Does Interest Rate Impact on Industrial Growth in Nigeria?

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Abstract
The main thrust of this study was to investigate the effect of interest rate fluctuation on industrial growth in Nigeria. Data for the study were obtained from the Central Bank of Nigeria statistical bulletin 2013 edition and indexmundi.com. Data collected were analyzed and tested using autoregressive distributed lag (ARDL) technique. The findings of the study revealed thatinverse relationship exist between interest rate and industrial growthin Nigeria, meaning that increase in interest rate will decrease industrial growthand verse versa inNigeria. It was then recommended that investment-friendly interest rate is a sine-quo-non for promoting industrial growth in Nigeria.

Key Words: Interest rate;Broad money supply;industrial-GDP; and financial intermediation.

Introduction

Interest rate as policy instrument can be used to foster meaningful macroeconomic stability. The rate of interest exacts its influence on the macro economy by transmitting through savings, investment, output, employment, money supply and balance of payment. As a return on investment in financial assets, interest rate serve as incentive to save and by extension influences the availability of savings. On the other hand, as cost of capital, interest rate affects the demand for and supply of credit (loanable funds). Changes in the rate of interest will influence investment for expansion, machinery and equipment. Interest rate facilitates the mobilization of funds from surplus spending units to deficit spending units of the economy for efficient utilization of such funds for the enhancement and growth of industry.

Interest rate is a crucial component of financial intermediation which is the process of transferring funds from surplus spending units to deficit spending units of the economy. Interest rate is a vital component of the financial market and a crucial tool of monetary policy.Interest rate is an important economic price. This is because whether seen from the point of view of cost of capital or from the perspective of opportunity cost of funds, interest rate has fundamental implications for the economy.

By either impacting on the cost of capital or influencing the availability of credit, by increasing savings, it is known to determine the level of investment in an economy. As the positive relationship between investment and economic development is well established, it therefore becomes expedient for any economy that wishes to grow to pay proper attention to changes in interest rate. Nigeria being a country in dire need of development cannot overlook the important role interest rate could play in this direction. The mainobjective of this study is to examine the impact of interest rate on industrial output in Nigeria.

Conceptual Issues

Interest rate is the rental payment for the use of credit by borrowers and return for parting with liquidity by lenders (CBN, 1997). Therefore, low interest rate serves as incentive to investment. Entrepreneurs base their demand for loanable funds for purposes of investment on the marginal efficiency of capital. The higher the productivity of new

capital good financed from the loan, the greater the willingness to borrow and vice versa. On the other hand, lenders require higher rate of interest as incentive to saving more.There is a positive relationship between interest rate and savings.

The Role of Interest Rate

a. It induces voluntary savings and provides capital for investment.
b. It measures the opportunity cost of various investments and allocate resources among them
c. It regulates the flow of investible funds and influences the growth and direction of activities in industry.
d. It serves as a powerful tool in the hands of monetary authority to control inflation, capital movement and investment.

Determinants of interest rates

Inflationary Expectation: In economies that exhibit inflationary pressure, lenders always think that their money will buy fewer goods in the future than it could in the present and will therefore seek compensation for lost in value from their borrowers.

Deferred Consumption: According to the time preference theory, consumers prefer goods now to deferring consumption of such goods. Hence lenders seek premium to compensate for the deferment of consumption.

Political Motives: The government arbitrarily lowers the rate of interest to give the economy short term boost in order to influence election. It is for this reason that the independence of the central banks are been advocated to limit the influence of politics on interest rate.

Risks: There is always risk that the borrower will default on payment. To hedge against such default, the lender seeks risk premium.

Liquidity Preference: People generally prefer to hold their wealth in the form of liquid cash for immediate exchange purposes than in other non-liquid forms that take time and cost for conversion into cash. The higher the money demand, the lower the interest rate while the lower the money demand the higher the interest rates.

Investment demand: The higher the level of investment demand the higher the level of interest rates. On the other hand, the lower the investments demand, the lower the level of interest rates.

The level of savings: The higher the level of savings the lower the interest rate while, the lower the level of savings, the higher the level of interest rates,

Money supply: In the Keynesian parlance as we increase money supply the interest rate will reduce.

Theoretical Framework

Classical Theory of Interest Rate

The classical theorists regarded interest rate as an equilibrating factor between the demand for and the supply of investible funds. Investment represents the demand for investible funds, and interest rate is the price at which the two are equated. Interest rate establishes equality between aggregate savings and aggregate investment. If there are at any time more savings than could be absorbed at the current rate of interest by investment demand, then interest rate will fall.

Neo-classical Theory of Interest Rate

The loanable funds theorists posit that the supply of loanable funds is a composite supply, composed of real savings (voluntary savings) and credit money. Similarly, the demand for loanable funds is composed of the demand for investment funds and the demand for speculative cash balances or hoarding. The loanable funds theory tries to solve the difficulties of the classical theory by emphasizing the influence of credit money from the supply side and hoarding from the demand side.

Liquidity Preference Theory of interest Rate

The rate of interest at any given time is determined by the liquidity preference, that is, the demand for money relative to the supply for money. The liquidity preference and the rate of interest are inversely related. At higher interest rate, wealth holders desire to hoard become weaker. According Keynes, interest rate is not the reward for savings, because wealth holders save even in the event of hoarding but does not earn any interest. Interest is earned only when one dishoards his savings by lending it to borrowers.

Interest rate is uniquely determined by the demand for money and the quantity of money supplied. The total demand for money is composed of precautionary demand, transaction demand for money (M1) and speculative demand for money (M2). The equilibrium rate of interest is determined at the level where total demand for equates total supply of money.

Modern Theory of Interest Rate

This neo-Keynesian theory, integrated the monetary and the real sectors in the determination of interest rate. The equilibrium rate of interest is determined at the point where the flow variables in the real sectors equal the stock variables in the monetary sector. The real sector is normally represented as the IS curve, which is the equilibrium in the real sector, showing the combinations of income and the rate of interest at which the aggregate savings and aggregate investment are in equilibrium. The monetary sector which is normally represented as the LM curve denotes the equilibrium in the monetary sector showing the combinations of income and the rate of interest that equal the supply of and the demand for money.

Empirical Framework

Udoka, et al (2012), investigates the effect of interest rate fluctuation on the economic growth of Nigeria,formulated two research hypotheses to investigate the relationship between interest rate and economic growth, and the difference in economic growth before and after interest rate deregulation regime in Nigeria. Data for the study were obtained from the Central Bank of Nigeria statistical bulletin. Data collected were analyzed and tested using the ordinary least square (OLS) analytical technique. The result of the findings revealed that: there existed an inverse relationship between interest rate and economic growth in Nigeria.Hence they concluded that increase in interest rate will decrease GDP growth in Nigeria, thus retarding growth of the real sector.

Teriba (1974) carried out a study on “Determinant of interest rate” Employing the OLS technique and the long linear relationship between real balance (or its components) and its determinants, The study specified and estimated a short term demand for money function that related real balance to aggregate real national income, lagged real balances and a variety of interest rates -federal government Long-term interest rate (RL), Central Bank short-term interest rate (RG), time deposit rate (RM), and savings deposit interest rate (RS). A war dummy was included to account for the civil war year 1967-1969. The study arrived at conclusions; that short-run and long-run interest elasticity of demand of currency is not significantly different from Zero while the short-run income elasticity is in all cases much greater than unity; and that for demand deposit, the interest elasticity

are very low and insignificant, while the short-run income elasticity was never below 0.8 and the long-run elasticity was generally about 1.4

Acha, et al (2011) examined the implications of interest rate for savings and investment in Nigeria. The study used data obtained from the Central Bank of Nigeria (CBN). Data were analyzed using Pearson's Correlation Coefficient and the ordinary least square (OLS) technique. Evidence from the study showed interest rate as a poor determinant of savings and investment indicating that bank loans are mostly not used for productive purposes according to the authors. The study then recommended that bank loans should be channeled to productive investments if interest is to play its catalytic role in the Nigerian economy.

Ojo (1974) in the study "The Nigerian financial system" investigated the choice facing an investors whether it is between money and physical assets rather than between money and financial assets in a developing economy like Nigeria characterized by underdeveloped money market and lack of financial assets. Consequently, the study specified a Log-linear model of relationship between money and its determinants. The study employed the Ordinary Least Square (OLS) techniques in estimating the model and came to the conclusion that interest rate is insignificance.

Ajayi, et al (1974) in the study "Money and banking: Analysis and policy in the Nigeria" specified a linear model with real balances expressed as a function of current nominal income, short-term interest rate and nominal balances. Employing the OLS technique to estimate the model, the study concluded that interest rate though with the wrong sing was statistically significant; and interest elasticity of the demand for money at the mean is low, while the income elasticity is high ranging from 1.5 to 1.9 for nominal money balance, indicating that demand for money is not sensitive to interest rate.

Methodology

Model Specification

Based on theoretical underpinnings, the modelof this study was specified to include industrial sector, interest rate, and broad money supply. Where industrialgrowth was proxied by industrial-GDP (IGDP), and expressed as a function of interest rate (INT), and broad money supply (M1). The empirical model was specified as follows;

$$IGDP = f(INT, M1, \varepsilon) \text{ ……..(1)}$$

Where:

IGDP = Industrial Gross Domestic Product

INT = Interest rate

M1 = Broad Money supply

ε = disturbance or stochastic term.

t = Time trend

To obtain an estimate of the above function, equation (1) is expressed in the implicit form of an ARDL model as;

$$IGDP_t = \Omega_0 + \sum_{i=1}^{p} \Omega_{1i} IGDP_{t-1} + \sum_{i=0}^{p} \Omega_{2i} INT_{t-1} + \sum_{i=0}^{p} \Omega_{3i} M1_{t-1} + \varepsilon_t \text{……(2)}$$

The a priori expectations for the coefficients are;

$\Omega_1 < 0$, $\Omega_2 > 0$;

Nature and Sources of Data

This study employed secondary data sourced from: Central bank of Nigeria's statistical bulletin (2013) edition and indexmundi.com. The data series sourced therefrom and used in this study include: Industry contributions to GDP (IGDP), Broad Money Supply (M1), and Interest rate (INT).This study employed the Autoregressive Distributed Lag (ARDL) technique in the estimation of impact of interest rate on industrial output in Nigeria being the primary objective of this study.

Data Analysis and Discussion of Findings

Stationarity Tests

In order to validate the ARDL technique as a suitable method of data analysis in this study, it became imperative to conduct stationarity test to ensure that there is no I(2) variable, the unit root test using the Augumented Dickey Fuller (ADF) test statistic was employed and further validated by Phillips Perron (PP) test statistic. The unit root test results shownin table1 revealed that the variables are mix of I(0) and I(1).

Table 1: Test for Stationarity

Unit Root Tests					Unit Root Tests			
Sample: 1981 2013					Sample: 1981 2013			
Test Type: ADF					Test Type: PP			
	Level	First	Order of Int.			Level	First	Order of Int.
LIGDP	0.697584	-4.376654	I(1)		LIGDP	0.826205	-4.368406	I(1)
INT	-3.279109	-5.511028	I(0)		INT	-3.236466	-8.957726	I(0)
M1	5.431002	8.296813	I(0)		M1	3.670603	-1.692385	I(0)
1% level	-3.65373	-3.661661			1% level	-3.65373	-3.661661	
5% level	-2.95711	-2.960411			5% level	-2.95711	-2.960411	
10% level	-2.617434	-2.61916			10% level	-2.617434	-2.61916	

Data Analysis and Discussion of Findings

After estimating the ARDL model for which the result is displayed in table 2 below, serial correlation test was also conducted on the model and result as shown in table 3 revealed that the variables in the model are serially independent. The joint (Wald) test of the coefficients of the long run estimates was estimated in order to derive the F- statistic needed to conduct bound test (to establish long run relationship among the variables). The F-statistic of the joint test of coefficients of the long run estimates as shown in table 4 was 6.461413 while the upper bound of the Pesaran critical value bounds at 5% is 4.85. Since the value of our F-statistic exceeds the upper bound at 5% levels of significance, we conclude that long run relationship exist between IGDP and the explanatory variables.

Table 2:Estimated Long Run Coefficients Results

Dependent Variable: D(IGDP)
Method: Least Squares
Sample (adjusted): 1984 2013
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1878452.	9232947.	0.203451	0.8411
IGDP(-1)	0.536658	2.898477	1.220178	0.2381
INTR(-1)	-0.888569	3.458962	-0.256889	0.0382
M1(-1)	0.414910	3.301810	2.245711	0.0275
DIGDP(-1)	0.455362	2.302769	6.754313	0.0000
DIGDP(-2)	0.524404	1.865082	7.637217	0.0000
DINTR	-0.376288	5.087679	-0.073961	0.4010
DINTR(-1)	-0.891628	5.888116	-0.151428	0.0171
DINTR(-2)	-0.160088	4.880122	-0.032804	0.0448
DM1	0.617838	4.906454	0.125924	0.0254
DM1(-1)	0.901952	5.221862	0.172726	0.0352
DM1(-2)	0.746503	5.802298	0.128656	0.0001

R-squared	0.902007	F-statistic	15.06242
Adjusted R-squared	0.842122	Prob(F-statistic)	0.000001
		Durbin-Watson stat	2.009756

Table 3: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	5.315033	Prob. F(2,16)	0.0670
Obs*R-squared	11.97526	Prob. Chi-Square(2)	0.0525

Table 4: Wald Test of Long-run Coefficients

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	6.461413	(3, 28)	0.0018
Chi-square	19.38424	3	0.0002

Table 5: ARDL Bound Testing Results (with Intercept and no Trend)

F-Statistic	1% Critical Value		5% Critical Value	
	Lower bound I(0)	Upper bound I(1)	Lower bound I(0)	Upper bound I(1)
6.461413	5.15	6.36	3.79	4.85

Source: Author's Computation.

The residuals series were constructed and the restricted error correction term (ECT) was fitted. The Error Correction Model in table 6 revealed that the current values of interest rate (DINTR) and money supply (DM1)significantly impact on industrial growth (IGDP) in Nigeria at five percent critical value.Thelags of DIGDP and DM1 significantly impact on industrial growth (IGDP) in Nigeria at 1% critical value, while the lag of interest rate DINTR(-1) significantly impact on industrial growth at 5% critical level.

The coefficient of determination R^2 was very high at 99%, this implies that all the explanatory variables in the model explained about 99% of the total variations in industrial growth (IGDP) in Nigeria. Also, the F-statistic was significant even at 1% which means that the joint test was statistically significant and the model is a good fit. The coefficient of the error correction term (ECT) was rightly signed and highly significant at 1 per cent, this is also indicative of long causality running from the explanatory variables to industrial growth in Nigeria. The coefficient of the error

correction term of -0.260005 is also indicative that 26 percent disequilibrium is corrected for yearly. The D.W value at 1.5 indicates the absence of autocorrelation in the model.

Table 6: Error Correction Model

Dependent Variable: D(IGDP)
Method: Least Squares
Sample (adjusted): 1984 2013
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4196184.	823880.1	5.093198	0.0891
DIGDP(-1)	3.234283	0.534142	6.055106	0.0000
DIGDP(-2)	3.840129	0.542278	7.081475	0.0000
DINTR	-197598.5	162580.4	-1.215389	0.0384
DINTR(-1)	-373384.0	187335.1	-1.993134	0.0201
DM1	1.846195	1.443226	1.279214	0.0155
DM1(-1)	2.344192	1.769827	1.324532	0.0003
DM1(-2)	12.44319	1.410059	8.824589	0.0000
ECT(-1)	-0.260005	0.034809	-36.19719	0.0000

R-squared	0.986576	F-statistic	163.3179
Adjusted R-squared	0.980535	Prob(F-statistic)	0.000000
		Durbin-Watson stat	1.479547

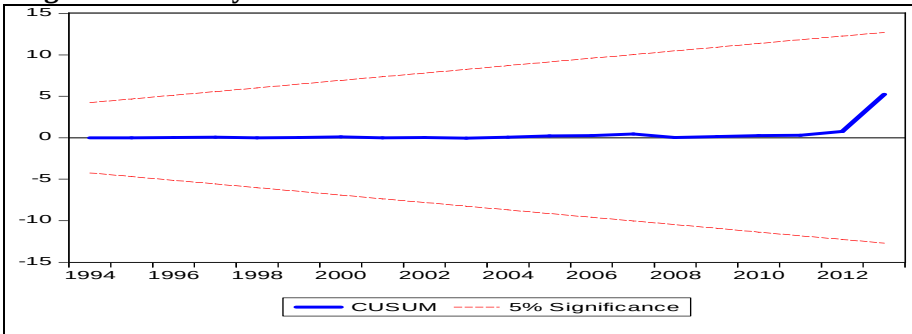
The error correction model was tested for serial correlation as shown in table 7 below, which revealed that the model is serially independent. Also to ensure that the model is stable, the cumulative sum of recursive residuals (CUSUM) test was conducted and the result revealed that the model is dynamically stable as shown in figure 1 below.

Table 7: Serial Correlation Testof the Error Correction Model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.411089	Prob. F(2,18)	0.2696
Obs*R-squared	4.066113	Prob. Chi-Square(2)	0.1309

Figure 1: Stability Test of the Error Correction Model



Conclusion

Based on the regression results, this study therefore concludes that interest rate and broad money supply significantly impact on industrial growth in Nigeria. The study also concludes that long causality running from interest rate and broad money supply to industrial growth in Nigeria.The study then recommendsthat,monetary authority must pursuemonetary policies that enhance investment-friendly interest rates as a sine-quo-non for promoting industrial growth in Nigeria.

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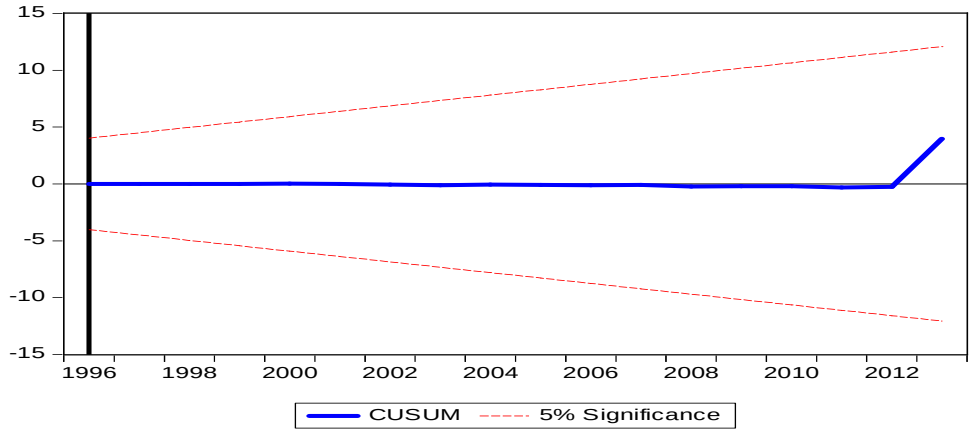

Dependent Variable: IGDP
Method: Least Squares
Date: 02/05/16 Time: 23:36
Sample (adjusted): 1982 2013
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1871865.	13888955	-0.134774	0.8938
IGDP(-1)	-0.269134	2.817052	-0.095537	0.9246
INTR(-1)	17684.79	744122.7	0.023766	0.9812
M1(-1)	4.213424	3.235798	1.302128	0.2035

R-squared	0.409086	Mean dependent var	8250246.
Adjusted R-squared	0.345774	S.D. dependent var	25660708
S.E. of regression	20755468	Akaike info criterion	36.65099
Sum squared resid	1.21E+16	Schwarz criterion	36.83420
Log likelihood	-582.4158	Hannan-Quinn criter.	36.71172
F-statistic	6.461413	Durbin-Watson stat	1.308201
Prob(F-statistic)	0.001835		