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## EFFECTS OF MONEY SUPPLY ON ECONOMIC GROWTH IN NIGERIA (1981-2019)

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### Abstract

*This study examines the effects of money supply on economic growth in Nigeria. Time series data on the subject from 1981-2019 were collected from Central Bank of Nigeria. The unit root test was carried out and the variables found to be stationary at first difference. The Johansen cointegration shows that there exist a long-run relationship between money supply and Gross Domestic Product (GDP) in Nigeria. The Error Correction Model results show that while broad money supply has a positive but marginal effect on GDP, interest rate exhibits negative but significant relationship with GDP. Also, the pairwise granger causality result reveals the presence of unidirectional causality between money supply and economic growth, with causality flowing from gross domestic product to broad money supply. The study concludes that interest rate is an efficient instrument of monetary policy capable of determining the quantum of money supply in the economy. Therefore, it is recommended that the interest rate policy of the Central bank of Nigeria should be relaxed, as that has a significant bearing on the rate of investment, which in turn is a prime mover of economic growth. Thus, if interest rate is kept moderate and stable in the short run, it will stimulate economic activities and ultimately lead to economic growth.*

**Key Words:** Broad Money Supply, Interest Rate, Gross Domestic Product, Nigeria

## 1. Introduction

The political authority in any country is always interested in developments in the monetary sector. This is because money is one variable that can be manipulated in an attempt to attain national goals. It is usually the key component of the monetary policy. Monetary policy refers to measures designed to influence, direct and control the volume, price and direction of money and credit in the economy. The key drive of monetary policy is to attain national objectives. The national objectives include: price stability, economic growth, full employment, balance of payments viability and poverty alleviation.

It is the exercise of central bank control over money supply. It is made up of those measures used to determine the cost and availability of money and credit in the economy. Such measures influence the economy in the desired direction.

There are two contrasting views on the efficiency of monetary policy; these include the monetarist and Keynesian views. The monetarists argue that money supply control should be the main focus of policies. This is considered appropriate since there is a close relationship between monetary policy aggregates and economic activities. The Keynesians on the other hand argue that monetary policy should be directed towards interest rate rather than money supply.

We note that the Nigeria monetary system constitute a fraction of the broader financial system, having monetary authorities, the banks as well as discount houses as its operators. Monetary management may appear in the form of direct or indirect monetary control. Direct control includes interest rate regulation, credit ceiling and sectoral credit allocation. Indirect control instruments are usually market based. It explores the advantages inherent in the nexus among money supply and the monetary base as well as the monetary authority's ability to stimulate suitable changes in the monetary base. Here, bank reserve make up a vital constituent of the monetary base, which the monetary authorities employ in the regulation of money supply. This control usually manifests in the manipulation of discount rate and reserve ratio.

Over the years, the promotion of economic growth has been a target of monetary policy. Ajayi and Ojo(1) assert that the main objective of the post-civil war monetary policy was promotion of rapid and sustainable economic growth. Economic growth is the expansion of the country's potential Gross Domestic Product (GDP), showing the outward shift of the production possibility frontier of a country. In the period 1960-1970, the economy recorded a growth rate of 3.1% annually. The growth rate was high during the oil boom (1970-78) with a record of 6.2% annually. Negative growth was recorded in the 1980s. It however picked up in response to structural adjustment of late 1980s. A very low rate of economic growth has been recorded in recent times.

Therefore, this study seeks to examine how economic growth has been impacted by money supply in Nigeria, by empirically, determining how broad money supply and interest rate influence gross domestic product in Nigeria for the period 1981 to 2019. It is believed that the outcome of the findings as well as recommendations of this study will be beneficial to policy makers, contribute to knowledge and form basis for further studies.

## 2. Review of Related Literature

Money supply has been identified as a major force in execution of the country's monetary policy. It also has strong link with growth of the economy.

### **2.1 Conceptual Issues**

Money supply is defined as the amount of money in the economy (10). However, alternative definitions of money supply often arise when we consider the composition of the term money supply. Ajayi & Ojo (1) argue that whatever concept of money that is adopted will be at best, a working rule for the purpose of measurement and should be guided by the institutional framework of the economy in question.  $M_1$  definition is the sum of currency and demand deposit held by non-bank public,  $M_2$  equals  $M_1$  plus saving and time deposit with commercial banks.  $M_3$  equals  $M_2$  plus savings and time deposit with all other financial institutions in the economy.

Akpakpan (2) argues that the definition of money supply to be adopted should depend on the purpose for which the information is sought. According to the author, if the purpose is to see how the level of money supply affects spending, prices and therefore the level of economic activities within a period of time long enough for savings and time deposit to mature,  $M_2$  is more realistic. If it is for a very short period, say a few weeks,  $M_1$  is appropriate.  $M_3$  is useful if the application is for a period long enough for all forms of deposit in all financial institutions to mature.

**Economic Growth:** This refers to the increase in the output level of goods and services over time. According to Todaro (12), view economic growth as continues process by which the productive capacity of the economy is increased over time to bring about rising level of income. Anyanwu and Oaikhenam (3) in support of the argument added that there is growing national income as a result of steady process of increasing the productive capacity of the economy.

Economic growth can be classified into two: Nominal and Real growth. Nwikina (10) states that nominal measurement involves examining the changes in current values and prices of aggregate product. Anyanwu and Oaikhenam (3) posit that nominal measurement of growth is premised on an evaluation of the trend behavior of aggregate expenditure over time. On the other hand, when nominal output is deflated by a price index to remove the effects of price fluctuation, is known as real growth. This enables us state more precisely, the magnitude of growth over time.

**2.2 Theoretical Considerations:** Money plays a very prominent role in the economy. Apart from its role as medium of exchange, store of value, unit of account and standard for deferred payment, it also serve as an invaluable tool in the execution of the country's monetary policy. We have earlier indicated that the manipulation of money supply leads to achievement of national objectives. Nwaru (9) re-echoes the great debate "Does Money Matter?" A consideration of the transmission mechanism highlights the strategic position occupied by money in achievement of national objectives.

It works through interest rate, liquidity requirements in banks as well as control of bank advances. Let us also examine growth. Several theories have been put forward to explain economic growth. The theories include Marxian Economic growth theory, Rostow's stages of growth and Harod Domar growth model. Let us have a closer look at the last model – Harod-Domar Model. The model lay emphasis on the rate of income growth necessary for a smooth and un-interrupted working of the economy (7). The emphasis on investment arises from its potential to create income and increase the capital stock.

In this model, the capital-output ratio refers to the amount of capital necessary to produce certain amount of national output. It is given as:

$$\frac{\Delta Y}{y} = S/K$$

Where:

$\frac{\Delta Y}{y}$  = rate of growth of GNP

S = savings

K= capital output ratio

The model emphasizes savings for investment.

### ***2.3 Empirical Issues***

Several studies have been carried out on the impact of money supply on economic growth in several countries. Iwedi (6) examines how economic growth has been impacted upon by money supply in Nigeria. Co-integration as well as VAR techniques were used for analysis. Money supply  $M_2$  was used alongside real GDP. The study covered the period, 1970-2014. The researcher found that changes in money supply aids to predict the outcome of real GDP in Nigeria.

Ogunmuyiwa and Ekone (11) examine the impact of money supply on growth in Nigeria (1980-2006). They applied the ordinary least square (OLS), causality test and ECM for the time series data. It was found that money supply positively influenced economic growth, while an insignificant relationship exist when it comes to GDP growth rates and choice between contractionary and expansionary money supply.

Galadima and Ngada (2017) examined how economic growth has been impacted by money supply in Nigeria (1981-2015). They used the Johansen Co-integration, Vector Error correction model as well as pair wise Granger causality test. The result confirmed presence of long-run relationship among the employed variables. While, lagged value of money exhibits negative but significant influence on the economy in the short run.

In the study of Dingela and Khobai (13) where how economic growth per capita was dynamically impacted by broad money supply in South Africa. The researchers applied autoregressive distributed lag (ARDL) technique to co-integration as well as error correction model. Time series data ranging from 1980-2016 was used. The result shows that money supply significantly influence growth of the economy both in the short run and long run.

Also, in the empirical work of Hussain and Haque (5), on the impact of Money supply on per capital GDP growth rate in Bangladesh, using Vector Error Correction Model, the result shows that money supply play significant role in economic growth.

### ***2.4 Literature Gap***

Having examined the works done on this topic especially application of money supply ( $M_3$ ) on real GDP as in Iwedi (6) application of  $M_3$  on real per capita GDP as in Dingela and Khobie (13) and the recommendation for application of expansionary monetary policy to achieve national objectives, by Galadima and Ngada (4) the current study applies  $M_2$  on GDP at current market prices to see if there is a variation in the result obtained.

### **3. Methodology**

Here we examine the plan or blue print for data collection and analysis of data in order to arrive at a valid result. Secondary data sourced from Central Bank of Nigeria Statistical Bulletin as well as National Bureau of Statistics on the employed variables (gross domestic

product, broad money supply and interest rate). After studying the data behaviour of the variables through descriptive statistics and graph, the Augmented Dickey-Fuller (ADF) test was employed to test the stationarity status of the variables. Thereafter, the Johansen Co-integration test and Error Correction Model were used to test the presence of co-integration among the series, as well as to determine the speed of adjustment of the dependent variable in response to changes in the predictor variables, using the error correction mechanism. The interaction as well as influence of employed variables on each other were determined by the use of Pairwise Granger Causality test.

### Model Specification

This is presented as the mathematical and economic relationship that exist between the dependent and independent variables thus:

$$GDP = f(MNS, INTR) \dots\dots\dots 1$$

Data on GDP and MNS were transformed using logarithm to have better performance in the model. Explicitly, the equation can be stated as;

$$\ln GDP = B_0 + B_1 MNS + B_2 INTR + U \dots\dots\dots 2$$

Where:

GDP = Gross Domestic Product

MNS = Money Supply

INTR = Interest Rate

U = Error term

### A Priori Expectation

$B_1 > 0, B_2 < 0$ .

## 4. Results and Discussion of Findings

### 4.1 Descriptive Statistics

**Table 1: Showing Descriptive Statistics of the Employed Variables**

	<b>GDP</b>	<b>MNS</b>	<b>INTR</b>
<b>Mean</b>	30560.17	6230.735	11.67692
<b>Median</b>	6897.480	1036.080	10.31000
<b>Maximum</b>	144210.5	29137.80	23.99000
<b>Minimum</b>	144.8300	16.16000	4.700000
<b>Std. Dev.</b>	41656.94	8935.668	4.905393
<b>Skewness</b>	1.292677	1.277155	0.972555
<b>Kurtosis</b>	3.429367	3.248441	3.263307
<b>Jarque-Bera</b>	11.16117	10.70261	6.260779
<b>Probability</b>	0.003770	0.004742	0.043701
<b>Sum</b>	1191846.	242998.7	455.4000
<b>Sum Sq. Dev.</b>	6.59E+10	3.03E+09	914.3894
<b>Observations</b>	39	39	39

Source: Eview 10 Output

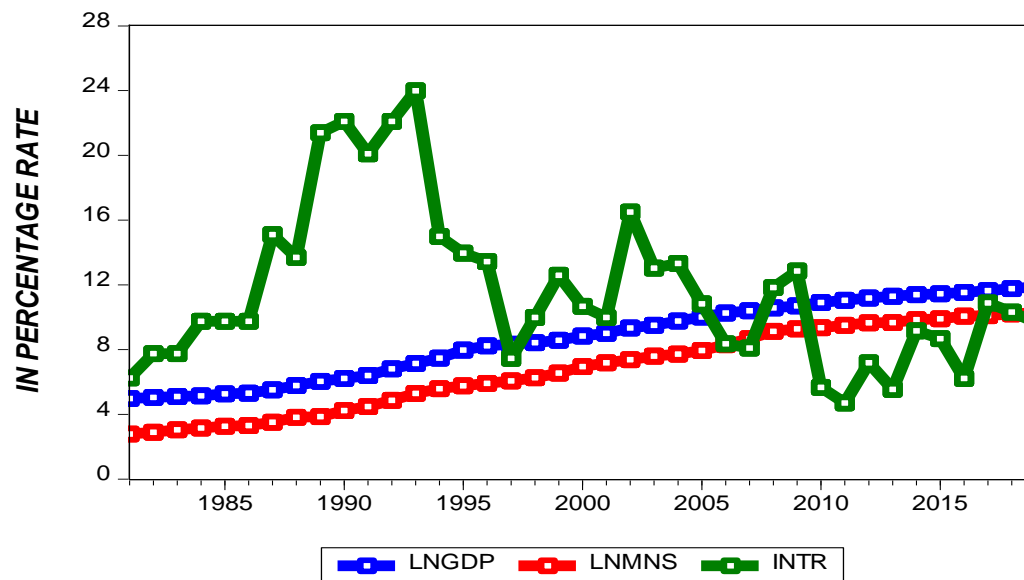
In table 1, it shows that GDP averaged about 30560.17 and varied from 144.8300 to 144210.5 with a standard deviation of about 41656.94 within the period under review. In addition, the

result reveals that MNS averaged about 6230.735 and varied from 16.16000 to 29137.80 with standard deviation of 8935.668, while INTR averaged 11.67692 and ranged from 4.700000 to 23.99000 with a standard deviation of 4.905393 within the period of study.

Furthermore, one important observation about Table 1 is the values of Skewness and Kurtosis. The skewness values of all the variables – GDP, MNS and INTR are positive, meaning that the distribution has a long right tail. The kurtosis values of all the variables – GDP, MNS and INTR are greater than 3, that is, leptokurtic, suggesting that the distribution is peaked relative to normal distribution.

Interestingly, as revealed in the table, INTR attained its mean value in the year 1982 which is traceable to the period when \$1 was equal to N1. However, GDP and MNS attained theirs in the year, 2000 and 2002 respectively, a period when democracy succeeded military rule in Nigeria. Also, this shows that economic activities and money supply gained prominence at early 2000s in Nigeria.

#### 4.2 Graphical Relationship among the Employed Variables



Source: EView 10 Output

**Figure 1: Showing the trend of gross domestic product (GDP), money supply (MNS), all transformed with logarithm, and interest rate (INTR) from 1981 to 2019 in Nigeria.**

A careful observation of figure 1 above reveals that GDP and MNS experience a mild ascending trend from 1981 to 2019. Although, both had a parallel movement from 1981 to 2006, however, from 2007 to 2019, MNS grew to reduce existing margin among them. On the other hand, Interest rate had recorded and irregular movement from 1981 to 2019. Nevertheless, it rises so high from 5% in 1981 to 24% in 1993 and dropped greatly to 7% in 1997, then, later increase to 16% in 2004, and staggerly fell to 4% in 2011 and thereafter rose to 9% in 2019. This suggests that output level of goods and services have been moving according to the quantum of broad money ejected into the economy. Also, the period of high interest rate witness low money supply as well as economic activities and vice versa in the study period.

#### 4.3 Unit Root Test

**Table 2: Summary of ADF Unit Root Test Result**

Variable	ADF test statistic	Critical Value			Order of Integration	Prob.
		1%	5%	10%		
LnGDP	-3.208285	-3.621023	-2.943427	-2.610263	I(1)	0.0274
LnMS	-3.736625	-3.621023	-2.943427	-2.610263	I(1)	0.0074
LnINTR	-5.335459	-3.626784	-2.945842	-2.611531	I(1)	0.0001

Source: E-Views 10.0 Output

The unit root test above shows that all the employed variables are stationary at first difference, which implies that variables are integrated of order one, I(1). Since the statistical properties of the data are stationary at first differencing and thus do not change over time for the period studied, we can test for long-run relationship between the variables employing the Johansen co-integration test.

#### 4.4 Johansen Co-integration Test

**Table 3: Johansen Co-integration Test Results**

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.578634	56.20066	29.79707	0.0000
At most 1 *	0.441123	25.08754	15.49471	0.0013
At most 2 *	0.108679	4.141815	3.841466	0.0418

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Source: E-view 10.0 Output

The Johansen co-integration test presented in table 3 above shows that the Trace and Max-eigen statistics indicated three (3) Co-integrating equation at the 5% level. The existence of the co-integrating equation(s) in the model is an indication that there exists a long-run relationship between broad money supply, interest rate and GDP in Nigeria. In effect, the influence of money supply has long term implications on the growth of the Nigerian economy.

#### 4.5 Error Correction Model Estimation

The study proceeded with the estimation of the Error Correction Model which was developed by Engle and Granger to reconcile the short-run behavior of money supply with its long-run behavior, and to investigate the adjustment mechanisms towards the long-run equilibrium represented by the cointegration relationship or the error correction coefficient. The result is summarized below:

**Table 4: Error Correction Model Result**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.254006	0.11349	-2.23814	0.0280
D(LNMNS)	0.177804	0.14156	1.25608	0.2127
D(INTR)	-0.008679	0.00413	-2.10271	0.0386
C	0.003622	0.01342	0.26986	0.7880
R-squared	0.519765	Mean dependent var		0.002195
Adjusted R-squared	0.395260	S.D. dependent var		0.101988
F-statistic	4.174638	Akaike info criterion		-2.033242
Prob(F-statistic)	0.000000	Schwarz criterion		-1.677734
Log likelihood	43.58173	Durbin-Watson stat		2.327015

**Source:** E-View 10 Output

The Error Correction model equation is therefore specified as follows:

$$GDP = 0.004 + 0.178*MNS - 0.009*INTR - 0.254*ECM(-1) \dots \text{equation (4.1)}$$

**Interpretation of Results:** The regression equation above shows that broad money supply has a positive and marginal effect on gross domestic product (GDP). In effect, a unit increase in broad money supply will result to 0.178 units increase in gross domestic product. This shows that increase in money supply increases the growth of the economy although in an insignificant manner. On the other hand, interest rate has a negative but significant effect on GDP. This is an indication that a unit increase in interest rate will results 0.009 units of decrease in GDP and vice versa. This confirms the a priori expectation that interest rate exhibits an inverse relationship with GDP.

The constant or intercept of the model indicates that GDP experiences a positive movement increasing by 0.004 units when employed money supply variables are held constant at zero. This indicates the effect of the stochastic variables not captured in the model.

The Error Correction Model (ECM) coefficient is estimated at approximately -0.254. This means that the money supply – economic growth model corrects its previous period’s disequilibrium at a speed of 25.4% which is approximately 25% annually. What this implies is that given a steady state of increase in money supply and decrease in interest rate in the Nigerian economy by 25% annually, gross domestic product (GDP) will experience a positive growth and will most likely attain equilibrium in the long run, all things being equal. As a result, the findings confirm the positive and significant effect of money supply policy in maintaining a sustainable economic growth in Nigeria.

**Test for Autocorrelation:** The model error term is free from serial correlation given the Durbin Watson statistic value of 2.327015 which suggests that there is no autocorrelation in the model. **Adjusted R-squared:** The R-squared value of 0.520 indicates that the explanatory variables account for up to 52% of the changes in gross domestic product (GDP) in Nigeria. This represents a good fit.



#### 4.6 Granger Causality Test

**Table 5: Pairwise Granger Causality Result**

Null Hypothesis:	Obs	F-Statistic	Prob.
MNS does not Granger Cause GDP	37	0.51761	0.6008
GDP does not Granger Cause MNS		9.63595	0.0005
INTR does not Granger Cause GDP	37	0.82033	0.4493
GDP does not Granger Cause INTR		1.55473	0.2268

**Source:** Eview 10 Output

As observed in table 5 above, a unidirectional relationship exist between money supply and gross domestic product with influence flowing from GDP to money supply. This indicates that economic activities support money supply in the economy. However, no causal relationship is traceable between INTR and GDP, an indication that shows that either of them has not promote the other within the period of study.

#### 4.7 Discussion of Results/Findings

The analysis of money supply and economic growth in Nigeria has brought to the fore the nature of relationship that exist between money supply (represented by broad money supply,  $M_2$  and Interest Rate, INTR) and gross domestic product (GDP). The variables were first subjected to unit root tests using the ADF test and the result showed that both GDP, Broad Money Supply and Interest Rate are stationary at first difference i.e. integrated of order I(1). This necessitated the test for long run relationship between the variables using the Johansen co-integration test and the result confirmed the existence of a long run relationship between money supply and economic growth.

Consequently, the Error Correction Model was estimated and the result obtained revealed that broad money supply has a positive but insignificant effect on GDP. However, interest rate exhibits negative but significant influence on Nigeria's GDP. The positive effect of broad money supply as well as negative effect of interest rate on GDP was also reflected in the model fitness where about 52% of the changes in GDP were accounted for by the employed monetary policy instruments, showing that the employed predictor variables complied with the a priori expectations. This shows that the monetary policy of the Central Bank of Nigeria, reflected in the amount of money supplied in the economy alongside adopted interest rate have been very effective in growing the economy. The result is in agreement with Iwedi (6), Robert and Nina (8), Galadima and Ngada (4) and Dingela & Khobai. However Dingela & Khobai used money supply  $M_3$  against economic growth. The coefficient of 0.178 and -0.009 is an indication that GDP is increasing at a constant and steady rate annually given that the CBN maintains a steady broad money supply and interest policy rate respectively.

The model also estimated a speed of adjustment of 25% to long run equilibrium. Thus, it is projected that by holding money supply at an increasing steady state of 25% annually, every sector of the economy will experience a massive boost thus leading to optimal growth of the GDP in the long run.

Moreover, it is discovered from the pairwise causality test, that the presence of unidirectional causality between money supply and economic growth, with causality flowing from gross domestic product to broad money supply. This is an indication that upsurge in the output

level of goods and services supports the quantum of money supplied and circulated in the economy.

### **5. Conclusion and Recommendations**

The study discussed the effects of money supply on economic growth in Nigeria. The trend of money supply indicates that it keeps pace with the growth target of the economy. Holding money supply at an estimated speed of 25% annually will lead to optimal growth of the economy. The study concludes that interest rate is an efficient instrument of monetary policy capable of determining the quantum of money supply in the economy. Thus, it is recommended that the interest rate policies of the Central bank of Nigeria should be relaxed, as that has a significant bearing on the rate of investment, which in turn is a prime mover of economic growth. Thus if interest rate is kept moderate and stable in the short run, it will stimulate economic activities and ultimately lead to economic growth.

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**Appendix 1: DATA ON EMPLOYED VARIABLES**

<b>Year</b>	<b>Gross Domestic Product (N' billion)</b>	<b>Broad Money Supply (N' billion)</b>	<b>Interest Rate (%)</b>
1981	144.83	16.16	6.25
1982	154.98	18.09	7.75
1983	163.00	20.88	7.75
1984	170.38	23.37	9.75
1985	192.27	26.28	9.75
1986	202.44	27.39	9.75
1987	249.44	33.67	15.10
1988	320.33	45.45	13.70
1989	419.20	47.06	21.40
1990	499.68	68.66	22.10
1991	596.04	87.50	20.10
1992	909.80	129.09	22.10
1993	1,259.07	198.48	23.99
1994	1,762.81	266.94	15.00
1995	2,895.20	318.76	13.96
1996	3,779.13	370.33	13.43
1997	4,111.64	429.73	7.46
1998	4,588.99	525.64	9.98
1999	5,307.36	699.73	12.59
2000	6,897.48	1036.08	10.67
2001	8,134.14	1315.87	9.98
2002	11,332.25	1599.49	16.50
2003	13,301.56	1985.19	13.04
2004	17,321.30	2263.59	13.32
2005	22,269.98	2814.85	10.82
2006	28,662.47	4027.90	8.35
2007	32,995.38	5809.83	8.10
2008	39,157.88	9166.84	11.84
2009	44,285.56	10780.63	12.85
2010	54,612.26	11525.53	5.67
2011	62,980.40	13303.49	4.70
2012	71,713.94	15480.85	7.18
2013	80,092.56	15681.26	5.54
2014	89,043.62	18885.50	9.16
2015	94,144.96	20029.83	8.68
2016	101,489.49	23591.73	6.22
2017	113,711.63	24140.63	10.88
2018	127,762.55	27068.58	10.31
2019	144,210.49	29137.80	9.68

**Source:** Central Bank of Nigeria (CBN) Statistical Bulletin, 2014 & 2019 editions