Impact of Exchange Rate on Some Macroeconomic Variables of the Nigerian Economy

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ABSTRACT

The paper sought to test the impact of exchange rate on some macroeconomic variables of the Nigerian economy. It provided the empirical estimates of the economic relationship between exchange rate, real GDP, foreign direct investment and inflation in Nigeria. The unit root test for stationarity was carried out on each of the data series using the Augmented Dickey Fuller. Results reveal that all the series were stationary at order one I(0). Hence, regression analyses using the OLS were performed. The results of the estimation demonstrated that there is positive and statistically significant relationship between exchange rate and RGDP. There is also positive and statistically significant relationship between exchange rate and foreign direct investment; there is negative and statistically significant relationship between exchange rate and inflation. Consequently, these results provide confirmation that there is evidence of a strong relationship between exchange rate and RGDP, exchange rate and foreign direct investment; and exchange rate and inflation. The study therefore recommends that, improvements in exchange rate management are necessary to revive the Nigerian economy

Keywords; Exchange Rate: Macroeconomics: Variables: Nigeria: Economy

I. INTRODUCTION

Exchange rate measures the value of one currency in terms of another. It is the price of one currency in terms of another currency (Usman & Adejare, 2013). Exchange rate is an important macroeconomic policy instrument. Changes in exchange rates have powerful effects on tradable and non-tradable of countries concerned through effects of relative prices of goods and services

(Bobai, Ubangida & Umar, 2013). It is one of the most important key macroeconomic variables in the context of general economic policy-making and reform programmes.

Exchange rate strategically lies at the centre of global financial system and sets the terms on which countries trade each other's goods and services. It is an essential element in the determination of the pace at which a country's economic activities will grow (Ani & Udeh, 2021). Exchange rate management and macroeconomic variables performance in developing countries has received considerable attention and generated much debate (Dada & Oyeranti, 2012). The general assumption on the relationship between flexible exchange rate and macroeconomic performance has been that if properly managed and integrated with macroeconomic objectives, it will enhance the realization of macroeconomic goals.

However, the above assumption has been empirically tested and exemplified in the developed economy with greater openness and less import compared to the emerging economies like Nigeria whose import is greater than the export, hence resulting to a Balance of Payment deficit (Okoro & Charles, 2019). Ufoeze, Okuma & Nwakoby (2018) asserted that the exchange rate of the naira was relatively stable between 1973 and 1979, during the oil boom. This was also the situation prior to 1970, when agricultural products accounted for more than 70% of the nation's gross domestic products (Ewa, 2011).

Though, as a result of the development in the petroleum oil sector, in 1970's the share of agriculture in total exports declined significantly, while that of oil increased. However, from 1981, the world oil market started to deteriorate and its economic crises emerged in Nigeria because of the country's dependence on oil sales for her export earnings. Since the Nigerian economy has remained import-dependent and oil-supported, the fluctuation of oil prices has affected Nigeria's oil revenue, the major source of income (Ufoeze, Okuma & Nwakoby, 2018).

Consequently, this study investigated the impact of exchange rate on some macroeconomic variables such as Gross Domestic Product (GDP), foreign direct investment and inflation. It is divided into five (5) parts. The first and second part is the introduction. Part three is the methodology. Part four is analysis and interpretation of data while part five is the conclusion.

Objectives of the Study

The main objective of the study was to examine the impact of exchange rate on some macroeconomic variables of the Nigerian economy. The specific objectives were to:

1. Examine the impact of exchange rate on Gross Domestic Product (GDP).

2. Determine the impact of exchange rate on foreign direct investment.

3. Assess the impact of exchange rate on inflation.

Hypotheses of the Study

The hypotheses of the study are:

1. Exchange rate has no positive and significant impact on Gross Domestic Product (GDP).

2. Exchange rate has no positive and significant impact on foreign direct investment.

3. Exchange rate has no positive and significant impact on inflation.

II. REVIEW OF RELATED LITERATURE

Nwobia, Ogbonnaya-Udo & Okoye (2020) examined the effect of exchange rate fluctuation on Nigeria external trade from 2000 to 2019. The study made use of secondary data sourced from central bank of Nigeria statistical bulletin of various issues from 2000 being the year of monetary authority regime of flexible exchange rate to 2019. The correlation and regression analysis of the Ordinary Least Square (OLS) were used to analyze the data. The result shows that the three variables; exchange rate, balance of payment, and inflation rate have significant effect on the Gross Domestic Product (GDP) and external trade of Nigeria; Exchange rate has a negative effect on the GDP because as it increases, the external trade is negatively affected. Therefore, in order to enthrone a favourable exchange rate that would boost the nations GDP, the study advised government to encourage the export promotion strategies in order to maintain a surplus balance of payment on trade.

Okoro & Charles (2019) examined the effect of exchange rate variation on the Nigerian economy. The objective was to investigate how Naira exchange rate variations against key currencies affect the country's real gross domestic product. Time series data was sourced from Central Bank of Nigeria statistical bulletin. Real gross domestic products were modeled as the function of United State commodity currency, British commodity currency, Japanese yen currency, Chinese yen currency and French franc currency. The ordinary least square method was used as data analysis techniques. The study used cointegration, unit root, and granger causality test and error correction estimate to study the dynamic effects of commodity currencies on financial market. The study found that naira exchange rate variation with the currencies can explain 65 percent variation on Nigerian real gross domestic products while the remaining 35 percent estimation can be traced to external variables not included in the model. The estimated f-test proved that the model is fit while the estimated DW statistics found the presence of positive serial autocorrelation among the variables. The estimated beta coefficient of the variables revealed that commodity currency of US; Japanese yen and Chinese yen have positive and significant effect on Nigeria real gross domestic products while British pound and French Franc have negative effect on Nigeria real gross domestic products. From the co-integration test, the study found at least two co-integrating equation from the trace test and maximum eigenvalue. The granger causality test found unidirectional causality from real gross domestic products to Chinese yen and from French Franc to real gross domestic products. The study found that in the long run, Japanese and Chinese yen and French Franc have negative long run effect on Nigeria

real gross domestic products; while United States dollar and British Pound Sterling have positive long run effect on Nigeria gross domestic products. The study recommended amongst others that Monetary and macroeconomic policies should be properly articulated with an impregnable feedback loop, implemented to the letter, and a quarterly examination of the impact on the Naira should be regularly engaged, evaluated, interpreted and ensure that the results and possible remedial action(s) get to the appropriate authority timeously so as to ensure well informed decision(s).

Dada & Onyeranti (2012) analyzed the impact of exchange rate on macroeconomic aggregates in Nigeria. Based on the annual time series data for the period 1970 to 2009, the research examines the possible direct and indirect relationship between the real exchange rates and GDP growth. The relationship is derived in two ways using a simultaneous equations model within a fully specified (but small) macroeconomic model, and a vector-autoregressive model. The estimation results show that there is no evidence of a strong direct relationship between changes in the exchange rate and GDP growth. Rather, Nigeria's economic growth has been directly affected by fiscal and monetary policies and other economic variables particularly the growth of exports (oil). These factors have tended to sustain a pattern of real exchange rate over-valuation, which has been unfavourable for growth. The conclusion is that improvements in exchange rate management are necessary but not adequate to revive the Nigerian economy. A broad programme of economic reform is required, which includes among others, a complementary restrictive monetary policy. On the whole, the results are informative.

Ufoeze, Okuma & Nwakoby (2018) compared the fixed and floating exchange eras to know the exchange rate system in which the economy was fairly better. The time period covered was 1970 to 2012. The study employed the ordinary least square (OLS) multiple regression technique for the analysis. The coefficient of determination (R2), F-test, t-test, beta and Durbin-Watson were used in the interpretation of the results. The resulted revealed that about 85% of the changes in macroeconomic indicators are explained in the fixed exchange era. In the floating exchange era, 99% was explained while the whole periods has 73% explanatory power, hence the floating exchange era (1986 to date) is more effective in explaining economic trends in Nigeria. Also, exchange rate had significant positive effect on GDP during the fixed exchange rate era and negative effect during the eras of floating and all-time; inflation has insignificant negative effect on GDP during the fixed exchange era; significant effect in floating era and significant negative effect in the all-time period; money supply has insignificant negative effect on GDP during the fixed exchange era; and significant positive effect during the floating and all-time period; and oil revenue has significant positive effect on the GDP in all the exchange rate regimes (floating, fixed and all-time) in Nigeria. The study thus concludes that exchange rate movement is a good indicator for monitoring Nigerian economic growth. So far, exchange rate has always been a key economic indicator for Nigeria. The floating exchange period has outperformed the fixed exchange rate in terms of contribution inflation, money supply and oil revenue to economic growth. This indicates that the floating exchange rate has been a better economic regime for sustainable economic growth in Nigeria. From the findings, it is evident that oil revenue has positive effect in Nigeria and has remained the mainstay of the economy. It is thus recommended, among other things, that the positive exchange rate stock be monitored regularly,

so as not to allow those that find exchange rate as an avenue of investment, such as banks and the public, carry out their business, a thing which is more devastating to the economy.

III. METHODOLOGY

The *ex-post facto* research design was adopted to enable the researchers make use of secondary data to determine the cause-effect relationship of exchange change rate on the following macroeconomic variables; RGDP, foreign direct investment (FDI) and inflation. The dependent and independent variables were observed from 1986 to 2019. The same data were analyzed and tested using Stata to determine the impact of the independent variables on the dependent variables. The hypotheses were tested at 5% level of significance. The apriori expectation was that exchange rate has positive and significant impact on the selected macroeconomic (GDP, FDI and inflation) variables. The unit root test for stationarity was carried out on each of the data series using the Augmented Dickey Fuller unit root test. Results revealed that all the series were stationary at order one $I(0)$. Hence, regression analyses using the Ordinary Least Square (OLS) can be performed. Consequently, OLS was used in the analysis.

IV. ANALYSIS AND INTERPRETATION OF DATA

The paper sought to test the impact of exchange rate on some macroeconomic variables of the Nigerian economy. The unit root test for stationarity was carried out on each of the data series using the Augmented Dickey Fuller. Results reveal that all the series are stationary at order one $I(0)$. Hence, regression analyses using the OLS can be performed. In the analysis, we use EXRATE for exchange rate, RGDP for real GDP, FDI for foreign direct investment and INF for inflation.

For the first hypothesis:

H_0: Exchange rate has no positive and significant impact on real Gross Domestic Product (GDP).

H_1: Exchange rate has positive and significant impact on real Gross Domestic Product (GDP).

Table 1   Result of the Impact of EXRATE on RGDP

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   Source  |       SS        df       MS              Number of obs =       34
-----------+--------------------------------          F( 1,    32) =   169.94
    Model  |  1361467.48       1   1361467.48         Prob > F      =   0.0000
 Residual  |  256363.409      32   8011.35652         R-squared     =   0.8415
-----------+--------------------------------          Adj R-squared =   0.8366
    Total  |  1617830.89      33   49025.1786         Root MSE      =   89.506


-----------+----------------------------------------------------------------
    RGDP   |      Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]
-----------+----------------------------------------------------------------
  EXRATE   |   2.214821   .1698979    13.04    0.000      1.86875    2.560892
   _cons   |  -28.70202    23.9247    -1.20    0.239    -77.43504      20.031
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Source: Author's Computation using Stata 13

The result in table 1 above shows that the model fit is statistically significant (Prob > F = 0.0000) and therefore, is valid and suitable for making predictions. Also, it shows that the independent variable, EXRATE, explained 84.15% variability in the Dependent variable. Furthermore, the result reveals that EXRATE has a positive and significant impact (β = 2.2148, p = 0.000 $\leq$ 0.05) on RGDP at 0.05 (5%) level of significance. Hence, a one percent increase in EXRATE will bring about a 221.48% increase in RGDP.

Durbin Watson Statistics   (2,   34) = 1.989051
Figure 1: Result from Durbin-Watson Statistic (Stata 13 Output)

To test the validity of the result, the test for autocorrelation (serial correlation) was done using the Durbin Watson statistic. The Stata output, displayed above, shows that the Durbin Watson statistic is within the tolerance level and therefore, no autocorrelation detected in the sample. Hence, the regression result is valid.

For the second hypothesis:

H_0: Exchange rate has no positive and significant impact on foreign direct investment

H_1: Exchange rate has positive and significant impact on foreign direct investment.

Table 2   Result of the Impact of EXRATE on FDI

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  Source |      SS       df      MS              Number of obs =      34
---------+------------------------------         F(  1,   32) =   85.21
   Model | 675.923095     1  675.923095          Prob > F      =  0.0000
Residual | 253.843933    32  7.93262289          R-squared     =  0.7270
---------+------------------------------         Adj R-squared =  0.7184
   Total | 929.767028    33  28.1747584          Root MSE      =  2.8165


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     FDI |    Coef.   Std. Err.      t    P>|t|    [95% Conf. Interval]
---------+---------------------------------------------------------------
  EXRATE | .0493496   .0053462    9.23   0.000    .0384598    .0602394
   _cons | 10.48698   .7528386   13.93   0.000    8.953494    12.02046
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Source: Author's Computation using Stata 13

The result in table 2 above shows that the model fit is statistically significant (Prob > F = 0.0000) and therefore, is valid and suitable for making predictions. Also, it shows that the independent variable, EXRATE, explained 72.7% variability in the Dependent variable. Furthermore, the result reveals that EXRATE has a positive and significant impact ($\beta = 0.0493$, $p = 0.000 \leq 0.05$) on FDI at 0.05 (5%) level of significance. Hence, a one percent increase in EXRATE will bring about a 4.93% increase in FDI.

Durbin Watson Statistics   (2,   34) = 1.839262
Figure 1: Result from Durbin-Watson Statistic (Stata 13 Output)

To test the validity of the result, the test for autocorrelation (serial correlation) was done using the Durbin Watson statistic. The Stata output, displayed above, shows that the Durbin Watson statistic is within the tolerance level and therefore, no autocorrelation detected in the sample. Hence, the regression result is valid.

For the third hypothesis:

H_0: Exchange rate has no positive and significant impact on Inflation

H_1: Exchange rate has positive and significant impact on inflation

Table 3   Result of the Impact of EXRATE on INF

Source	SS	df	MS		Number of obs =	34
					F(1, 32) =	7.01
Model	1934.68077	1	1934.68077		Prob > F =	0.0125
Residual	8829.01196	32	275.906624		R-squared =	0.1797
					Adj R-squared =	0.1541
Total	10763.6927	33	326.172507		Root MSE =	16.61

INF	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
EXRATE	-.083491	.0315294	-2.65	0.012	-.1477143	-.0192677
_cons	28.71611	4.439914	6.47	0.000	19.6723	37.75992

Source: Author's Computation using Stata 13

The result in table 3 above shows that the model fit is statistically significant at 5% level of significance and is considered valid and suitable for making predictions. The result also shows that the independent variable, EXRATE, explained only 17.97% variability in the Dependent variable while the remaining 82.03% is explained by other variables not considered in the study. Additionally, the result reveals that EXRATE has a negative and significant impact (β = -0.0835, p = 0.012 $\leq$ 0.05) on RGDP at 0.05 (5%) level of significance. Hence, a one percent increase in EXRATE will bring about a 8.35% reduction in INF.

Durbin Watson Statistics   (2,   34) = 1.702191
Figure 1: Result from Durbin-Watson Statistic (Stata 13 Output)

To test the validity of the result, the test for autocorrelation (serial correlation) was done using the Durbin Watson statistic. The Stata output, displayed above, shows that the Durbin Watson statistic is within the tolerance level and therefore, no autocorrelation detected in the sample. Hence, the regression result is valid.

V. CONCLUSION

This study provided empirical estimates of the economic relationship between exchange rate, real GDP, foreign direct investment and inflation in Nigeria. The results of the estimation demonstrated that there is positive and statistically significant relationship between exchange rate and RGDP. There is also positive and statistically significant relationship between exchange rate and foreign direct investment; there is negative and statistically significant relationship between exchange rate and inflation. Consequently, these results provide confirmation that there is evidence of a strong relationship between exchange rate and RGDP, exchange rate and foreign direct investment; and exchange rate and inflation. The study therefore recommends that, improvements in exchange rate management are necessary to revive the Nigerian economy.

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