

Relationship between the Interest Rate and Manufacturing Sector Performance in Nigeria

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Abstract

This research paper investigated the relationship between interest rate and the manufacturing sector performance in Nigeria from the period 1981-2016. The wide interest rate spread and the irregular contribution of manufacturing sector to Gross Domestic Product in Nigeria necessitated this study. The study employed time series secondary data which were sourced from the central bank of Nigeria (CBN) statistical bulletin. The study applied several estimation techniques such as unit root to test for the stationarity, the Johanson cointegration test to verify long run association among the series and the vector error correction model as a verification of the short run adjustment. The results established the existence of a long run relationship among the variables, the results equally confirmed a negative but significant relationship between lending rate and manufacturing output in Nigeria. A positive but insignificant relationship between deposit rate and the manufacturing sector output was observed. Short run association between the variables was equally recorded. Bases on the findings, the study therefore recommends, that the Government through the central bank of Nigeria should develop strategies and policies geared at reducing the wide interest rate spread among commercial banks in Nigeria.

Keywords: Bank Credit, Interest Rate, Manufacturing Sector Output, Lending Rate

1.0 Introduction

The critical role played by deposit money bank in financing businesses in Nigeria dates back to post independence. The primary role in this sector is credit extension. Credit has been defined by Okereke (2003) as the fund based and non-fund based activities of the banks extended to needy economy units that exposed them to risk of financial losses of varying degree and at a cost called interest rate. Interest rate is a microeconomic indicator of the availability of funds in the banking sector necessary to foster growth. This is because it is the rate at which money is lent and borrowed that determines the cost and availability of credit. The movement of interest rate determines the direction and flow of funds for businesses. If the interest rate is too high, the cost of borrowing goes up, resulting in the high cost of doing business and consequently poor performance (Dunmade, 2012).

In a regulated economy, interest rate is always benchmarked by government to foster economic posterity through fiscal and monetary policies measures. Monetary regulators often pursue policies that ensure that economies production is financed by banks to grow the economy, create jobs, income and increase GDP (Ettah, 2004). The manufacturing sector acts a catalyst that accelerates the pace of structural transformation and diversification of the economy, thus enabling a country to utilize its factors endowments and to depend less on foreign supply of finished goods or raw materials (Akinyomi, 2014.)

This sector also creates investment capital at a faster rate than any other sector of the economy while promoting wider and more effective linkages among different sectors (Toby & Peterside, 2014). In spite of these role played by the manufacturing sector in growth process, scholars have noted that the sector is compounded by many problems some of which are neglect and maladministration on the part of successive military and civilian governments, corruption, indiscriminate policy reversals, inadequate funding, high cost of borrowing from financial institutions, poor management, poor lack of infrastructures and unguided competition from foreign manufacturing firms (Okafor, 2012).

To combat these problems, the Federal Government of Nigeria prioritized the manufacturing sector by directing commercial banks, through the Central Bank of Nigeria (CBN), to devote a certain percentage of their loanable fund to the sector at a lower rate since industrialization has been noted as the major driving force serving as the pivot for the production of goods and services, employment generation and sustainable national income in both developed and developing economies. If a firm finances its investment by borrowing the rate of interest on the funds borrowed for investment purpose is an important element of the rental cost of capital. Therefore, interest rate as the cost of capital establishes the linkage that is absorbed between the financial and manufacturing sector in any economy (Nwokoro, 2017) Borrowings for investment purpose are highly discourage when lending rate is high and vice versa. Despite this measures by the monetary authorities, manufacturing sector contribution into the Gross Domestic Product in Nigeria has been inconsistent over the years. As suggested by Rasheed (2010), the Nigerian sector growth level had been negatively affected by high lending rate which is responsible for high cost of production in turn. Interest rate spread, which is the difference between the interest rate commercial banks pay on deposit by surplus economic units and that enlarged on loans to borrowers is wide in Nigeria. As noted by Nwokoro (2017), the responsibility of ensuring that the rate of interest is not too low enough to discourage savings and also give room for inflation but also not high enough to discourage borrowing for investment is saddled with the central bank of Nigeria. The prevalence of wide interest rate spread and poor contributions of Nigerian manufacturing into the Gross Domestic Product clearly showed that the issue of interest rate management as a determinant of bank credit to the manufacturing sector might not have been addressed effectively by the monetary authorities. Hence, the purpose of this study is to ascertain the relationship between interest rate and manufacturing sector performance in Nigeria. The remainder of the paper is organized into four sections, following section one is section two and three covering the literature review and methodology respectively. The results are presented in section four while section five cover the conclusion.

The high rate of interest charged on loans and advance granted by the commercial banks to manufacturing sector has become an issue of concern to the monetary authorities and government. Many explanations have been provided by scholars for banks to generate revenue from the unstable nature of the Nigeria economy to the need for bank to generate revenue from the interest income that will be enough to cover the cost of deposits, (Udoka, Ibor & Arikpo, 2015).

Also the stringent lending conditions that must be met before bank loans could be granted has also impeded the access to funds by the manufacturing sectors and by extension their productive capacity (Edam 2006). To reduce the negative effect of this situation and facilitate the productivity of the manufacturing sector, the government through the CBN has adopted various monetary policy measures. Such measures include reducing the monetary policy rate, using the prudential guideline to direct the allocation of credit to the productive

sector, regulating the rate at which these loans should be granted to these preferred sectors etc. (Ojong, Arikpo & Ogar, 2015).

2.0 Literature Review

The review of theoretical and empirical review is the main focus of this section.

2.1 Theoretical framework

The work is anchored on the Neoclassical theory of investment. Jorgenson (1967) significantly contributed to the development and understanding on the neoclassical theory of investment. Under the neoclassical theory of investment (NTI), the marginal rate of return on investment is equated or is a function of interest rate. The theory is called neoclassical theory of investment behaviour because it is based on the neoclassical theory of optimal capital accumulation which is determined by relative prices of factors of production such as interest rate.

According to the neoclassical theory, investment, that is, addition to the stock of capital in an economy is determined by marginal product of capital (MPK) and user cost of capital which is also called real rental cost of capital (Mukher, 2017). Marginal product of capital (MPK) measures the addition to the production by using an additional unit of capital, labour and technology remaining constant.

According to the theory, if a firm finances its investment, that is purchase of new capital goods, by borrowing, the rate of interest on the funds borrowed for investment purpose is an important element of rental cost of capital.

The neoclassical approach to investment was formulated by Jorgensen (1967) and Hall and Jorgensen (1971) to address and close gaps associated with the accelerator theory. This model related the value of capital required by the firm as a function of its output level (Hall & Jorgensen, 1971). It indicated that the desired capital depended on the level of output and the cost of capital, the real interest rate, inflation, and depreciation. Unlike the accelerator model, the neoclassical model essentially recognized the existence of lags in the real interest rate and government policies. According to this theory, interest rates, investments, and fluctuations in the private sector had a profound effect on manufacturing sector growth.

The loan pricing holds that banks cannot always set high interest rates, e.g. trying to earn maximum interest income. Banks should consider the problem of adverse selection and moral hazard since it is very difficult to forecast the borrower type at the start of the banking relationship (Stiglitz & Weiss, 1981). If banks set interest rates too high, they may induce adverse selection problems because high-risk borrowers are willing to accept these high rates (Chris, Ibor & Arikpo, 2015). Once these borrowers receive the loans, they may develop moral hazard behaviour or so called borrower moral hazard since they are likely to make on highly risky projects or investment (Chodecia, 2004). From the reasoning of Stiglitz & Wisee (1981), it is usual with the risk of the borrowers.

The credit market theory on the other hand is a neoclassical credit market model that believes that the terms of credit remain constant, the interest rate is the only price mechanism which the interest rate rises, and vice versa. It is thus believed that the higher the supply, premium, and the higher the failure risks of the borrowers (Ewert, Szesmy & Schenk, 2000).

2.2 Empirical Literature

A lot has been reviewed in terms of lending activities of various deposit money bank. Some opinions deliberated on the factor responsible for banks willingness to extend much credit to some sector of the economy, while some discussed effect of such extension of credits on productivity and output.

Sangosanya (2011) used panel regression analysis model and Gibrat's law of proportionate effect in investigation firm's growth dynamics in Nigerian manufacturing industry. The study observed that the manufacturing firms finance mix, utilization of assets to generate more sales, abundance of funds reserve and government policies are significant determinants of manufacturing industry growth in Nigeria. The gap in this study is that the authors did not identify those environmental factors that affect the manufacturing sector and the implementation of fiscal policy.

Rasheed (2010) used error correction model (ECM) to investigate the impact of interest rates and other macroeconomic factors on manufacturing performance in Nigeria using co-integration and an error mechanism (ECM) technique with annual time series covering the period between 1970 and 2002. The study revealed that interest rate spread and government deficit financing have negative impact on the growth of manufacturing sub-sector in Nigeria. Again, the liberalization of the economy has promoted manufacturing growth during the period covered by the study.

Charles (2012) investigated the effect of monetary policy on manufacturing sector in Nigeria, using econometrics test procedures. The result indicates that monetary supply positively affect manufacturing index performance while company lending rate, income tax rate, inflation rate and exchange rate negatively affect the performance of manufacturing sector. This means that monetary policy is vital for the growth of the manufacturing sector in Nigeria which in turn would lead to economic growth. The gap in this study is that the authors did not identify those factors that measures manufacturing sector performance like capacity utilization (output) and manufacturing share in GDP (input).

Chris, Ibor and Arikpo (2015) studied interest rate as a key variable for deposit money banks' lending in Nigeria. The study used the ordinary least square multiple regression technique to investigate the influence of lending rate, deposit rate, monetary policy rate and treasury bills rate on loan in Nigeria. The study revealed monetary policy rate reduces the capacity of banks to lend; deposit rate and Treasuring bill rate have an inverse but significant relationship with bank loans and advances; lending rate had a positive and significant relationship with bank loan and advances in Nigeria.

Tomola, Adebisi and Olawale (2012) employed co-integration and vector error correction model (VECM) techniques to determine the link between bank lending, economic growth and manufacturing sector in Nigeria. The finding of the study revealed that manufacturing capacity utilization and bank lending rates significant affect manufacturing output in Nigeria. This means that the growth of manufacturing output has not been enough to generate sizeable growth in economy. Nnamdi (2007) attempting to evaluate the dynamic impacts and relationships between deposit structure, lending rates and risk assets created in the Nigeria system. The results indicated a significant multiple correlation between risk assets and a combination of the independent variables savings deposit, time deposit, demand deposits and lending rate.

Emery (1971), studied the use of interest rate policies as stimulus of economic growth. Using the OLS technique. He submitted that government of few less developed countries were beginning to view interest rate policy as one of their major discretionary policy variables – along with monetary and fiscal policy-in their efforts to stimulate economic growth and – when appropriate – to reduce inflationary pressure. According to him “this change in attitude had been caused in part by the experience of Taiwan, Korea and Indonesia following the introduction of substantial change in the interest rate structure particularly for time and savings deposit.

Horgan (2014) examined the impact of interest and foreign exchange rates on manufacturing sub sector in Nigeria during the period 1980-2012. The study adopted the OLS and the co-interaction techniques. Data on index of manufacturing sector output, interest rate, government expenditure on manufacturing sector were utilized. The study revealed that interest rate in the long run does not impact on manufacturing output but government expenditure does. The scenario according to him has affected the performance of the manufacturing sub sector in Nigeria.

Odior (2013) investigated empirically the impact of macroeconomic factors on manufacturing productivity in Nigeria over the period 1975-2011. The analysis starts with examining stochastic characteristics of each time series by testing their Augmented Dickey Fuller (ADF) test and estimate error correction mechanism model. The findings establish the presence of a long term equilibrium relationship among the variables as indicated by the co integrating equation of the VECM. He found from the analysis of result that credit to the manufacturing sector in the form of loan and advance has the capacity to sharply increase the level of manufacturing output in Nigeria. The study concluded that high cost of borrowing is due to wide interest rate spread and a cut in margin between lending and deposit rate was recommended.

Erinma (2016) examined the impact of rising interest rate on the performance of the Nigeria manufacturing sector. Annual time services data used for the study span thirty five (35) years covering 1981 to 2015. The models were analyzed using the ordinary least square techniques. Findings from the study shows rising interest rate in Nigeria has a negative effect on the contribution of the manufacturing sector to GDP as well as on the average capacity utilization of the Nigeria manufacturing sector. Given the findings, the study recommends that aside from trying to manage interest rate for enhanced economic growth, the Nigeria government should strive to provide infrastructural facilities particularly power and transportation to reduce high cost of production.

Ogar et al. (2014) investigated the relationship between bank credit and manufacturing sector performance in Nigeria for the period of 1992-2011. The study employs ordinary least squares multiple regression techniques and discovered that commercial bank credit had a significant relationship with the manufacturing sector in Nigeria.

Ebere and lorember (2016) examined the effect of commercial bank credit on the manufacturing sector output in Nigeria from 1980 to 2015 using Cochrane-ortcutt method. The study revealed that inflation rate and interest rate have negative effect on manufacturing sector output while ways and advance and broad money supply have positive effect on manufacturing sector performance in Nigeria. Onakoya, Ogundajo and Johnson (2017), investigated monetary policy and the sustainability of the manufacturing sector in Nigeria. The findings established a positive relationship between monetary policy and manufacturing sector performance in

Nigeria. Nwokoro (2017), carried out a study on the relationship between foreign exchange, interest rates and manufacturing sector output in Nigeria. He employed the ordinary least square (OLS), stationary, cointegration, together with error correction modelling. The results showed a negative but significant relationship between foreign exchange rate, interest rate and manufacturing output in Nigeria.

From the empirical review above, it is glaring that the debate on the relationship between interest rate, credit to manufacturing sector and manufacturing sector performance remains inconclusive. The review of empirical literature has opened for the expectation of the possible relationship between interest rate and manufacturing sector performance in Nigeria.

3.0 Methodology

3.1 Data sources and description

This paper employed a time series secondary data. The secondary data were obtained from the Central Bank of Nigeria Statistical Bulletin (various editions) covering 1981 through 2016. The period is sufficiently long enough for a reliable result to be obtain and for a comprehensive review of the relationship between interest rate and manufacturing sector performance in Nigeria base on the study scope. The proxy for manufacturing sector performance is the sectorial contribution of manufacturing to Gross Domestic Product (GDP). Other data for analysis include lending rate, inflation and deposit rate.

3.2 Model specification

The model for this study is built base on the postulation of the Neoclassical theory of investment with slight modification to achieve the objective of the study. Under the Neoclassical theory of investment (NTI), the marginal rate of return on investment is equated or is a function of interest rate. That is, manufacturing output is a function of prices of factors of production such as interest. Since lending rate determines bank loans, is it not better to use one of the variables only to avoid the problem of multicollinearity. Hence, based on the above assertion, the interest rate and manufacturing output model can be specified as:

$$\text{MANOPT} = f(\text{LR}, \text{INFL}, \text{DR})$$

LR = Lending rate

DR = Deposit rate

INFL = Inflation rate

The model in its econometric linear form can be expressed as:

$$\text{MANOPT}_t: b_0 + b_1\text{LR}_t + b_2\text{DR}_t + b_3\text{INF}_t + U_t \dots\dots\dots (1)$$

Where:

$b_0 + b_3$ are the parameters to be estimated and U is the stochastic error term.

3.3 Model estimation procedure

Several estimation techniques and steps was employed in this study. The first step was the determination of the stability of the variables. The Augmented Dickey-Fuller (ADF) unit root test was deployed. Based on that, the following equation was estimated:

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \sum_{j=1}^j \beta_j \Delta y_{t-j} + \varepsilon_t \dots\dots\dots (2)$$

Where:

ΔY_t = $Y_t - Y_{t-1}$ is the difference of series Y_t ;

ΔY_{t-1} = $Y_{t-1} - Y_{t-2}$ is the first difference of Y_{t-1}

e_t = Stochastic error term

α_0, α_1 and β_i are the parameters to be estimated.

If $\alpha_1 = 0$, the null hypothesis of non – stationary is accepted.

The second step was the testing of the process, or otherwise of co-integration between the series of the same order of integration through forming a co-integration equation. Johansen and Juselius multivariate cointegration approach was employed to investigate the long-run equilibrium relationship among the variables in the model. The vector autoregression model of order P (VARCP) is constructed as the following equation:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta y_{t-i} + C + \varepsilon_t \dots\dots\dots(3)$$

Where ΔY_t is (n x 1) vector of macroeconomic variables in period t, μ is (n x 1) vector of constant terms, Γ_i (i = 1...k-1) represents the (n x n) coefficient matrix of short-run dynamics, Π is the n x n long term impact matrix, and ε_t is (n x 1) vector of error term and it is independent from all explanatory variables. The cointegration test is conducted using trace test and maximum eigenevalue test.

The next step was a test for the short run relationship or dynamics between variables. The Vector Error Correction Model (VECM) equation is specified thus:

$$\Delta MANOPT_t = \lambda_0 + \sum_{i=1}^j \lambda_{1i} \Delta MANOPT_{t-i} + \sum_{i=1}^j \lambda_{2i} \Delta LR_{t-i} + \sum_{i=1}^j \lambda_{3i} \Delta INFL_{t-i} + \sum_{i=1}^j \lambda_{4i} \Delta DR_{t-i} + \phi ECM_{t-i} + U_t \dots\dots(4)$$

Where: U_t is the white noise error term; ECM is error correction factor.

4.0 Interpretation of results and discussion of findings

4.1 Stationarity test results

The results of the Augmented Dickey Fuller (ADF) test is presented in Table I.

Table 1: Unit Root Test Results: Augmented Dickey Fuller Test

Variables	5% critical value	ADF Test at first Difference (Prob)	Equation specification	Order of integration
MANODT	-2.95	-5.09(0.00)	Intercept	1(1)
LR	-2.95	-5.81(0.00)	Intercept	1(1)
DR	-2.95	-5.99(0.00)	Intercept	1(1)
INFL	-2.95	-3.17(0.03)	Intercept	1(1)

Source: E-views 10.0 – Econometric output of the study

The result in the table above presents the unit root test results gotten at levels, and first difference. The analysis of the ADF unit root test revealed that more of the variables of interest in the study was found to be stationary at levels. However, all the variables become stationary when difference once. That is, all the variables are integrated in order of unity.

4.2 Johansen Co-integration test result

Table 2: Unrestricted cointegration rank test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.783021	80.01277	47.85613	0.0000
At most 1	0.413471	29.59019	29.79707	0.0528
At most 2	0.292852	11.98358	15.49471	0.1577
At most 3	0.016486	0.548584	3.841466	0.4589

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

The result of the trace test as presented in table 2 above indicates one cointegrating equation at 5 percent level. This is because the trace statistic value in the one cointegrating equation is greater than its critical value at 5 percent level of significance. Based on the trace test therefore, we can conclude that there is the presence of long-run relationship among the variables in the model.

Table 3: Unrestricted cointegration rank test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.783021	50.42258	27.58434	0.0000
At most 1	0.413471	17.60661	21.13162	0.1453
At most 2	0.292852	11.43500	14.26460	0.1337
At most 3	0.016486	0.548584	3.841466	0.4589

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

The result of the maximum eigenvalue test as shown in table 3 above indicates one cointegration equation at 5 percent level of significance. This is so because, the maximum eigenvalue statistic values in the one equation is greater than its critical values at 5 percent level of significance. The result based on the maximum eigenvalue test also showed that there is long-run relationship among the variables in the model.

4.3 Result of short run VECM result

The short run result of the model can be represented below:

$$\text{MANOPT} = 0.19 - 2.639 \cdot \text{LR} + 0.062 \cdot \text{DR} - 2.841 \cdot \text{INFL}$$

The Vector Error correction model test result in table 4 above reveal that, manufacturing sector performance (MANODT) and the annual result for the independent and control variables showed the expected negative sign of ECT and highly significant as theoretically expected. The highly significant ECT further confirms the existence of a stable long run relationship. The coefficient of ECT (-0.1944) simply imply that deviation from the long run manufacturing output is deemed corrected by 19.44 percent by the following year. This negative sign signals

an oscillating convergence in manufacturing sector performance in Nigeria and a move back towards equilibrium.

The regression result indicates lending rate and inflation have negative but significant relationship with manufacturing sector output. Deposit rate is positively related to manufacturing but not significant.

4.4 Discussion of findings

This study was carried out to evaluate the relationship between interest rate and manufacturing sector performance in Nigeria. The result of the research confirms the negative and significant relationship between lending rate and manufacturing output in Nigeria. This finding is consistent with the report of the study of Adegemi et al (2017) that high lending rate is an impediment to manufacturing performance in Nigeria. High lending rate in Nigeria inhibits the availability of fund at a significant level to the manufacturing sector. High cost of capital is a major cause of the inability of manufacturing firms to optimize their capacity utilization in Nigeria.

The result of the study equally reveals that inflation influences manufacturing output negatively but significantly. This is in agreement with the finding of Modebe and Ezeaku (2016). Persistent increase in the price of input is harmful to manufacturing sector production.

The effect of deposit rate on manufacturing output is also positive but not significant. This is in consonance with the findings of Ojo (2010) who maintains that the wide spread between lending rate and deposit rate in Nigeria is an impediment to deposit mobilization from the supplies economic unit, which in turn inhibits credit alleviation to the manufacturing sector.

5.0 Conclusion

The major findings in this research work is that lending rate as a determinant of bank credit to the manufacturing sector has a negative but significant influence on manufacturing output in Nigeria. Based on these findings, the study recommends that government should always embark on interest rate reforms which can reduce the wide interest rate spread between lending and deposit rate in Nigeria.

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