). Does devaluation improve the trade balance of Nigeria: A test of the marshall-Lerner condition Journal of Economics and international finance 3(11) 624 – 633. Retrived from http://www.academicjournals.org.jeif

Kenneth,J.(2016). Devaluation of the Nigeria and its effect on the Nigeria economy guardian editorial board retrieval from www.flationes.com/time.com/2016/20 on devaluation of Naira.htm/?m=1

Ozumba, C.C. (1978). Devaluation and Balance of Payment in ECOWAS countries: A Study of Nigeria Exchange Rate Policy" Central Bank of Nigeria Economic and Final Review 16 (19)

Ohaja, E.U. (2003). Mass Communication Research and Project Writing. Lagos: John Letterman Limited.

Olabis, O.(2015,Nov8). Naira Devaluation Dangerous Unnecessary- Tella Punch Retrieved from https://developers.google.com/youfube/vs/docschannel/list

Richard, N. (1971). Currency Devaluation in Developing Countries: Princeton New Jersey.

Sule, M. (2016, Jan14): the Danger in Naira Devaluation. The Guardian Retrieved from auafrica.com/stories/20160114054.html

Todaro, M.P.(1982). Economics for a Developing World (2nd ed) Longman group Limited Essex, UK.

Walter, E.(2015 0ct19). Effect of naira devaluation on the Nigeria construction industry sapient vendors ltd: retrieved from sapient vendors.com/naira- devaluation and Nigeria – construction industry

Appendix

Null Hypothesis: D(LRGDP,2) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.945363	0.0070
Test critical values:	1% level	-2.771926	
	5% level	-1.974028	
	10% level	-1.602922	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LRGDP,3)
Method: Least Squares
Date: 06/22/16 Time: 16:57
Sample (adjusted): 2003 2014
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRGDP(-1),2)	-1.256404	0.426570	-2.945363	0.0133

R-squared	0.427477	Mean dependent var	-0.004741
Adjusted R-squared	0.427477	S.D. dependent var	0.031935
S.E. of regression	0.024164	Akaike info criterion	-4.528258
Sum squared resid	0.006423	Schwarz criterion	-4.487849
Log likelihood	28.16955	Hannan-Quinn criter.	-4.543219
Durbin-Watson stat	1.437013		

Null Hypothesis: D(LMS,2) has a unit root
Exogenous: None
Lag Length: 3 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-15.59604	0.0001
Test critical values:	1% level	-2.847250	
	5% level	-1.988198	
	10% level	-1.600140	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMS,3)
Method: Least Squares
Date: 06/22/16 Time: 16:58
Sample (adjusted): 2006 2014
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMS(-1),2)	-3.023252	0.193847	-15.59604	0.0000
D(LMS(-1),3)	1.659911	0.172063	9.647082	0.0002
D(LMS(-2),3)	1.740135	0.141864	12.26619	0.0001
D(LMS(-3),3)	1.153552	0.085493	13.49289	0.0000

R-squared	0.992845	Mean dependent var	-0.006075
Adjusted R-squared	0.988552	S.D. dependent var	0.256180
S.E. of regression	0.027410	Akaike info criterion	-4.054724
Sum squared resid	0.003757	Schwarz criterion	-3.967069
Log likelihood	22.24626	Hannan-Quinn criter.	-4.243884
Durbin-Watson stat	2.857905		

Null Hypothesis: D(INT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.405298	0.0003
Test critical values:	1% level	-2.754993	
	5% level	-1.970978	
	10% level	-1.603693	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT,2)
Method: Least Squares

Date: 06/22/16 Time: 16:59
Sample (adjusted): 2002 2014
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INT(-1))	-1.221411	0.277260	-4.405298	0.0009

R-squared	0.617836	Mean dependent var	-0.074615
Adjusted R-squared	0.617836	S.D. dependent var	5.393903
S.E. of regression	3.334479	Akaike info criterion	5.320314
Sum squared resid	133.4250	Schwarz criterion	5.363771
Log likelihood	-33.58204	Hannan-Quinn criter.	5.311381
Durbin-Watson stat	2.099341		

Null Hypothesis: D(EXCH) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.540291	0.0019
Test critical values:	1% level	-2.754993	
	5% level	-1.970978	
	10% level	-1.603693	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCH,2)
Method: Least Squares
Date: 06/22/16 Time: 17:00
Sample (adjusted): 2002 2014
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCH(-1))	-1.015882	0.286949	-3.540291	0.0041

R-squared	0.510866	Mean dependent var	-0.063846
Adjusted R-squared	0.510866	S.D. dependent var	15.01296
S.E. of regression	10.49977	Akaike info criterion	7.614388
Sum squared resid	1322.943	Schwarz criterion	7.657846

Log likelihood -48.49352 Hannan-Quinn criter. 7.605456
Durbin-Watson stat 2.009484

Date: 06/22/16 Time: 17:01
Sample (adjusted): 2002 2014
Included observations: 13 after adjustments
Trend assumption: No deterministic trend
Series: LRGDP LMS INT EXCH
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.916247	51.26116	40.17493	0.0027
At most 1	0.710970	19.02264	24.27596	0.1993
At most 2	0.198527	2.886701	12.32090	0.8616
At most 3	0.000749	0.009746	4.129906	0.9357

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.916247	32.23852	24.15921	0.0032
At most 1	0.710970	16.13594	17.79730	0.0873
At most 2	0.198527	2.876955	11.22480	0.8065
At most 3	0.000749	0.009746	4.129906	0.9357

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LRGDP	LMS	INT	EXCH
-0.242945	-1.257190	0.207219	0.143882
-2.177324	2.602166	0.611608	-0.103694
2.169105	-2.539221	-0.058758	0.109270
2.408523	-2.754675	-0.344404	0.026185

Dependent Variable: LRGDP
Method: Least Squares
Date: 06/22/16 Time: 17:05
Sample (adjusted): 2001 2014
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.412374	0.228587	41.17629	0.0000
LMS	0.270900	0.023011	11.77252	0.0000
INT	-0.000359	0.004204	-0.085274	0.9339
EXCH	-0.001132	0.001501	-0.754447	0.4699
ECM(-1)	-0.357970	0.426413	-0.839491	0.4229

R-squared	0.989301	Mean dependent var	13.32947
Adjusted R-squared	0.984547	S.D. dependent var	0.265354
S.E. of regression	0.032987	Akaike info criterion	-3.712974
Sum squared resid	0.009793	Schwarz criterion	-3.484739
Log likelihood	30.99082	Hannan-Quinn criter.	-3.734101
F-statistic	208.0598	Durbin-Watson stat	2.146368
Prob(F-statistic)	0.000000		

Data for the Model

	LRGDP	LMS	INT	EXCH	ECM
2000	12.88184	13.09837	9.980000	102.1100	0.017449
2001	12.92958	13.35181	12.59000	111.9400	0.021325
2002	12.97568	13.68592	10.67000	120.9700	-0.012081
2003	13.02096	14.05399	9.980000	129.3600	-0.053540
2004	13.11233	14.22494	16.50000	133.5000	0.016161
2005	13.17605	14.48484	13.04000	132.1500	-0.003020
2006	13.23914	14.57249	13.32000	128.6500	0.030192
2007	13.29770	14.78550	10.82000	125.8300	0.018457
2008	13.36020	15.14996	8.350000	118.5700	-0.039121
2009	13.41831	15.45011	8.100000	148.8800	-0.006525
2010	13.48559	15.89598	11.84000	150.3000	-0.048719
2011	13.56234	16.05740	12.85000	153.8600	-0.006752
2012	13.63399	16.21658	5.670000	157.5000	0.009137
2013	13.69773	16.31469	6.030000	150.3000	0.033354
2014	13.70293	16.44707	7.670000	159.3000	0.023682

Source, CBN Bulletin Vol. 24 2015.