

# THE EFFECT OF MACROECONOMIC INDICATORS ON ECONOMIC GROWTH IN A PETROL-DOLLAR ECONOMY: THE NIGERIAN EXPERIENCE

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**Abstract:** The study set out to examine how macroeconomic variables such as exchange rate, inflation and interest rate can affect economic growth in Nigeria whose economy depend heavily on earnings from crude oil(Petrol-Dollar).Data for the study were sourced from .Central Bank Nigeria(CBN) statistical bulletin of various years using archival method. The study collated secondary data from 1999- 2014 which forms a times series data used to examine the post-Structural adjustment programme era on issues of volatility of macroeconomic variables on economic growth. The dependent variable(Real GDP) and the independent variables(exchange rate, inflation and interest rate were subjected to statistical analysis using the multiple regression technique where exchange rate, inflation and interest rate were regressed against GDP. The study found out that independent variables-exchange rate, inflation and interest rate could only explain 41.80% of variation in the dependent variables-economic growth proxy by GDP growth rate. The Durbin Watson statistics of 1.418 shows auto-correlation among the residuals which were positively correlated. The study found Positive relationship between exchange rate and interest rate with regards to economic growth while inflation showed a negative relationship with respect to economic growth. However these relationships were not significant meaning their effect is negligible. The study concluded that macroeconomic variables of exchange rate, inflation and interest rate do not impact significantly on economic growth in Nigeria. The study recommends that the interplay of fiscal instruments and monetary instruments backed with political will of the government on genuine implementation of well-thought out programmes is the only antidote to ensure that the macroeconomic objectives are achieved both in the short and long-run.

**Key words:** Volatile Exchange Rate, Macro-economic indicators, Monetary Policy, Purchasing Power Parity, Petrol-Dollar.

## 1. INTRODUCTION:

The Central Bank of Nigeria Act of 1958(CBN) vested the monetary policy powers of economic stability on the apex regulatory bank (CBN).Since our independence in 1960,CBN has operated a fixed exchange regime which was at various times was at par with the British pounds and later the United States Dollar. This exchange rate regime was operated in addition to administrative controls on foreign exchange to ensure macroeconomic goals of government are achieved.

Exchange rate volatility became problematic following the breakdown of the Breton Woods negotiations in 1973 which led to flexible exchange rate among world currencies. Countries tried to establish exchange rates with trading partners whom they have bilateral and multilateral trade agreements with.

A watershed in exchange rate policy was achieved in 1978, as CBN pegged the Nigeria Naira to 12 currencies of her major trading partners. This lofty objective was short-lived as the oil-glut of the 1980s in the international oil market led to inability of the Federal Government to meet international financial commitment.

Monetary policy is the process the government uses through the apex bank (CBN) to control the supply of money of money, availability of money and cost of money or rate of interest in order to attain a set of objectives oriented towards the growth and stability of the economy (Chigbu & Njoku, 2013). Monetary policy can be expansionary or contractionary in outlook. A policy is contractionary if it reduces the size of the money supply or raises the

interest rate while expansionary policies increases the size of the money supply or decrease the interest rate (Udenwa, 2000)

Monetary policies can be accommodative, if it is intended to create economic growth; neutral, if it is intended neither to create growth nor combat inflation; or tight if intended to reduce inflation (Orphanides, 2008). Monetary policy over the years in Nigeria is hinged on inflation targeting and exchange rate policy which have dominated CBN's monetary policy. The monetary policy focus is based on the assumption that the tools of inflation targeting and exchange rate policy can engender macroeconomic stability (Ajayi, 1999). Monetary policy is usually targeted at achieving full-employment equilibrium, rapid economic growth, price stability and external balance.

The structural adjustment programme (SAP) of 1986 made exchange rate volatility to escalate in various forms which had a cumulative negative effect on real growth rates, investment per capita, consumer price, inflation and government income per capita. The SAP which was based on the dictates of International Monetary Fund (IMF) introduced the floating exchange rate in Nigeria and open the economy to liberalization. Nigeria since then has experimented with fixed exchange rate and floating exchange. Proponents of flexible exchange rate built their assumptions that the stabilizing behavior of speculators will make exchange rates relatively stable compared to fixed rates. Nigeria position has been precarious since our mono-culture economic which is heavily dependent on crude oil prices has implication on the economy. Macroeconomic indicators (inflation, interest rate, investment and gross domestic product) and exchange rate has exhibited volatility with fluctuations in world crude oil prices. Volatility of exchange rate in Nigeria can be viewed from four eras namely pre-SAP era, SAP era, Lethargy era and post SAP era. Each era has their monetary and exchange rate policies based on the dictates of the time.

Volatility is the fluctuation in the value of a variable price. Volatile exchange rate makes international trade and investments more difficult because it increases the exchange rate risk. Exchange rate volatility tends to increase the risk and uncertainty of external transactions and predisposes a country to exchange rate related risks (Jin, 2008). Real exchange rate is a good measure of international competitiveness. It is regarded as an indication of competitiveness of currency of any country in relation to another country's currency.

The nexus of exchange rate in the formulation of monetary policies is based on the objective of price stability. Volatility in exchange rate is injurious to goals of price stability. Prior literatures on issues of monetary policy and exchange rate volatility showed that domestic price instability negates the store value of money which impedes investment and economic growth. These studies focused investigations in developed economies (Lewis, 1995; Faust & Rogers, 1999) and little appears to have been done in this area of research in developing economies like Nigeria where research effort has been to estimate exchange rate volatility on trade balance, economic growth and GDP growth (Aliyu, 2010; Olowe, 2009; Yinusa, 2008; Yinusa & Akinlo, 2008). These studies have shown mixed results regarding macroeconomic variables impact on exchange rate volatility.

This study will anchor its theory on purchasing power parity (PPP) hypothesis which tests the long-term stability and consistency of bilateral exchange rate. Monetary models hinge validity of long-run PPP theory and can be used to link domestic and foreign development especially in developing countries. PPP hypothesis can provide fundamental determinants that can be used to calculate the long run exchange rates and assess the appropriate level of exchange when a long-run relationship exists.

The persistent variability in exchange rate since December 2015 in Nigeria has more than ever before presented the need to investigate the effect that this volatility has on the economy. Bollen (2008) is of the view that policy makers are anxious about the effect that exchange rate volatility has on macroeconomic policies while businesses hinge their concern on this issue on the effect on profit by adjusting risk management tools. Exchange rates cannot be taken in isolation in trying to determine its effect on the economy as there are other macroeconomic variables like inflation and interest rate that jointly interplay to establish economic stability. The present interest rate of 14%, inflation rate of 17.6 and exchange rate of N396.15 TO \$1 (BCD US\$) and a negative growth rate in GDP of -2.06% going by figures by the National Bureau of statistics for the second quarter of 2016.

Morana (2009) provided a recent student for fundamentals in terms of relationship between cause and trade-off in exchange rate volatility and volatility in macroeconomic factors (output, inflation, interest rate and money

supply). The study found out that the direction of causality is bidirectional but however, stronger from macroeconomic factors to exchange rate volatility than vice-versa.

Based on these revelations by Morana (2009) on relationship between macroeconomic indicators and exchange rate volatility, the objective of this paper is to examine how the three macro-economic issues of exchange rate, inflation and interest affect the economic growth and (economic growth will be proxy by GDP) in mono-culture economy. The following hypothesis is developed based on the stated objectives:

H<sub>01</sub>: Macroeconomic indicators do not have significant impact on Economic Growth in Nigeria.

The study will be of significance to policy makers in directing and utilizing only those monetary policies that will impact positively on the economy and granger-cause growth and help mitigate the effects of economic policies that will impede economic growth.

## **2. THE CONCEPT OF EXCHANGE RATE VOLATILITY:**

Crude oil prices predominantly trade in U.S. dollars and are thus susceptible to exchange rate volatility. However, currencies of major crude oil exporters and importers also face impacts of crude oil price dynamics. The relationship is hence bidirectional and the relevance for each factor varies considerably. Intuitively, a devaluation of the U.S. dollar against other exchange rates leads to a correspondent increase in crude oil prices. The underlying theory states, that a U.S. dollar devalues lets crude oil importers' demand soar because of relatively lower prices for crude oil. In turn, an oil exporter might seek to curb supply in order to reach a higher price for its oil.

The key determinant of our exchange rate is the interplay of crude oil prices which affects how the currency is pegged. The volatility of the Crude oil market has always exposed the Nigeria Naira to forces and dictates of international economic variables and vagaries which the government has no control over. Volatility in exchange rates restrict the flow of investment capital by reducing direct and portfolio investment.

## **3. ECONOMIC GROWTH RATE AND MACROECONOMIC INDICATORS VOLATILITY:**

Chipili (2013) studied the exchange rate volatility and its effect on macroeconomic management in Zambia over a period of 2007-2013 when Kawha/US Dollar exchange rate tends to depress trade, increase inflation, discourage capital flows and dampen output. The study found out that the impact of exchange rate volatility tends to be temporary and exchange rate depreciation in excess of 1% tends to generate negative effect on the economy.

The study of Chipili in 2013 which investigated the relevance of exchange rate volatility in monetary policy setting as well as CBN foreign exchange intervention decision noticed varying degree of impart on variables studied. This studies show that exchange rate alone cannot determine economic implications on an economy.

Mahmood (2011) examined the effect of exchange rate volatility on macroeconomic variables in Pakistan. The study investigated the effect of four macroeconomic variables, GDP, FDI growth rate and trade openness on exchange rate. GARCH model was applied in this study to calculate volatility of real exchange rate and ordinary least square regression technique was used to investigate the relationship between the variables under consideration. The study found out and confirmed the impact of exchange rate volatility on macro-economic variables in Pakistan. The study concluded that exchange rate volatility positively affects GDP growth rate, trade openness and negatively affects the FDI. The conclusion by Mahmud (2011) also buttressed the point made by Chipili that exchange rate volatility has varying degrees of effect on macroeconomic indicators.

Similarly, Edwards (2000) investigated the changing association between exchange rate regimes, capital flows and currency crisis in emerging economies. The study drew experience from policy controversies that emerged in Mexico, East Asia, Russian and Brazilian crisis of the 1990s. The study concluded that given the appropriate economic conditions and policies, floating exchange rate can be effective and efficient. The issue with exchange rate policies is that no policy seems to be fool-proof as most developing economies still grapple with the optimum exchange rate policy to adopt whether floating or fixed exchange rate.

In Argentina, study conducted by Tayler (2001) argued the case for liberalized economic policies. The study found out that Argentina failed in maintaining the liberalized economic policies about capital flows and a firm currency. Argentina adopted an exchange rate policy based on freezing the exchange rate in the 1990s to curb inflationary trends. The import of this measure is to tie money supply and supply of credit to international reserves.

Mirchandani (2013) examined the macroeconomic determinants of exchange rate volatility in India. The impact of various macroeconomic variables on exchange rate was subjected to statistical analysis using Pearson's correlation analysis. The study found out that exchange rate is in correlation with many variables such as interest rate, inflation rate and GDP growth has a bi-directional relationship. The study concluded that India Rupee has showed volatility over the years because India received capital flows in the midst of global uncertainty in 2009-2011 as its domestic outlook was positive. With domestic outlook looking dismal, Rupee devaluation became inevitable as without stable capital inflow, the Rupee is expected to remain volatile, the study concluded. Conversely, Chit (2008) found a different result as the study on exchange rate volatility had adverse effect on investment, growth and trade. Schanabi in 2009 also reached a conclusion that exchange rate volatility had effects on trade, investment and growth which is in agreement with the works of Schanabi (2009) who found adverse effect of exchange rate volatility on macroeconomic indicators.

In contrast to the work of Mirchandani (2003), Chit(2008) and Schanabi(2009) who found some level of relationship between exchange rate volatility and macroeconomic variables; Baxter and Stockman(1989) did not find evidence of exchange rate volatility impacting on macroeconomic aggregates under alternative exchange rate regimes. The same result was obtained by Sapir and Sekkat (1995) whose study found no appreciable effect of exchange rate volatility on trade investment and growth.

Overseas research on how exchange rate volatility affects macroeconomic variables as seen in Zambia, Pakistan, Mexico, East Asian, Russian, Brazil and India showed mixed findings as both positive, neutral and negative effects of exchange rate volatility on macroeconomic indicators were noticed when data were subjected to empirical investigation. The fiscal policy thrust of any government has implications on exchange rate volatility and this might explain the reasons for the mixed findings noticed and the fact that exchange rate alone as an macroeconomic variable cannot determine the direction of economic indicators in any country whether developed or developing.

Studies in Nigeria presented interesting scenario and revelations, Oluwaseyi, Adesoye & Oluwakemi(2015) investigated the effect of exchange rate volatility on investment and growth in Nigeria from 1986-2014. The vector error correction method, impulse responses function, co-integration and Augmented Dickey fuller (ADF) test for stationarity were employed to capture interactions between the variables, The results confirm the existence of long-term relationship between exchange rate, investment, interest rate, inflation and growth. The study concluded that exchange volatility has a negative effect with investment and growth while exchange rate volatility has a positive relationship with inflation and interest rate in Nigeria. This conclusion is consistent with the findings in overseas countries, where similar research of this nature has been carried out. Varying impact of exchange rate volatility on macroeconomic indicators has been established in different countries.

Chigbu and Njoku(2013) assessed the impact of monetary and fiscal policies on economic growth from 1990-2010 using data on Rediscount Rate(LNMRR), interest rate(LNIR), liquidity rate(LNLR), corporate income tax(CIT) and federal government budget which was regressed against gross domestic product(GDP). The study found and confirmed that fiscal policy measures exert greater effect than monetary policy measures on the level of economic development in Nigeria. The study concluded that interest rate and liquidity rate impacted negatively on the GDP but minimum rediscount rate, corporate income tax and federal government budget affect the GDP positively and that both monetary and fiscal policies measures are jointly statistically significant to level of economic growth in Nigeria.

In the same vein, Adeolu, Kehinde and Bolarinwa (2012) assessed how fiscal/monetary policy affects economic growth in Nigeria. The study argued that curbing the fiscal indiscipline of government will make much more than

enshrining fiscal policy rules in our statute books. The study concluded that there exist a mild long-run equilibrium relationship between economic growth and fiscal policy variables in Nigeria.

Amassoma, Nwosa and Olaiya (2011) examined the effect of monetary policy on macroeconomic variables in Nigeria for the period 1986 -2009 using the simplified ordinary least square technique. The study found that monetary policy had a significant effect on exchange rate and monetary supply had insignificant influence on price stability.

Udude (2014) extended the time series analysis more than what Adeolu et al did in 2012, and investigated the affect of monetary policy on economic growth of Nigeria from 1981-2012 with the objective of finding out the impact of various monetary policy instruments (money supply, interest rate, exchange rate and liquidity ratio) in enhancing economic growth in Nigeria. The study adopted advanced econometric techniques were employed to test significance. The findings showed using vector error correction mechanism tests that only exchange rate exerted significant impact on economic growth in Nigeria while other variables did not. The study concluded that monetary policy did not impact significantly on economic growth during the period under review and that the ineffectiveness of monetary policy is hinged on the inadequacies of the policy instrument used in Nigeria as such instrument impedes its contribution to economic growth.

Studies on exchange rate volatility and macroeconomic variables has shown mixed findings, but there seems to be a convergence of opinion by various studies that exchange rate volatility do have effect on the economy of any nation but the effect cannot be established in isolation with taking into consideration the other macroeconomic variables such as interest rate, inflation, interest, money supply and liquidity ratio which also do exert their own influence. The joint effect of these macroeconomic variables does have bi-directional or neutral relation with economic growth according to literatures reviewed. Empirical evidence regarding the effect of exchange rate volatility on macroeconomic indicators is inconclusive as there is no consensus among scholars on this vexed issue. In Nigeria the exchange rate is an integral part of the monetary policy targeting and CBN foreign exchange intervention decision. CBN adjust nominal short-term interest rate in response to deviations of output and inflation from potential level and target attainment of macroeconomic objectives.

#### 4. RESEARCH METHODOLOGY:

The research methodology adopted for the purpose of this research is a correlation descriptive research design and the variables under study will be subjected to empirical analysis to determine their causal relationship. Archival method will be use to collate secondary time series data from CBN statistical bulletin (1999-2014) and data will be analyzed using SPSS 16.0.

#### 5. MODEL SPECIFICATION:

The model specification will be a multiple regression technique stated in general form as:

$$GDP = a_0 + b_1EXR + b_2INF + b_3INT + e_i$$

Where GDP =Gross Domestic Product

EXR= Exchange Rate

INF = Inflation

INT = interest rate

$e_i$  = Error term

$a_0, b_1, b_2$  and  $b_3$  are the parameters to be estimated and  $a_0$  as the constant term.

## 6. DATA PRESENTATION AND ANALYSIS:

YEAR	GDP	EXR	INF	INT
1999	3989450	92.52	6.62	7.48
2000	4679212	109.55	6.94	9.58
2001	6713575	112.48	17.87	8.18
2002	7795758	126.4	12.89	8.1
2003	6895198	135.4	14.03	6.5
2004	9913598	132.67	15.01	5.48
2005	11411067	130.29	17.85	7.42
2006	14610881	128.27	8.24	7.16
2007	18564595	117.97	5.38	6.65
2008	20657818	132.56	11.6	3.51
2009	24296329	149.58	8.4	5.07
2010	33984754	150.66	8.46	11.06
2011	37409861	154.74	9.48	10.32
2012	40544100	156.81	12.2	8.78
2013	4954200	157.81	13.2	8.78
2014	5890235	163.9	13.8	7.21

Table 1: Figures for GDP, EXR, INF & INT

SOURCE: CBN BULETTIN OF VARIOUS YEARS

## 7. MULTIPLE REGRESSION RESULT:

Dependent Variable: GDP

Method: Multiple Least Square Regression

Date: 09/27/2016

Sample: 1999-2014

Included Observations: 16

### 7.1 Result of Regression 1

TABLE 2: Test of Coefficient Significance Results from SPSS 16.0

Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
(Constant)	-2.331E7	2.080E7		-1.121	.284	
EXCHANGE RATE	345447.931	139915.322	.565	2.469	.030	
INFLATION	-1.178E6	724965.894	-.371	-1.625	.130	
INTEREST RATE	795058.206	1.428E6	.126	.557	.588	

a. Dependent Variable: GDP

**7.2 Result of Regression 2**

TABLE 3: ANOVA Test Statistics from SPSS 16.0

ANOVA<sup>b</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.500E14	3	3.167E14	2.871	.081 <sup>a</sup>
Residual	1.324E15	12	1.103E14		
Total	2.274E15	15			

a. Predictors: (Constant), INTEREST RATE, INFLATION, EXCHANGE RATE

b. Dependent Variable: GDP

**7.3 Result of Regression 3**

TABLE 4: Model summary Statistics Test from SPSS 16.0

Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin - Watson
1	.646 <sup>a</sup>	.418	.272	1.05023E7	1.418

a. Predictors: (Constant), INTEREST RATE, INFLATION, EXCHANGE RATE

**8. DISCUSSION OF FINDINGS:**

Table 2(Co-efficient Significance) shows the probability value of exchange rate, inflation and interest rate are 0.30, 0.130 and 0.588 respectively, all are greater than 0.05 (level of significance); therefore, the null hypothesis H<sub>01</sub>: Macroeconomic indicators do not have significant impact on Economic Growth in Nigeria is accepted.

The negative intercept of inflation (-1.178) indicates that a unit change in inflation will bring about a 37.1% decrease in the rate of real GDP. Therefore, inflation has an adverse effect on the real GDP, but the effect is not significant.

Conversely, the exchange rate and interest rate both have positive intercepts which indicate that a unit change in any of these variables will granger-cause a 56.5% and 12.6% increase respectively in real GDP. Therefore, exchange rate and interest rate have a favorable effect on the real GDP, but the effect is not significant.

Table 3(ANOVA), tests the overall significance (F-test) i.e. measure the overall significance of the coefficients of the explanatory variable in the specified model.

**Decision Rule:**

If  $F_{\text{Calculated}} < F_{\text{Tabulate}}$  Accept  $H_{01}$ , otherwise reject.

From the results in Table 3,  $F_{\text{Calculated}} < F_{\text{Tabulate}}$ ,  $2.871 < 9.01$  (table fig. from Omotosho, 2011), therefore  $H_{01}$  the null hypothesis is accepted. This means that jointly that all the independent variable is not statistically significant in explaining the variations of the independent variable. This means that Macroeconomic variables of exchange rate, inflation and interest rate do not have significant impact on Economic Growth in Nigeria (GDP).

Table 4(Model Summary) showed that the coefficient of determination( $R^2$ ) value of 0.418 or 41.80% of variation in the dependent variable(GDP) is granger caused by the independent variables consisting of exchange rate ,inflation and interest rate. This means that 59.20% of the residual are due to factors not considered in the model that can lead to rapid change in the GDP accounted for by the stochastic term. The adjusted ( $R^2$ ) value of 0.272 means that, the model is about 27.2% goodness fit and help to rectify any overstatement by original  $R^2$ .

The Durbin Watson Statistic is 1.418 which means that there exists the presence of auto-correlation. The residuals are positive correlated.

The study is consistent and in agreement with the works of Udude (2014),Taylor (2001) and Mahmood (2001) who found positive relationship between exchange rate and GDP growth and at variance with the works of Amassoma et al(2011) and Oluwaseyi et al.(2015) whose study found a negative relationship in the variables.

**9. CONCLUSION AND RECOMMENDATIONS:**

The study found out that the macroeconomic variables of exchange rate, inflation and interest rate do not impact significantly on GDP growth. Although exchange rate and interest rate showed a positive relationship towards GDP growth, the impact is not significant while inflation showed a negative relationship towards GDP. The conclusion of this study is that factors not built-in the regression model used for analysis do more than explain what variables that have significant impact on the GDP growth of a mono-culture economy like Nigeria. The study also noted that the independent variables are auto-correlated meaning the relationship exists between the variables under discuss. Therefore their effect should have a joint impact on an economy as findings have shown.

The study recommends that macroeconomic policy decision is not enough to stimulate growth in the economy of any nation. The interplay of fiscal instruments and monetary instruments backed with political will of the government on genuine implementation of well-thought out programmes is the only antidote to ensure that the macroeconomic objectives are achieved both in the short and long-run.

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