Macro-Economic Variables and Economic Growth in Nigeria

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Abstract. The paper evaluated the effect of macro-economic variables on economic growth in Nigeria. Data were collected from CBN statistical bulletin and World Bank for twenty five (25) years. Expost facto design was employed for the study. The data were subjected to unit root test and the result suggested the use of autoregressive and distributed lag model for the analysis. The findings showed that inflation rate, unemployment rate, exchange rate and interest rate had no significant effect on economic growth but the combination of these variables had negative effect on economic growth at 5 percent level of significance during the period of the study. Bound test was also conducted to check the co-integration so that the error of the short run could be corrected at the long run but the result still showed no relationship. Based on the findings, we recommend that government should strive to bring these variables under control in order to grow the economy.

Key Words: Economic Growth, Gross Domestic Product, Inflation Rate, Unemployment Rate, Exchange Rate, Interest Rate

Introduction

Macroeconomic variables such as inflation rate, unemployment rate, exchange rate and interest rate affect the economy directly and/or indirectly. These variables need to be managed in order to achieve the goal of every economy. The goal of every economy is to ensure full employment of resources, exchange rate stability, price stability, maintenance of economic growth and development, balance of payment equilibrium, maintenance of external reserve etc (Nzotta, 2004; Ihenetu, 2021).

While inflation is the sustained and persistent rise in price of goods and services, unemployment is the proportion of the active labour force that are willing to work but could not see job, exchange rate is the rate of Nigeria's currency to other currency of the world. It is always seen as the rate of naira per US dollar and interest rate is the amount of money sacrifice to get another money. Put in another way, interest rate is the rate of money to be paid to acquire or obtain a certain amount of money (Ihenetu, 2021).

All these variables are the key indices that every government of the country must strive to subject under control in order to grow the economy. If neglected, these variables are capable of throwing the whole economy into comatose (Ihenetu, 2021).

Economic growth is the increase in income, goods and services of any country over a given period of time (Sanusi, 2011). It is the key indicator of performing or non performing economy. If the growth rate of every economy is declining, it means then that the economy is heading towards recession but if the growth rate is increasing, then that economy is booming. Economic growth therefore should not be toiled with if any economy is to make progress.

In Nigeria especially from 2015 till today, the economic growth rate has been rising and falling. Sometime, we find our self in recession and after a while, we are out of recession. The worse hit was the recent global pandemic known as Covid 19 which hit hard on virtually every countries of the world and bringing the world economy to a halt, Nigeria is not exception. Nigeria is out of recession now and the economy is picking up gradually, but the

effective tackling of the macroeconomic variables will help in growing the economy fester and therefore should not be overlooked.

Economic growth is measured by some key indices such as gross domestic product etc. Oruwari (2009) defines gross domestic product as the value of all the transactions of goods and services over a given period of time (preferably one year). These transactions are made by citizens and residents in Nigeria that live and do business in the country. The value of the goods and services in a particular year constitutes the gross domestic product of the country. Many works has been done on the subject area but considering these four key macro-economic variables and their effect on the economy remains a gap to be filled. This therefore constitutes the core problem of the study.

The purpose of the work is to determine the effect of macro-economic variables on economic growth in Nigeria. The hypothesis is stated in a null form:

Macroeconomic variables have no significant effect on economic growth in Nigeria.

The rest of the work shall be segmented into four subheadings such as literature review, methodology, presentation and analysis and finally conclusion and recommendations.

Literature Review

Conceptual Framework

The concepts relevant to the work which the researcher shall consider are:

i. Macro-economic variables - These are the variables that affect the economy directly and/or indirectly. These variables need to be managed to avoid the economy being crumbled. These variables are inflation rate, unemployment rate, exchange rate, interest rate etc.

ii. Inflation rate – Inflation is the persistent rise in the price of goods and services in the country. Most times, it is caused by demand pull, cost push or hyperflation. While demand pull inflation is as a result of excess money chasing too few goods, cost push is caused by workers asking for the increment in wages which makes the sellers of goods and services to increase their prices. Hyperinflation is the situation whereby the velocity of the inflation has come to a point that it becomes difficult to manage because the momentum of the inflation is uncontrollable.

iii. Unemployment - This depict a situation whereby active labour force in the economy are looking for job and are ready to work but do not have work to do. Unemployment rate is the percentage of unemployed labour force to the percentage of the total population.

iv. Exchange rate – This is the rate of the value of naira (as in the case of Nigeria) to another country currency value. The exchange rate is very important because the value of Nigeria currency may be valueless in the world market if the value of naira is depreciating. It will have direct effect on the economy. The value of goods and services imported such as car etc will be high if our naira value is low, therefore government agencies responsible, have to put up a policy to safeguard the value of naira.

v. Interest rate – This is amount paid to obtain funds from a bank or any other financial institutions (Ihenetu, 2021). Interest rate gives a signal to the amount of money supplied into the economy. High interest rate will mean low money supply and less economic activities in the country and low interest rate will mean high supply of money into the economy. Neither of these extreme is good for the growth of the economy. Therefore monetary authorities have to project the interest rate that will stimulate growth in the economy. The most preferred interest rate that will boost the economy has been adjudged to be single digit interest rate.

Theoretical Framework

The theories considered are:

i. The Classical Interest Rate Theory

The classical theory of interest rate was propounded by David Ricardo, Marshall, A.C. Pigou, Cassels, Walras, Taussing and Knight. The theory is also referred to as real theory of interest rate. Here, only real factors such as productivity and thrift are considered and monetary aspect is not considered. According to this theory, the rate of interest is determined by the forces of demand and supply of investment (or capital). Interest is the sacrifice made for investment because industries acquired funds for investment. Thus, investment is an inverse function of interest rate. Low interest rate enhances high investment and high interest rate discourages investment. So, investment and interest rate are inversely related. However, high interest encourages high saving and low interest discourages high saving. Thus, saving is positively and directly related to interest rate. Firms' demand for investment is fulfilled by households' saving.

ii. The Purchasing Power Parity Theory

The purchasing power parity theory was associated with Professor Gustav Cassel of Sweden. This theory is one of the theories of exchange rate. The theory posited that the rate of exchange between two countries is a function of the relative purchasing power of their relative currencies. The rate will be the rate that equates the two purchasing powers. For instance, if a price of a particular product is N420 in Nigeria and the same product cost $1 in America, then N420 is similar to $1. Thus, the rate of exchange, according to purchasing power parity theory, will be N420 = $1.

iii. Keynesian Theory of Unemployment

Keynesian economics provides an alternative theory of unemployment. John Maynard Keynes and adherents of the Keynesian school of thought came up in 1936 and explained that unemployment occurs when there is not enough aggregate demand in the economy. After all, if demands for goods and services decrease, then there is a lesser need for production and consequently, lesser needs for workers. Note that Keynesian economics also argues that market economies or capitalist economic systems naturally undergo a boom-and-bust cycle. Low aggregate demand and unemployment characterize the bust phase of the economy.

iv. Growth Theory

This theory was propounded by Adam Smith in 1776 in his book the wealth of the nation. He posited that increase in the wealth of the nation increases the growth of the economy. If the economy's wealth is dwindled or retarded, then the economy will have low growth rate. He therefore advocated that every nation should strive to increase their wealth so as to increase their growth.

v. Mark-up Theory

Mark-up theory of inflation was propounded by Prof Gardner Ackley. The theory according to him, inflation cannot occur by demand or cost push factors alone, but by aggregate effect of demand-pull and cost-push factors. Demand-pull inflation occurs as a result of excess of aggregate demand that further give rise to increase in price level. The increase in prices levels push up production and also increases demand for factors of production and at the same time, increases cost and prices. As wages also increases, the demand of products also increases. This is because too much money in the hand of the people will make them to purchase many products leading to increase in prices of products. The shortage of products in the market will result in further increase in the price of goods and services.

Methodology

According to Ihenetu (2008), "research design is a blue print, framework for collecting and analyzing data". The researcher employed expost facto design. The fact that the data were original from CBN statistical bulletin and adopted for the study necessitated the choice of the design. The data used for this work were purely secondary data. The data collected were gross domestic product, inflation rate, exchange rate, unemployment rate and interest rate. While the inflation rate, exchange rate, unemployment rate and interest rate were the independent variables, gross domestic product was used as the dependent variable. The sample size is twenty five years (1995-2019).

The researchers applied unit root test to stationarize the data and the result showed that autoregressive and distributed lag model is the suitable statistical tool for the analysis. The model specification is given as:

GDP = f(INFR, UNER, EXR, INTR)

This can be transmodified as:

$$GDP_t=\alpha_0+\sum_{i=1}^{n}\beta_{1i}\,GDP_t+\beta_1 GDP_{t-1}+\sum_{i=0}^{n}\beta_{2i}\,INFR_t+\beta_2 INFR_{t-1}+\sum_{i=0}^{n}\beta_{3i}\,UNER_t$$

$$+\beta_3 UNPR_{t-1}+\sum_{i=0}^{n}\beta_{4i}\,EXR_t+EXR_{t-1}+\sum_{i=0}^{n}\beta_{5i}\,INTR_t+\beta_5 INTR_{t-1}+\mu$$

Where GDP = Gross Domestic Product

INFR = Interest Rate

UEPR = Unemployment rate

EXR = Exchange Rate

INTR = Interest Rate

α = constant intercept

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$ = Coefficient of independent variables (Slope)

μ = error term.

Data Presentation and Analysis

The data used for the work are presented below:

Table 1. Gross Domestic Product (GDP), Inflation Rate (INFR), Unemployment Rate (UEPR), Exchange Rate (EXR) and Interest Rate

Year	GDP	INFR	UEPR	EXR	INTR
1995	2,895.20	51.6	1.9	84.58	72.84
1996	3,779.13	14.3	2.8	79.6	29.27
1997	4,111.64	10.2	3.4	74.63	8.53
1998	4,588.99	11.9	3.5	84.37	10
1999	5,307.36	0.2	17.5	92.53	6.62
2000	6,897.48	14.5	18.1	109.55	6.93
2001	8,134.14	16.5	13.7	113.45	18.87
2002	11,332.25	12.2	12.2	126.9	12.88
2003	13,301.56	23.8	14.8	137	14.03
2004	17,321.30	10	11.8	132.85	15
2005	22,269.98	11.6	11.9	129	17.86
2006	28,662.47	8.5	12.3	127	8.23
2007	32,995.38	6.6	12.7	116.8	5.39
2008	39,157.88	15.1	14.7	131.25	11.58
2009	44,285.56	12	19.7	148.1	12.56
2010	54,612.26	11.8	5.1	148.81	13.72
2011	62,980.40	10.3	6	156.7	10.84

2012	71,713.94	12	10.6	155.76	12.22
2013	80,092.56	8	10	155.74	8.48
2014	89,043.62	8	7.8	168	8.06
2015	94,144.96	9.6	10.44	197	9.01
2016	101,489.49	18.6	14.23	305	15.68
2017	113,711.63	15.4	20.42	306	16.52
2018	127,736.83	11.4	23.1	307	12.09
2019	144,210.49	11.98	27.1	307	11.4

Source: CBN Statistical Bulletin and World Bank

GDP is in naira value where as others in percentages. GDP was logged in order to ensure the same unit of measurement.

Table 2. Stationarity (Unit Root) Test Results

Variables	Level	1st difference	Order of Integration	Remark
DGDP	-1.16182	-3.984388	I(1)	Stationary
DINFR	-5.546906	-	I(0)	Stationary
DUEPR	-2.026934	-4.769272	I(1)	Stationary
DEXR	-1.334465	-3.980648	I(1)	Stationary
DINTR	-11.03139	-	I(0)	Stationary

Note: Significant at 5% level, ADF test > Critical Value, then the variable is stationary
Source: Extracts from E-Views 9 Output

The table above presents the unit root stationarity test results with the outcomes for the utilized information of maximum of lags 4 with trend and intercept. The summary of the results are integrated in order I(0) and I(1). The ADF test statistic are higher when compared with all their critical values at 5%. As such, they are deemed fit for utilization and subsequent estimations and suggests the use of ARDL model for analysis (Pasaran & Shin 1999).

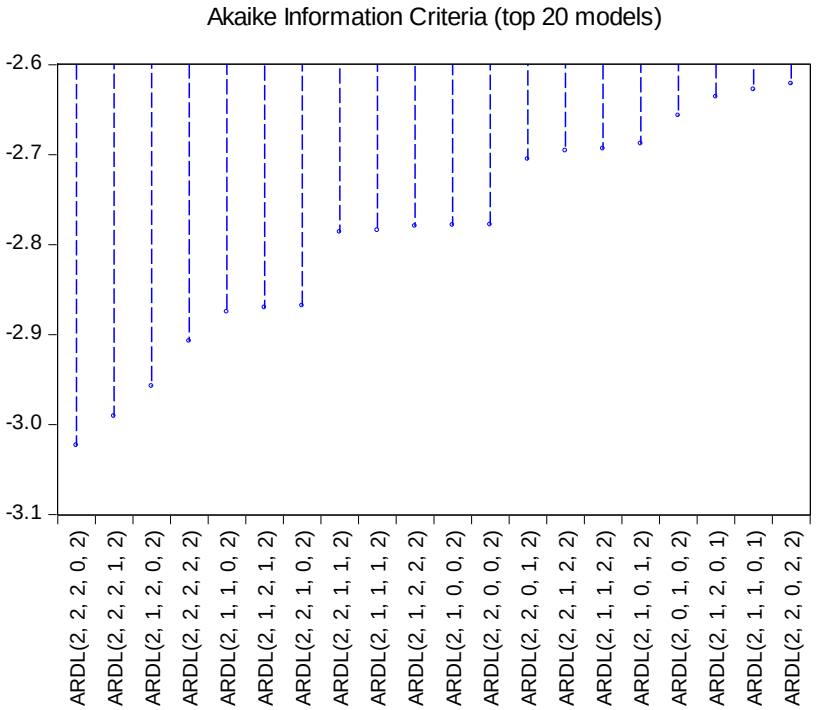

Figure 1. Auto-Regressive Distributed Lag (ADRL) Model selection test result
Source: E-view version 9

The method is guided by the shortrun data span. The researcher chooses a maximum order of 2 for the provisional ARDL vector error correction model by using the Akaike information criteria (AIC). Number of models evaluated was 162 and the result showed that the best model is ARDL (2 2 2 0 2) which was summarized in graph above.

Table 3. Auto-Regressive Distributed Lag (ADRL) shortrun result

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DGDP(-1)	0.167949	0.206074	0.814993	0.4361
DGDP(-2)	0.792176	0.209938	3.773381	0.0044
DINFR	0.000197	0.003969	0.049519	0.9616
DINFR(-1)	-0.006482	0.004614	-1.404833	0.1936
DINFR(-2)	0.004628	0.003745	1.235841	0.2478
DUEPR	0.001342	0.002615	0.513159	0.6202
DUEPR(-1)	0.004081	0.002385	1.711206	0.1212
DUEPR(-2)	0.004268	0.002694	1.584178	0.1476
DEXR	-0.000229	0.000650	-0.352961	0.7322
DINTR	0.002006	0.005656	0.354691	0.7310
DINTR(-1)	0.009830	0.005091	1.931086	0.0855
DINTR(-2)	-0.007375	0.002842	-2.595128	0.0290
C	-0.031134	0.068994	-0.451258	0.6625
R-squared	0.816572	Mean dependent var		0.161702
Adjusted R-squared	0.572001	S.D. dependent var		0.070635
S.E. of regression	0.046210	Akaike info criterion		-3.023227
Sum squared resid	0.019219	Schwarz criterion		-2.378520
Log likelihood	46.25550	Hannan-Quinn criter.		-2.871354
F-statistic	-3.338793	Durbin-Watson stat		0.862341
Prob(F-statistic)	0.039226			

Note: p-values and any subsequent tests do not account for model selection.
Source: Extracts from E-Views 9 Output

From Table 3, INFR, UEPR, EXR and INTR are the independent variables where as the GDP is the dependent variable. The result of the analysis showed that INFR (present year), INFR(-1) previous year and INFR(-2) (two years back) had no significant effect on economic growth. Their probabilities are more than 0.05. The coefficients of present year and two years back are positive ie 0.000197 and 0.004628 respectively, where as the coefficient of the immediate previous year is negative ie -0.006482. This means that a percentage rise in inflation of the present year and two years back increases economic growth where as a percentage increase in inflation of the immediate previous year decreases economic growth.

The result further confirmed that UEPR (present year), UEPR(-1) previous year and UEPR(-2) two years back had no significant effect on economic growth. Their probabilities are more than 0.05. Their coefficients are 0.001342, 0.004081 and 0.004286 respectively which is positive. This means a percentage rise in unemployment increases economic growth. This is against the apriori expectation.

Also the result revealed that EXR had no significant effect on economic growth. The probability is more than 0.05. The coefficient is -0.000229 which is negative. This means a percentage increase in exchange rate decreases economic growth.

Finally, the result showed that INTR of the present and previous years had no significant effect on economic growth where as INTR of two years back had negative significant effect on economic growth. The coefficients of the present and previous years are

0.002006 and 0.009830 which is positive and the coefficient of the two years back is -0.007375. While the coefficients of the present and the previous years informed that a percentage rise in interest rate increases the economic growth, the coefficients of two years back informed that a percentage increase in interest rate decreases the economic growth at 5 percent level of significance during the period of the study.

The adjusted $r^2$0.57 implies that variation in all the explanatory variables account for 57% of the variation in gross domestic product. F – Statistic measures the overall significance of the model. The F-statistic is -3.338793 and the probability of F-statistic is 0.039226 and less than 0.05 power of test. This means that the joint macro-economic variables had negative significant effect on economic growth in Nigeria.

Table 4. ARDL Bound cointegration test

Test Statistic	Value	k
F-statistic	1.143331	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Extracts from E-Views 9 Output

The bound cointegration test is to check whether there will be longrun relationship. The outcome showed that the F-statistic 1.143331 is lower than the upper bound which is 4.01 at 5% level of significant. There is therefore no cointegration and the error of the shortrun cannot be corrected in the longrun.

Conclusion and Recommendations

From the result of the analysis, it is very apparent that though the individual variables do not have significant effect on economic growth in Nigeria but the combination of the macro-economic variables have negative significant effect on economic growth in Nigeria within the period under consideration, therefore, we recommend that government should strive to bring these variables under control in order to grow the economy.

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