

## RETHINKING THE EFFECTS OF MACRO-ECONOMIC VARIABLES ON NIGERIA'S ECONOMIC GROWTH: A TIME SERIES ANALYSIS

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### ABSTRACT

*Overcoming economic problems and achieving economic growth is the desire of every nation, especially developing nations with myriads of economic problems. To determine how macroeconomic variables are associated with economic growth is useful in effective and efficient management of the economy. This study examined the relationship between macro-economic variables and economic growth in Nigeria, using time series data obtained from CBN statistical bulletins as well as National Bureau of Statistics (NBS) records from 2000 to 2019. Macro-economic variables included interest rates, inflation rate and exchange rate, while economic growth was measured using unemployment rate and real GDP. The study was anchored on Keynes Theory. The researchers adopted the ex post facto research design, while descriptive, correlational and Ordinary Least Square regression techniques were used to analyze the data collected. The results showed that both inflation rate and exchange rate have positive signs, which do not really conform to the a priori expectations of the study. On the other hand, the relationship between foreign exchange and GDP growth is negative but significant, implying that an increase in the exchange rate will lead to a fall in economic growth. The two models tested by the study have statistical fit as shown by the p-values of the F-statistics. It was recommended, amongst others; that government should ensure macroeconomic stability by making sure that those dynamics are regularly monitored and put under control; in order to grow the GDP as well as level of employment in the country.*

**Keywords:** Macro-economic variables, economic growth, interest rate, inflation rate, exchange rate

## 1. INTRODUCTION

Recently, the Nigerian economy has been experiencing a plethora of mind-boggling problems, which could be attributable to a number of factors, ranging from security, economic, ethno-religious to socio-political issues. Of these, the economic problems appear the most-biting. Yaqub (2011) asserted that, the growth of Nigeria economy is sluggish when compared to some emerging economies in the world. As a matter of fact, the tasks constantly facing the Nigerian economic managers among others include; how to increase economic growth, how to reduce extreme poverty, how to increase Nigeria's production capacity, how to improve standard of living, how to curb or reduce incidences of crime and violence (such as banditry terrorism and kidnapping), and how to make the country an attractive destination for foreign direct investments.

In response to that, the Nigerian government and policy makers have embarked on various macroeconomic policies to address these issues. Some of the policies involved the use of monetary and fiscal policy, export promotion strategy, imports substitution strategy, NEEDS, Vision 20 20 20, the austerity measure, etc. The fundamental objectives of the policies include price stability, maintenance of balance of payments equilibrium, and promotion of employment, output growth and sustainable development. These objectives are necessary for the attainment of internal and external balance of value of money and promotion of long run economic growth. Further, the Central Bank of Nigeria(CBN) and other relevant agencies of government, as part of their responsibilities to put in place and monitor policies to boost macro-economic stability, have come up with various policies and guidelines to ensure stability and also to put the nation's economy on the part of growth. These, have varying effects on key macro-economic variables (such as the rate of inflation, the interest rate, the foreign exchange rate, the inflows of foreign direct investment, household consumption, and so on). The dynamics of these macro-economic variables impact on our GDP and other growth indices in the economy, which is of interests to researchers, policy makers, the government and others.

Prior studies have been carried out by researchers on the effect of macro-economic variables on the growth of the Nigerian economy. For instance, Alasha (2020), Idris (2019), Akutson, Messiah & Araf (2018), Atale & Ayunku (2016), Ajide (2014) and others, all examined the subject matter. However, some of the findings were conflicting, inconclusive and highly controversial amongst scholars and other stakeholders. Secondly, no none study on this subject has used unemployment rate as

a proxy for economic growth; to the best of our knowledge. This study attempts to fill that gap as well as contribute to knowledge. Specifically, our point of departure from prior studies, was to assess the effects of inflation rate, interest rate and exchange rate on both unemployment rate and real GDP in Nigeria, using data from 2000 to 2019. At the end, it is expected that our study would provide answers to the following questions begging for answers:

- i. To what extent does inflation rate influence unemployment and real GDP of Nigeria?
- ii. To what extent does interest rate affect both unemployment and real GDP of Nigeria?
- iii. To what extent does exchange rate volatility impact on unemployment and real GDP of Nigeria?

The remainder of this paper is organized as follows: Section two- focuses on review of empirical literature; Section three- highlights the methodology employed by the researcher, sections four looked at the discussion of findings; while section five deals with the conclusion some policy recommendations.

## **2. REVIEW OF RELATED LITERATURE**

### **2.1 Conceptual Review**

#### *2.1.1 Macroeconomic Variables and Dimensions*

Macroeconomists look at aggregate variables such as the GDP, unemployment, interest rates, inflation rates and general price indices; so that they can understand how the entire economy functions. They also develop functional models which will explain the relationships and/or effects of such factors (as national income, output, consumption, inflation, savings, investment, government spending, and international trade) on the economy. The dimensions of macro-economic variables used in the study are discussed below;

**Interest Rate-** Interest rate means the rate at which interests are paid by a borrower for the use of money that they borrow from a lender. It also means the amount of interest paid per unit of time expressed as a percentage of the amount borrowed. Interest rates differ mainly in terms or maturity (that is, the length of time for repayment and liquidity, that is, quick conversion of assets to funds). Interest rates can be described as 'nominal' or 'real'. In general, interest rates are used not only to gauge financial market conditions but also used as a major tool for the formulations of effective monetary policies the CBN and other economic managers.

**Inflation Rate-** Inflation is the rate at which the general prices for goods and services fall relative to the value of the country's currency. The inflation rate is usually indicated by the consumer price index. Consumer price indices are based on a sample basket of goods and services bought by consumers in an economy (Ismaila, and Imoughele; 2015). Practically, a high inflation rate is an indicator of macroeconomic imbalances and vice versa.

**Exchange Rate-**Exchange is the price of a unit of a given currency, in relation to other currencies. It is the rate at which a country's currency exchanges with other currencies in the global financial market. Exchange rate is a product of a country's external trade and directly related to the balance-of-payments. Balance- of- payments deficit and the level of external reserve usually influence exchange rates. Accordingly, the higher the value of a country's currency relative to other currencies, the more economically sound the country is seen to be, *ceteris paribus*.

#### 2.1.2 Economic Growth and Measures

Economic growth simply means the ability of an economy to increase its productive capacity through the production of additional units of goods and services. This economic growth is also seen as a reflection of the economic policies put in place by a country. The growth and development of a country can be measured using some economic indicators such as the Gross Domestic Product (GDP), the Human Development Index (HDI), Total Factor Productivity (TFP), unemployment rate, etc. (Smyth, 1995). This study uses the real GDP as well as the growth in employment; as indicators of economic growth.

**Employment Growth-** This is measured by the level of unemployment in the country. The lesser the unemployment rate, the more the economy is perceived to be growing, *ceteris paribus*. Hence the unemployment rate is an important indicator of economic and social well-being. By description, the unemployment rate is the percentage of the labour force that is not working or jobless. On the other hand, the rate of unemployment is simply the number of jobless persons found among the labour force measured in percentage. Alanana, (2003) opined that a high unemployment rate sends a dangerous and disturbing signal to all segments of the society and deserves to be controlled or checked.

**Real GDP Growth-** Could be used as a measure of a nation's economic growth. The growth in real GDP indicates the rate of income growth per head of the population. A variation of the indicator could be the growth in real GDP per capita, which is derived as the percentage change in real GDP divided by the population. The indicator is a basic

economic indicator and measures the level of total economic output relative the population of a country. It reflects changes in total well-being of the population (Zhao, 2013).

## **2.2 Theoretical Review**

This research work was anchored on the Keynes' Theory. The theory states that output of a state is propelled via government spending, likewise government often borrow funds to finance its budget deficits, (particularly to execute capital projects), which will in turn increase output and eventually propel growth. Moreover, the funds are used to solve state problem on the short run than waiting for market forces to solving the problem on the long run, because we may cease to exist on the long run.

## **2.3 Empirical Review**

Alasha (2020) studied the effect of exchange rate fluctuations on Nigeria's economic growth. The study adopted regression model to analyze the data collected from secondary sources. Findings showed that exchange rate fluctuations and other variables such as interest rate, inflation rate; may impact on economic growth. It was therefore recommended that there was need to develop an efficient and effective exchange rate regime that would help to prevent inflation, as well as increase Nigeria's production capacity.

Olaniyan et al. (2020) looked at the impact of interest rates on economic growth in Nigeria from 1989 and 2019. The data used for the study were obtained from secondary sources. The findings revealed a long-term relationship between interest rates, external borrowings, rate of exchange, and economic growth. It was therefore recommended that the government should embark on growth-enhancing policies and reforms as a prerequisite for sustainable economic growth and investments in the country.

Idris (2019) investigated the impact of interest rate on Nigeria's economic growth. The study used annual time series data ranging from 1980 to 2017. The Vector Auto Regression (VAR) model and the Granger causality tests were used to test the hypotheses. The result showed a negative relationship between the rate of interest and economic growth in Nigeria. The study then recommended that to attain the desired growth level in Nigeria, regulatory authorities and policy makers should put in policy measures that would grow the economy

Akutson et al. (2018) studied the effect of unemployment on economic growth in Nigeria. Data were sourced from the Central Bank Statistical Bulletin and National Bureau of Statistics for the period 1986 -2015. Data collected were analyzed using the ARDL Bound Testing and the Error Correction Model (ECM) The findings showed that

there was no long- run link between unemployment rate and Economic growth in Nigeria

Utile et al. (2018) examined the influence of interest rates on the economic growth in Nigeria. The data used for the study was obtained from secondary sources between 1980 and 2016, and were analyzed using multiple regression technique. The adopted the ex-post facto research design. The result showed that interest rate and exchange rate had negative and insignificant effect on Nigeria's GDP. The researchers therefore concluded that that interest rate had negative and insignificant relationship with GDP.

Atale and Ayunku (2016) examined the impact of interest rate on economic growth in Nigeria. Data from 1985- 2014 was collected from various secondary sources, mainly from the CBN bulletin and the National Bureau of Statistics. The study made use of Augmented Dicker-Fuller (ADF) and unit root tests for analysis. It was revealed that interest rate was inversely related to economic growth, but the relationship was not significant. It was recommended that monetary authorities should adopt appropriate polices that would promote and stimulate economic growth in Nigeria.

Ajide (2014), employed a time series analysis to examine the determinants of economic growth in Nigeria for the periods1980-2010. He added an institutional variable proxies as economic freedom to capital FDI, labour, tax, expectancy, financial variables and GDP, and degree of openness into the multivariate regression model in order to establish the link between economic growth, foreign direct investment (FDI), and institution. His findings showed that labor, life expectancy, the degree of openness and economic freedom influence the level of the country's economic growth at different significant levels. The outcome of disaggregated model pointed out that freedom of international trade has a positive impact on economic growth but the size of government adversely affects the economic growth.

Adeniran et al. (2014) investigated the impact of exchange rate fluctuation on the Nigerian economic growth using OLS method, correlation and regression analysis and found that interest rate and rate of inflation have negative impact on economic growth, but this is not so significant. Also found was that exchange rate has positive but not significant impact on economic growth.

However, Nwoye et al. (2015) inquired about the effect of Nigeria's macroeconomic environment on the performance of the national economy. Using the OLS method and found that unique relationship exists between the country's national currency exchange rate to a US dollar, inflation rates, monetary policies, and the extent or level of GDP growth the country. Agwu (2014) obtained a different result while carrying out

a survey on factors that contribute to economic growth in Nigeria with data for the period between 1981 and 2012 using the VECM model.

Antwi et al. (2013) studied the impact of macroeconomic factors on economic growth in Ghana. The researchers employed error correction model (ECM) and carried out tests such as Augmented Dickey Fuller (ADF), Johansen co-integration and found that long run economic growth in Ghana is explained by physical capital, foreign direct investment, foreign aid, inflation and government expenditure.

Brigitta (2015) analyzed the impact of exchange rate regimes on economic growth sourcing data from seventy-four countries comprising majorly of developing countries. The researcher used a combination of both descriptive analysis and a multiple regression model to analyze his results and it was found that there is indeed a significantly positive correlation between fixed regimes and economic growth, by using inflation rate and gross capital formation as a percentage of GDP as the control variables.

### 3. METHODOLOGY

This study adopted the Ex post facto research design. Data used in this study were sourced from secondary sources, (mainly from Central Bank of Nigeria annual reports, the National Bureau of Statistics (NBS) statistical bulletins and annual reports of Nigeria Deposit Insurance Corporation (NDIC)). The scope of the study was limited to macroeconomic variables such as: Inflation rate, (IR) exchange rate (EX), and economic growth variables were used as the independent variables whereas the dependent variables used for the study was the Gross Domestic Product (proxied by Real GDP Growth Rate (RGDPGR) and Unemployment rate (UEMR). The data used for the study covered from the period from 2000 – 2019. In bid to analyze the collected data, the researcher employed the ordinary least square (OLS) regression estimation technique.

#### Model Specification

The linear regression model used in this study is adapted from the prior studies of Shehu (2013) and Ogare, (2013) with modification. Consistent with previous studies, this model modified and extended the model tested by prior studies and the ordinary least square was guided by the following linear model;

$$RGDP = f(INFLR, INTR \text{ and } EXR) \quad (1)$$

$$UEMR = f(INFLR, INTR \text{ and } EXR) \quad (2)$$

These are further expressed economically as follows;

$$RGDP = \beta_0 + \beta_1 INFR + \beta_2 INTR + \beta_3 EXR + \mu \quad (3)$$

$$\text{UEMR} = \beta_0 + \beta_1\text{INFR} + \beta_2\text{INTR} + \beta_3\text{EXR} + \mu \quad (4)$$

Where; INFR = Inflation Rate; INTR = Interest Rate; EXR = Exchange Rate;  $\beta_0$  = Intercept;  $\beta_1$ –  $\beta_4$  = Is the coefficient of independent variables;  $\mu$  = Error terms

#### 4. DATA ANALYSIS AND DISCUSSION OF FINDINGS

**Table 1 Descriptive Statistics**

|              | INFR     | INTR      | EXR      | RGDPGR    | UEMR     |
|--------------|----------|-----------|----------|-----------|----------|
| Mean         | 12.05500 | 13.07200  | 174.2485 | 6.016000  | 7.143000 |
| Median       | 12.10000 | 13.77500  | 150.0850 | 6.445000  | 3.820000 |
| Maximum      | 18.90000 | 18.98000  | 306.9500 | 14.60000  | 22.60000 |
| Minimum      | 5.400000 | 4.500000  | 106.7100 | -1.580000 | 3.540000 |
| Std. Dev.    | 3.674303 | 4.464625  | 70.87869 | 3.689315  | 5.351853 |
| Skewness     | 0.068811 | -0.468302 | 1.206899 | 0.089186  | 1.643646 |
| Kurtosis     | 2.260049 | 2.066119  | 2.826252 | 3.232295  | 4.854743 |
| Jarque-Bera  | 0.472056 | 1.457801  | 4.880511 | 0.071481  | 11.87197 |
| Probability  | 0.789758 | 0.482439  | 0.087139 | 0.964891  | 0.002643 |
| Sum          | 241.1000 | 261.4400  | 3484.970 | 120.3200  | 142.8600 |
| Sum Sq. Dev. | 256.5095 | 378.7247  | 95452.00 | 258.6099  | 544.2042 |
| Observations | 20       | 20        | 20       | 20        | 20       |

Researcher's Computation based on output from E Views 10

The result above indicates that INFR, INTR and EXR have mean values of 12.1%, 13.1 and N174, respectively while RGDPGR and EXR have means value of 6.0% and 7.1%, respectively. More so, INFR, INTR and RGDPGR have medians that are almost equal to their means; showing normal distribution of the data. This is also supported by the Jarque Bera Statistics, which shows that all the variables are normally distributed except UEMR.

**Table 2 Correlation Matrix**

|       | INFR      | INTR      | EXR       | GDPGR     | UEMR     |
|-------|-----------|-----------|-----------|-----------|----------|
| INFR  | 1.000000  |           |           |           |          |
| INTR  | 0.171205  | 1.000000  |           |           |          |
| EXR   | 0.193420  | 0.460962  | 1.000000  |           |          |
| GDPGR | -0.006203 | -0.286660 | -0.768635 | 1.000000  |          |
| UEMR  | -0.025382 | 0.351462  | 0.859118  | -0.633153 | 1.000000 |

Researcher's Computation based on EViews 10

The correlation statistics above shows that all the independent variables are negatively correlated with RGDPCR but are positively correlated with UEMR, except INFR, which has a negative correlation.

#### **4.1 Least Square Regression Test**

The least square regression is carried out to determine the functional relationships existing between the variables in the model formulated in this study. This is performed using the multiple regression technique, so as to capture the effect of the selected macroeconomic variables RGDPCR as well as UEMR for the period under review. The result of the regression test is presented Tables 3 and 4 below.

**Table 3 Multiple Regression Result (Model 1)**

Dependent Variable: GDPGR

Sample: 2000 2019

Included observations: 20

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.  |
|--------------------|-------------|-----------------------|-------------|--------|
| INFR               | 0.142522    | 0.159289              | 0.894736    | 0.3842 |
| INTR               | 0.058767    | 0.144933              | 0.405478    | 0.6905 |
| EXR                | -0.043144   | 0.009168              | -4.706094   | 0.0002 |
| C                  | 11.04742    | 2.443515              | 4.521119    | 0.0003 |
| R-squared          | 0.615834    | Mean dependent var    | 6.016000    |        |
| Adjusted R-squared | 0.543803    | S.D. dependent var    | 3.689315    |        |
| S.E. of regression | 2.491852    | Akaike info criterion | 4.840786    |        |
| Sum squared resid  | 99.34920    | Schwarz criterion     | 5.039932    |        |
| Log likelihood     | -44.40786   | Hannan-Quinn criter.  | 4.879661    |        |
| F-statistic        | 8.549544    | Durbin-Watson stat    | 1.612421    |        |
| Prob(F-statistic)  | 0.001285    |                       |             |        |

Researcher's Computation using EViews 10

**Table 4 Multiple Regression Result (Model 2)**

Dependent Variable: UEMR

Method: Least Squares

Date: 11/26/21 Time: 13:52

Sample: 2000 2019

Included observations: 20

| Variable  | Coefficient | Std. Error         | t-Statistic | Prob.  |
|-----------|-------------|--------------------|-------------|--------|
| INFR      | -0.285362   | 0.175962           | -1.621721   | 0.1244 |
| INTR      | -0.043359   | 0.160104           | -0.270819   | 0.7900 |
| EXR       | 0.068990    | 0.010127           | 6.812324    | 0.0000 |
| C         | -0.871552   | 2.699280           | -0.322883   | 0.7510 |
| R-squared | 0.777224    | Mean dependent var | 7.143000    |        |

|                    |           |                       |          |
|--------------------|-----------|-----------------------|----------|
| Adjusted R-squared | 0.735454  | S.D. dependent var    | 5.351853 |
| S.E. of regression | 2.752676  | Akaike info criterion | 5.039881 |
| Sum squared resid  | 121.2356  | Schwarz criterion     | 5.239027 |
| Log likelihood     | -46.39881 | Hannan-Quinn criter.  | 5.078756 |
| F-statistic        | 18.60702  | Durbin-Watson stat    | 1.062502 |
| Prob(F-statistic)  | 0.000018  |                       |          |

#### Researcher's Computation with Eviews 10

The result in table 3 shows that the independent variables determine 54% of the changes in Real GDP growth. The F-statistic of 8.5 with the p-value of 0.001 also indicates a high goodness of fit of the model. On the other hand, the t-statistic reveal only EXR has a significant impact on RGDPGR. More so, the Durbin Watson of 1.6 suggests unlikelihood of serial autocorrelation in the model. In Table 4 the independent variables determine 74% of the changes in UEMR. The F-statistic of 18.6 with the p-value of 0.000 also indicates a high goodness of fit of the model. Similarly, the t-statistic also reveals that only EXR, though negative has a significant relationship with UEMR. Lastly, the Durbin Watson of 1.06 suggests the likelihood of serial autocorrelation in the model but the Breusch-Godfrey Serial Correlation LM Test, shown in the Appendix confirms absence of serial correlation in the model estimate.

From the result in Table 3 both inflation, and exchange rates have positive signs, which do not really conform to the apriori expectations except that of exchange rate. This agrees with the findings of Alasha (2020) and Olaniya et al (2020). The positive relationship between inflation and exchange rates imply that an increase in these parameters would cause an increase in real GDP growth. As posited by economic theorists, a moderate level of inflation is desirable for an economy to grow. On the other hand, the relationship between foreign exchange and GDP growth is negative but significant. That is, an increase in the exchange rate will lead to a fall in economic growth. This is probably because rising rates of foreign exchange is an indication of a high level of instability, which indicates that the country is weaker than that of the foreign country. For example, the recessionary trend in Nigeria since the end of 2015 was due to the exit of the United State of America from the oil market, which resulted in the volatility of the foreign exchange that has put the country in a high level of macroeconomic instability. This implies that macroeconomic instability negatively affects the economic growth potential of the country. The negative relationship between inflation rate and GDPGR is an indication that rising levels of inflation reduces economic growth. This is because rising prices results in a decrease in real income as

well as erodes capital, thereby causing lower productivity; an indication of declining economic growth.

In the second model in Table 4, inflation, and interest rates have negative but insignificant effects on UEMR but exchange rate is positive and also significant. The implication of these results is that rising levels of inflation provides the incentive for production firms to make extra profits since additional costs are transferred to the consumers in the form of increase in price. On the other hand, EXR has a significant positive relationship with UEMR. This is consistent with a priori expectation. This is because increase in exchange rate increases cost of inputs and therefore firms may be forced to cut operating costs by reducing workforce or possibly using casual workers.

## **5. CONCLUSION AND RECOMMENDATIONS**

This research work looked at the effect of macroeconomic variables on economic growth in Nigeria. From the results of our analysis, we were able to deduce that both inflation, and exchange rates have positive signs, which do not really conform to the apriori expectations except that of exchange rate. The positive relationship between inflation and exchange rates imply that an increase in these parameters would cause an increase in real GDP growth. On the other hand, the relationship between foreign exchange and GDP growth is negative but significant. That is, an increase in the exchange rate will lead to a fall in economic growth. Thus, in order for the economy to make progressive and sustained growth; the administrators of the Nigerian economy must optimize the process of bringing down or reducing the negative effect of the exchange rate. Also, we concluded that, despite the concerted efforts of the government in ensuring that we have macroeconomic stability in Nigeria, the erosive nature of inflationary (increase in price of goods and services) have eaten up the desired transmission of this variable in the economy. Based on the findings in this study and further to induce economic performance in Nigeria, the following recommendations are suggested:

- There is need for the government to consciously provide the enabling environment to provide employment for its citizens and enhance economic development in the country.
- There is need for the government (through the CBN) to put in place and maintain the right monetary and fiscal policies in order to fight inflation in the Nigerian economy, since inflation have negative influence on investment and Nigeria economic growth.
- Corruption should be adequately discouraged or minimized. Also an effective and efficient utilization of resources should be carried out by the authorities.

- Finally, government should ensure the stability the macroeconomic variables and put in place some deliberate growth oriented and stabilization policies particularly at macro level which will enhance economic growth in the nation.

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