The Impact of Lending Rate on the Manufacturing Sector in Nigeria

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Abstract

The study investigates the impact of lending rate on output of the manufacturing sub-sector using the Vector Error Correction Model (VECM) and annual data from 1981-2014. The empirical results indicated that high lending rate had negative impact on manufacturing output in the long-run. This suggests that increase in lending rate undermines manufacturing output, thus retarding growth in the real sector. Specifically, the estimates revealed that a 1.0 per cent increase in lending rate reduces manufacturing output by 0.03 per cent. The study, therefore, recommends the implementation of investment friendly policies that narrows the lending rate by the deposit money banks (DMBs) in order to stimulate output growth in the manufacturing sub-sector and allow global competitiveness of products. Similarly, development finance institutions should be encouraged to lend at concessionary rates to the manufacturing sector.

Keywords: *Deposit Money Banks, lending rate, Intermediation, Manufacturing capacity utilisation, Vector Error Correction Model (VECM), Co-integration*

JEL Classification Numbers: E2, E5

I. Introduction

The manufacturing industry remains a key driver of economic growth. Its performance is driven largely by monetary policy action, especially bench mark interest rate. Precisely, an appropriate interest rate remains crucial for achieving improved productivity and promoting economic growth and development. High interest rate increases cost of borrowing, retards domestic investment, diminish aggregate demand, increase unemployment and contract economic growth. It poses serious concerns for policymakers about economic growth; investment and financing options. On the other hand, lower interest rate stimulates aggregate demand, output, investment, employment, business confidence and export competitiveness.

The benchmark policy rate set by the monetary authority directly affects interest rates that banks and other financial institutions charge. These charges by banks for on-lending to economic agents are, however, determined by both explicit and implicit costs. The explicit costs are the costs of obtaining

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deposits, while the implicit cost is the opportunity cost associated with firms' use of its own resources.

In Nigeria, there is growing disaffection among investors and entrepreneurs on the current high cost of production, which has constrained their efforts at creating wealth and reducing unemployment in the country. Globally, Nigeria ranks 52nd and 170th on both the ease of getting credit and doing business, respectively, out of 189 economies examined by the World Bank in its Ease of Doing Business publication (2015). For instance, the maximum lending rate increased from 24.6 per cent in 2012 to 24.9 per cent in 2013 and further rose to 25.7 per cent in 2014. The contribution of the manufacturing sector to GDP which was merely 8.0 per cent in 2012, increased marginally to 9.2 per cent in 2013 and further to 10.0 per cent in 2014.

The poor performance of the manufacturing sector has been attributed to high bank lending interest rates, among other factors (Adebiyi and Babatoe-Obasa 2004; Obamuyi et al., 2012; and Gideon et. al., 2015). The high rates charged by banks are influenced by increased overhead costs, contributions by deposit money banks (DMBs) to the Banking Sector Sinking Fund, payment of the Nigerian Deposit Insurance Corporation's (NDIC) premium, as well as the cash reserve ratio (CRR) and the liquidity ratio, placed additional pressure on banks' earnings and the cost of funds. These additional costs may partly be transmitted to high lending rates which have remained double digit over the years (Jibrin et. al., 2015).

To promote its developmental functions and ensure that credit gets to the real sector at single digit rates, the CBN has continued to support and encourage specialised institutions such as the Bank of Industry (BOI), the Bank of Agriculture (BOA), the Nigeria Export Import Bank (NEXIM) and the Urban Development Bank through funding, technical assistance, regulation and supervision. The CBN has also assisted through the provision of specialised credit schemes at concessionary interest rates, particularly in the areas of agricultural finance, export promotion and small and medium scale enterprises.

Despite these interventions, interest rates charged by banks have remained high making credit expensive for the private sector, particularly those engaged in capital-intensive production processes. This has led to the folding up of manufacturing firms contributing to job losses and declining output. The challenge, therefore, has been the determination of the extent to which the cost of borrowing as reflected in the prevailing lending rates charged by banks impacts the performance of the manufacturing sector in Nigeria and

the role of other intervening variables in reinforcing this impact. Past studies on this relationship in Nigeria have produced mixed evidence raising questions about the overall stability of selected models. Enebong (2003) had argued that the Nigerian manufacturing sector is exposed to stiff competition in the international market for raw materials; yet none of the identified studies captures this effect. This paper, therefore, deviates from existing studies by introducing 'Trade Openness' to account for this 'competitive effect' which is arguably an intervening variable in explaining the relationship between lending rate and performance of the Nigerian manufacturing sector. To this end, it has as its main objective, the determination of the impact of lending rate on manufacturing sector performance in Nigeria employing the Co-integration technique and the Vector Error Correction Model (VECM).

The paper is structured into five sections. Following the introduction, Section two reviews the theoretical and empirical literature. Section three provides stylised facts on interest rates and manufacturing output in Nigeria, while Section four presents the methodology of the study. The presentation and discussion of empirical findings are undertaken in Section four, while the summary, recommendations and conclusions are presented in Section five.

II. Literature Review

II.1 Theoretical Review

II.1.1 Theories of Interest Rate

The major theories of interest rate are the Classical, Neoclassical (Loanable Funds), Keynesian and Taylor rule models. Each of these theories is discussed in this sub-section.

The Classical Theory of Interest Rate

The rate of interest played a critical role in the Classicalist analysis of the relationships between financial flows and real flows. Their perspective reflects the traditional conceptualisation of interest rate and its determination in economics. The Classicalists conceived the interest rate as the factor that equates the demand for investment and individuals' willingness to save and thus, described interest rate as the price of investible resources. Walras (1874) for instance considers the interest rate as the variable that brings the sum that individuals are willing to save and invest in new capital assets, to equality.

In this regard, interest rate is determined in the capital market where demand for investment, on one hand, is equated to the supply of investment, which is dependent on individuals' marginal propensity to save, on the other. The demand and supply for investment identity is stated as:

$$I = f(r): \frac{\Delta I}{\Delta r} < 0 \quad (1)$$

$$S = f(r): \frac{\Delta S}{\Delta r} > 0 \quad (2)$$

Where I is investment demand, S is the volume of savings, while r is the interest rate, and f connotes a functional relationship. The interest rate thus, plays an important role in determining both the quantum of investment that would be demanded and the level of savings. The equilibrium interest rate is eventually determined at the point investment demand equals the supply of savings ($S = I$).

Neo-Classical (Loanable Funds) Theory of Interest Rate

The neo-classical or loanable funds theory was built on the classical approach. The theory states that interest rate is the price paid for loanable funds demanded by economic agents: government, firms and households, while the supply of loanable funds comes from their savings. The supply of funds available for lending (credit) is influenced by the incentives to save and the money supply through credit creation by banks. Thus, savings comprise the supply of loanable funds (S), and new money supply resulting from credit creation by commercial banks (M). The total supply of loanable funds is equal to S + M, while the demand side of the loanable funds is determined by the demand for investment expenditure (I) and the demand for hoarding money (H). Thus, I + H are the total demand for loanable funds. If the hoarded money increases, there would be a reduction in the supply of funds, and vice versa.

According to the loanable funds theory, equilibrium interest rate is determined at the point where the demand for loanable funds (I + H) and the supply of loanable funds (S + M) intersect (Hansen, 1951).

This assertion can be expressed as;

$$r \rightarrow (S + M) = (I + H)$$

Where;
r = equilibrium rate of interest
I = Investment expenditure
S = Savings
M = Credit creation by commercial banks
H = Demand for hoarded money

More loonable funds are available at higher interest rates, and vice versa. Overall, the demand for loanable funds is inversely related to the interest rate, while the supply of loanable funds is positively related to the interest rate.

Keynesian Theory of Interest rate

This is otherwise known as the liquidity preference theory and is predicated on the ground that interest rate is determined based on the interaction of supply of money and the desire to hold money. By this assumption, the quantity of money and prices are non-proportional and absolutely indirect, through the rate of interest. In other words, the stock of money is determined by the ability of the monetary authority to manage the monetary base, while the demond for money is influenced by the desire of economic agents to hold money.

The Keynesian theory of interest rate considered interest to be the reward for parting with liquidity for a specified period, rather than saving as argued by the classical economists. Individuals have the choice of what to consume which is dependent on the propensity to consume and what to save from their income which will either be held as cash or non-interest-paying bank deposits. How much an individual will part with or lend depends on what the Keynesian theory termed 'liquidity preference' (Keynes, 1936).

According to the Keynesians, the demand for liquidity is determined by three motives; transactionary - desire to hold cash for day-to-day transactions; precautionary - desire to hold cash for unforeseen contingencies; and speculative - desire to hold resources in liquid form in anticipation of future changes in interest rates and bond prices. The demand for money (specifically, the liquidity preference for the speculative motive) and supply of money determine the rate of interest. The rate of interest is determined by the reward for keeping money in bonds or other assets rather than keeping it in cash. The rate of interest is thus, determined by the interaction between investments and savings on the assumption that the relationship between changes in the quantity of money and prices is non-proportional and is absolutely indirect, through the rate of interest.

The hallmark of the Keynesian theory lies in its integration of monetary theory and value theory, on the one hand, and the theory of output and employment through the rate of interest, on the other. Thus, when the quantity of money increase, the rate of interest falls, leading to an increase in aggregate investment and demand, thereby raising output and employment. The theory observed a link between the real and monetary sectors of the economy – an economic phenomenon that describes equilibrium in the goods and money market (IS-LM). The theory also considers the relationship between the quantity of money and prices under situations of unemployment and full employ-

ment. Accordingly, so long as there is unemployment, output and employment will change in the same proportion as the quantity of money, but there will be no change in prices. At full employment, however, changes in the quantity of money will induce a proportional change in price (Keynes, 1936).

Taylor Rule

The Taylor Rule is a monetary policy rule used to establish interest rate as a monetary policy instrument. Thus, it postulated how central banks determine interest rate in the economy based on the rational expectation theory. It explains how central banks adjust interest rate policy instruments in response to macroeconomic developments. It provides a useful framework for the analysis of historical policies and economic evaluation of specific economic strategies that the central bank can use as the basis for its interest rate decisions. In principle, when economic growth unexpectedly weakens below its potential, accommodative monetary policy can stimulate aggregate demand and restore full employment. Likewise, when inflationary pressures develop, monetary restrictions can restore the central bank's price stability objective (Durlauf and Blume, 2010).

As it relates to the nominal interest rate, the Taylor rule prescribes that for a one per cent increase in inflation, the central bank should raise the nominal interest rate by more than one percentage point. This implies that the nominal interest rate should be set to equate the inflation rate plus an equilibrium real central bank rate that is consistent with full employment in the long-run and a weighted average of inflation gap (current inflation rate minus a target inflation rate) and output gap (percentage deviation of real GDP from an estimate of its potential or natural rate output growth).

The movement in interest rate by central banks according to the Taylor rule could be written as:

$$i = r^* + pi + 0.5\,(pi - pi^*) + 0.5\,(y - y^*)$$

Where:

i = the target short-term interest rate

r* = real monetary policy rate

pi = rate of inflation

p* = target inflation rate

Y = logarithm of real output

y* = logarithm of potential output

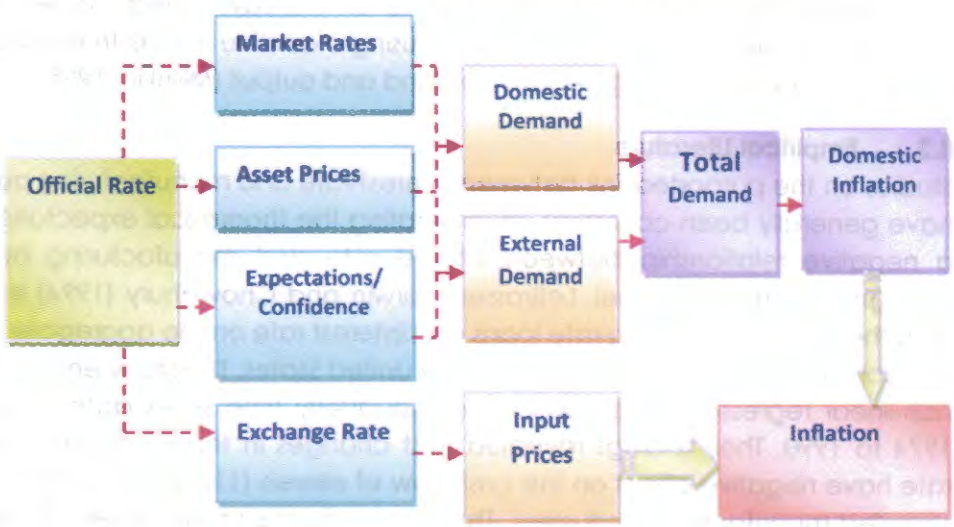
The coefficient (0.5 or 5 per cent) is a specific weight suggested by Taylor (1993) as a 'rule of the thumb'. The weight ensures that inflation remains low and output remains high.

Under the assumption of the model, central banks determine the future interest rate in the economy based on the rational expectation theory. The model presupposes that the difference between nominal and real interest rate is inflation. Overall, the Taylor Rule requires that central banks should raise interest rates when inflation is above planned target or when GDP growth is too high and above potential. The model aims at stabilizing the economy in the short-term and inflation over the long-term. In addition, it systematically linked monetary policy formation to current economic conditions in a manner that, on average, yields favourable results.

II.1.2 Interest Rate Transmission Mechanism

The interest rate channel is often referred to as the 'traditional' channel of monetary policy transmission mechanism and forms the framework for this study. It is the main channel of monetary policy transmission and was first popularised by the Keynesian view of how monetary policy effects are transmitted to the real economy through the interest rate.

Figure 6: Monetary Policy Transmission Mechanism



Source: Adapted from the Bank of England (Undated)

According to the traditional Keynesian interest rate channel, a policy-induced increase in the short-term nominal interest rate leads first to an increase in long-term nominal interest rates. Thus, adjustments in short-term rates are transmitted to the medium and long-term interest rates. Investors will act to arbitrage away differences in risk adjusted expected returns on debt instruments of various maturities. When nominal prices are slow to adjust, movements in nominal interest rates translate into movements in real interest rates. Firms, observing that their real cost of barrowing has increased, reduce their investment expenditures. Similarly, households facing higher real borrowing costs, reduce consumption, thus, aggregate demand, output and employment decline.

Mishkin (1995) observed that the traditional Keynesian view of how monetary tightening is transmitted to the real economy can be characterised schematically as follows;

$M\downarrow \rightarrow i\uparrow \rightarrow I\downarrow \rightarrow Y\downarrow$ Where;

M= Money supply
i = real interest rate
I = Investment Spending
Y = Output

A contractionary monetary policy leads to an increase in real interest rate, which in turn raises the cost of capital, causing a decline in investment spending which then reduces aggregate demand and output (Mishkin, 1995).

II.2 Empirical Literature

Studies on the purported link between interest rate and manufacturing output have generally been consistent, reverberating the theoretical expectation of a negative relationship between interest rate and manufacturing output through the credit channel. LeBrasseur-Serwin and Chowdhury (1994) examined the impact of floating rate loans and interest rate on the aggregate cash flow for 14 manufacturing industries in the United States. The study employed a non-linear regression model to estimate quarterly time series data covering 1974 to 1990. Their findings revealed that changes in the short-term interest rate have negative effect on the cash flow of eleven (11) of the fourteen (14) sampled manufacturing industries. The study indicated some levels of heterogeneity in the effect and noted that the magnitude of decline in industries' cash flow tended to vary between industries. For instance, while a rise in the short-term interest rate impacted positively on the cash flows of the petroleum

and the primary metals industries, the effect was negative for the cash flow in the textile mills products and the transportation equipment industries.

Although the negative impact of interest rate on the cash flows of selected industries was the highlight of LeBrasseur-Serwin and Chowdhury (1994), the heterogeneity of the impact exposed new grounds in the literature. One explanation for the observed heterogeneity basks on the differing characteristics of firms, especially in relation to their sizes (Kumar and Francisco, 2005).

Gertler and Gilchrist (1994) analysed the differential responses of small versus large manufacturing firms to monetary policy in the United States. The authors estimated bivariate and multivariate systems VAR equations using many firm-level quarterly panel data from 1958 to 1994. The Federal Funds Rate was used as the proxy for monetary policy. The study attributed the differential response of firms to their sizes noting how this feature determines their access to the capital market (credit) and consequently their susceptibility to business cycles. The results showed that small firms contracted substantially and accounted for a significantly disproportionate share of the manufacturing decline relative to large firms after a monetary policy tightening.

Sanchez (2002) investigated the behaviour of investment by Mexican manufacturing firms covering the period 1994-1999. He utilised annual panel data and estimated standard investment equations focusing on the relevance of a difference between the costs of internal funds and external funds to the firm. His major findings were that internal funds in the form of cash flow played a relevant role in explaining investment expenditures by firms. Specifically, he separated firms more likely to be financially constrained from those not likely to be financially constrained and found the former to be more sensitive to changes in internal funds. Furthermore, investment expenditures were also found to respond to changes in real interest rates when a measure of the foreign interest rate was used as a proxy for the cost of capital.

Zulfiqar and Din (2015) investigated the effects of some macroeconomic variables on the performance of Pakistan's textile industry. Using a panel of 50 textiles firms for the period 2006 to 2011, they found that interest rate had a positive impact on return on equity.

In Nigeria, empirical studies on the impact of interest rate on manufacturing output are quite novel. Some of the earliest studies on the subject dated back to the last decade. For instance, Adebiyi and Babatope-Obasa (2004) employed the co-integration and Error Correction Model (ECM) techniques within the Ordinary Least-Square (OLS) framework to estimate the impact of interest rate on the financing of the manufacturing industry in Nigeria in the SAP and pre-SAP interest rate regimes, using annual time series data ranging between

1970 and 2002. Assuming a bivariate relationship among the variables, the authors established the existence of a long-run relationship between interest rate and the Nigerian manufacturing index. They found that interest rate spread had a negative, but significant effect on the growth of the manufacturing sector. A 1.0 per cent rise in the interest rate was noted to induce a 3.0 per cent decrease in manufacturing output. The study also concluded that the liberalisation of interest rates in Nigeria left a positive trail on the growth of the Nigerian manufacturing industry. It, however, failed to establish any significant relationship between bank credit and growth in the manufacturing sector.

Gideon et. al., (2015) replicated the work of Adebiyi and Babatope-Obasa (2004) adopting similar estimation techniques – co-integration and ECM in investigating the effect of banking sector reforms on manufacturing output in Nigeria. They, however, introduced additional explanatory variables and extended the study period using annual time series data between 1970 and 2011. Their findings revealed that banks' lending rate, exchange rate and the real rate of interest exerted positive and significant impact on the growth of the manufacturing sector; and that financial deepening and interest rate spread have significant and negative effect on manufacturing output in Nigeria. A 1.0 per cent decrease in the real interest rate and the lending rate would result in a decrease in manufacturing output by 0.2 and 8.0 per cent, respectively. On the other hand, a one percent decrease in interest rate spread leads to an increase of 0.7 per cent in manufacturing output. Thus, the authors' findings contradict the results in Adebiyi and Babatope-Obasa (2004) and Obamuyi et al., (2012) with respect to the impact of interest rate on manufacturing output.

Obamuyi et al., (2012) projected the empirical inquisition by extending the study period in Adebiyi and Babatope-Obasa (2004) and adopting a system equation approach. They investigated the effect of bank lending on the growth of the Nigerian manufacturing sector using annual time series data covering 1973 to 2009. The authors tested for co-integration and employed the Vector-Error-Correction Model (VECM) technique to ascertain the short-run dynamics. Their results indicated a unique long-run relationship between manufacturing output, lending rate and capacity utilisation of the manufacturing sector. They also found that both the bank lending rate and capacity utilisation in the manufacturing sector impact significantly on the manufacturing sector with a priori signs.

Udoh and Ogbuagu (2012) investigated the relationship between financial sector development and growth of industrial production in Nigeria over the period 1970 to 2009 employing the ARDL bounds testing co-integration approach. The long-run estimation based on the ARDL approach, indicated that the interest rate has a positive and significant effect on industrial production. In the short-run, however, the effect was found to be negative.

Ogunleye and Saliu (2013) studied the effect of financial institutional reforms on the manufacturing performance in Nigeria. They employed co-integration and ECM techniques on annual time series data covering the period 1970 to 2005. The broad finding was that financial institutions reforms had no significant impact on manufacturing sector performance in Nigeria. Specifically, the lending rate, a proxy of the interest rate, had no significant impact on the performance of the manufacturing sector.

Ogar et al., (2014) examined the impact of commercial bank loans and the interest rate on manufacturing output in Nigeria. The study employed time series data over the period 1999 to 2011 using the OLS regression. The authors found no evidence of the impact of bank credit and interest rate on output in the manufacturing sector. At the 5.0 per cent significance level, neither of the regressors was significant in explaining output growth in Nigeria. These findings deviate from earlier studies with regards to the interest rate manufacturing output relationship. It, however, reinforced the result of Adebiyi and Babatope-Obasa (2004) on the impact of bank credit on manufacturing output. Udoh and Ogbuagu (2012) explained this mismatch between bank credit and the manufacturing output to the low support the industrial sector receives from the private sector, compared with the dominant public sector.

Olayemi and Michael (2016) investigated the impact of financial reforms in Nigeria and industrial productivity growth. A VAR analysis was used along-side the impulse-response and variance decomposition analyses to isolate the effects of financial services reform variables on industrial productivity, using time series data between the period 1986 and 2013. Although the VAR estimation revealed that lending rate explained 48.4 per cent of variation in industrial output, the F-Statistics was insignificant at the 5.0 per cent significance level. Their findings on the low level impact of lending rate on industrial growth echo that of Ogar et. al.,(2014).

All the studies reviewed confirmed the *apriori* expectation on an inverse relationship between interest rate and manufacturing output. However, evidence on the role of interest rate in manufacturing sector performance Nigeria appeared to be mixed.

This study, therefore, intends to enrich the literature by firstly extending the coverage of the estimation period to accommodate current economic data, and secondly, by introducing an additional variable (trade openness) to the set of determinants of manufacturing performance in Nigeria, given the glut of empirical evidences on the impact of trade openness on real output in Nigeria.

III. Stylised Facts on Interest Rate and Manufacturing Output in Nigeria

III.1 Trends in Interest Rate in Nigeria

Interest rate is a major monetary policy instrument in Nigeria owing to its role in the mobilisation of financial resources in supporting growth and development. Over the years, Nigeria has adopted different interest rate policy regimes targeted at inflation, savings, investment, employment and growth. Broadly, these policies can be examined within two policy regimes – the *pre* and structural reforms periods (pre-SAP and Reform eras). In the pre-SAP era, interest rates were largely fixed and administratively determined, while in the Reform era, they were deregulated and market-based.

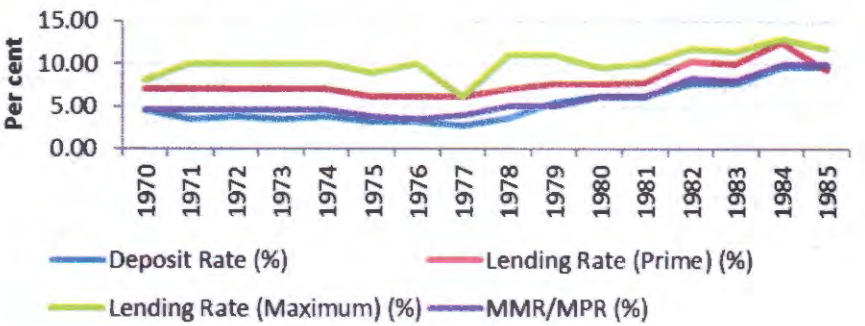
III.1.1 Pre-SAP Era (1970 – 1986)

Prior to the deregulation era and the introduction of the Structural Adjustment Programme (SAP), issues in interest rate in Nigeria were institutionally and administratively determined by the CBN, in line with the Federal Government annual macro-economic objectives of price stability and economic growth. The pre-SAP period witnessed selected interest rates for preferred sectors of the economy. The preferential interest rates were based on the assumption that the market rate, if universally applied, would exclude some of the priority sectors. Interest rates were, therefore, adjusted periodically to promote increase in the level of investment in different sectors of the economy. For example the agriculture and manufacturing sectors were accorded priority, and commercial banks were directed by the CBN to charge preferential interest rates that varied from year to year on loans and advances to these sectors (Figure 1).

The pre-SAP period was considered as a period of financial repression and was characterised by a highly regulated monetary policy environment in which policies of direct credits, interest rate ceiling and restrictive monetary expansion were the rule rather than exception (Soyibo and Olayiwola, 2000). During the regulated era, the monetary authority relied on the exclusive use of direct control mechanism to fix interest rates and other banking charges. The major reasons for the administrative interest rates were the desire to obtain optimum resource allocation, promote orderly growth of the financial market

and combat inflation. Consequently, interest rates during the period were largely irresponsive to bank cost of funds because the CBN fixed the rates in line with the desired macroeconomic objectives and a maximum limit was stipulated. Thus, resource allocation was based on the classification of preferred and less-preferred sectors. The preferred sectors, which included agriculture, mining and manufacturing, had concessionary interest rates, while the less-preferred sectors, which included imports and commerce, had higher rates (CBN Briefs, 2004 - 2005).

Figure 1: Selected Rates (1970-1985)



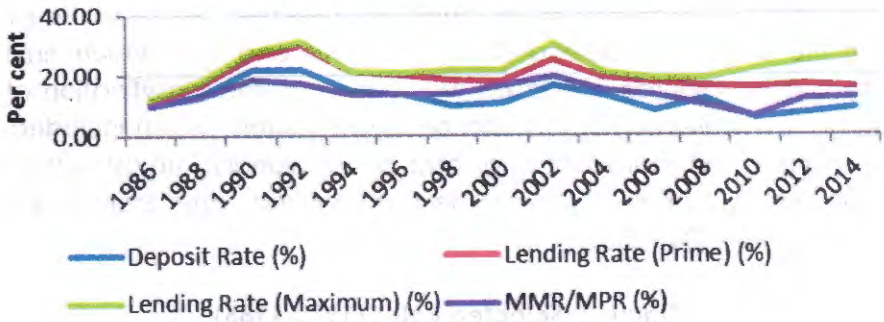
Source: Central Bank of Nigeria

The practice of direct controls promoted stability of interest rates in the banking sector because the rates were seldomly changed by the CBN. It, however, led to the inefficient use of capital which resulted in inappropriate pricing of credits and deposits. The prevailing rates were unable to keep pace with inflation, resulting in negative real interest rates. Thus, the problem of inefficient pricing and resource allocation, lack of competition and under-development of the financial markets, were among the factors that necessitated the deregulation of interest rates in the late 1980s.

III.1.2 Reform Period 1986 – 2014

The advent of the SAP in 1986 resulted in radical departure from the regime of administrotive interest rate to a broad based market-determined interest rate system. By 1990, the deposit and maximum lending rates had risen to 22.1 and 27.7 per cent, respectively. In line with the SAP expectation, interest rate during the reform period continued to vary leading to maximum lending rates dropping to 20.8 per cent in 1991 and falling further to 19.5, 18.7, and 18.4 per cent in 2005, 2006 and 2007, respectively.

Figure 2: Selected Rates (1986-2014)



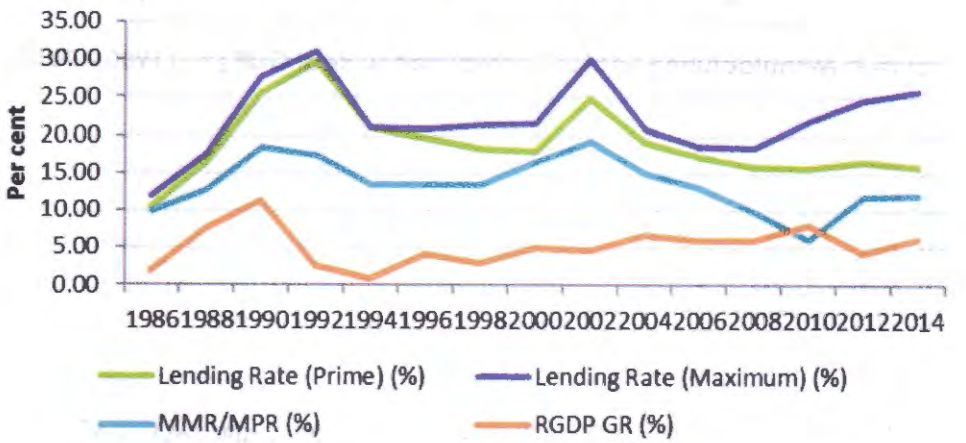
Source: Central Bank of Nigeria

The reform in interest rate in 1987 impacted positively on real GDP growth rate which rose from 7.6 per cent in 1988 to 11.4 per cent in 1990. For most of the reform period, the real GDP growth was positive. The CBN indirectly influenced the level and direction of change in interest rate using the Minimum Rediscount Rate (MRR) as well as the stop rate of weekly tender for treasury bills (CBN, 2006).

In furtherance of the liberalisation reforms, the cap on interest rate was lifted in 1992 but was re-imposed in 1994. The re-introduction was primarily due to a number of factors, including; the financing of huge fiscal deficits of the Federal Government by the banking sector resulting in the "crowing-out" of private sector investment; high rate of domestic inflation; technical insolvency and pervasive defaults in the money market; and speculative attacks on the foreign exchange.

With effect from October 1996, the earlier restriction on interest rates were removed, and the determination of interest rates became market-driven. The monetary authority set the rules of engagement and banks were allowed to participate according to the dictates of the market. The CBN, however, retained its discretionary power to intervene in the money market to ensure orderly developments in interest rates. The MRR was replaced with the Monetary Policy Rate (MPR) in 2006, aimed at ensuring stability in short-term interest rates. The purpose was to ensure liquidity management and enhance the development of inter-bank trading. Thus, the MPR was fixed at 10.0 per cent from 14.0 per cent.

Figure 3: Lending Rates, MPR and GDP (1986-2014)



Source: Central Bank of Nigeria

III.2 Interest Rates and Manufacturing Sector Performance 1970 - 2014

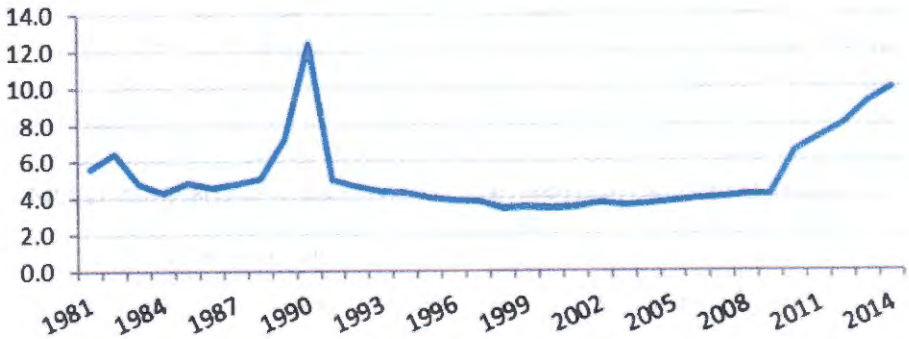
The manufacturing sector in Nigeria has suffered neglect since the discovery of crude oil in the early 1970s. Prior to the oil boom, manufacturing contributed over 10.0 per cent to the country's total output. The increased revenue from oil, however, led to the persistent decline in the sector's relative share in GDP. Consequently, the sector has not been able to attract the necessary investment to boost economic growth. The manufacturing sector's share of GDP has remained low (less than 7.0 per cent) over the past decades. Also, its contributions to foreign exchange earnings, as well as revenue and employment generation have been minimal. In 1982, manufacturing output contributed only 6.4 per cent to total output, and fluctuated between 4.3 per cent and 4.8 per cent between 1983 and 1987.

The recession triggered by the oil glut of the 1980s, however, brought about structural reforms in the economy. Consequently, the World Bank's SAP was initiated in 1986. The major policies of SAP included: trade liberalisation, deregulation of interest rates, public sector reforms, privatisation and commercialisation. During the reform period, deposit and lending rates were allowed to be determined by market forces and the interest rate actually increased as envisaged. For instance, the average deposit and maximum lending rates which were 9.7 and 10.5 per cent in 1986 rose to 15.1 and 19.2 per cent, respectively, in 1987 because of several deregulations. As a result, the share of manufacturing to GDP began to witness slight increase recording 5.1 per cent and 7.2 per cent in 1988 and 1989, respectively.

The contribution of manufacturing output to GDP peaked at 12.4 per cent in 1990. The deposit and maximum lending rates rose to 22.1 and 27.7 per cent, respectively. Throughout the 1990s and 2000's, however, Nigeria's over de-

pendence on crude oil exports continued to soar, while the manufacturing sector remain ignored with persistently low performance (Figure 4).

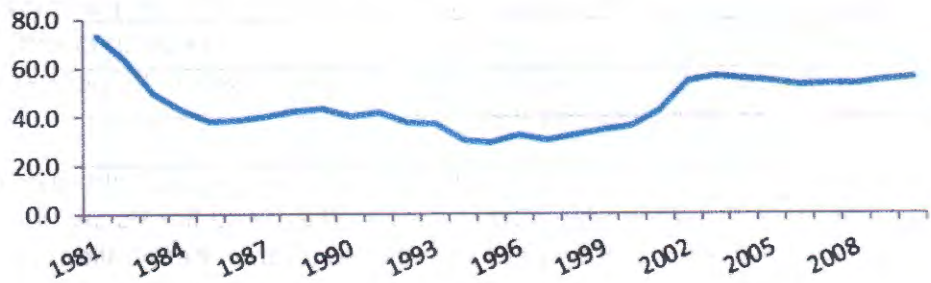
Figure 4: Manufacturing Sector Contribution to Real GDP (%) (1980 - 2014)



Source: Central Bank of Nigeria

Also, the policies of import licensing and interest and exchange rates controls led to shortages of industrial input with adverse effects on capacity utilisation and manufacturing output. The average capacity utilisation declined steadily from 73.3 per cent in 1980 to 36.1 per cent in 2000, averaging 53.6 per cent from the period 2001 to 2010 (Figure 5).

Figure 5: Average Capacity Utilisation (%) (1980 - 2010)



Source: Central Bank of Nigeria

The inadequacy of infrastructure, mostly power and transport, led to escalating costs and non-competitive operations further contributed to the decline in manufacturing output. Following the rebasing of the GDP in 2010, however, the contribution of manufacturing output to GDP started rising and maintaining an upward trend. In 2010, the manufacturing sector represented 6.6 per cent of GDP. It grew steadily from 7.3 per cent in 2011 to 10.0 per cent in 2014 (Figure 4). The increase in the contribution of the manufacturing sector to GDP

was not unrelated to the expansion of the scope of manufacturing activities. Prior to the rebasing in 2010, the manufacturing sector comprised only 3 sub-sectors - oil refining, cement ond other manufacturing.

With the rebasing, however, the manufacturing sector currently comprises 13 sub-sectors, namely: oil refinery; cement; food, beverages and tobacco; textiles, apparel and footwear; wood and wood products; pulp, paper and paper products; chemical and pharmaceutical products; non-metallic products; plastic and rubber products; electrical and electronics; basic metals; iron and steel; motor vehicles and assembly; and other manufacturing. The dominant manufacturing activities are the food, beverages and tobacco sub-sectors contributing the largest output within the sector (46.4 %), followed by textiles apparel and footwear (21.5 %) in 2014.

III.3 Interest Rates and Deposit Money Banks (DMBs)' Cost of Fund

Banks obtain funds from both short and long-term sources. The costs incurred by banks in the process of sourcing funds could be direct and/or indirect, and constitute major elements in determining banks' lending rates. Direct costs are mostly interest expenses, while indirect costs comprise administrative costs incurred in the intermediation process. The cost of funds is calculoted as the total interest expense annualised, divided by average interest bearing deposits and other interest bearing borrowings, plus average non-interest bearing checking deposits. It is the interest rate paid by financial institutions for the funds deployed in their businesses and constitutes one of the most important input costs for a financial institution (Jibrin, et. al., 2015). The spread between the cost of funds and the interest rate charged on loans to borrowers is one of the major sources of profit for most banks.

In Nigeria, over the years, lending rates have remained persistently high and have continued to raise concerns among policy makers, investors and other economic agents. The high lending rates have been attributed largely to the high cost of raising funds by DMBs. In a bid to influence the availability and cost of credit in the economy, the CBN stipulated the composition of cost of funds for commercial banks to include the following; i) interest expense; ii) insurance Premium; iii) cash and clearing; iv) cost of liquidity; v) overheads recovery rate; vi) cost of risk; and vii) minimum profit margin. The cost of funds includes cost items (i) to (iv), while the remaining are termed other costs (Jibrin, et. al., 2015).

Interest expense was identified as a direct cost, while the indirect cost of funds includes overhead (salaries, other costs), statutory cost such as NDIC premium and Cash Reserve Ratio (CRR), opportunity cost of holding liquid assets in excess of the minimum requirement, cost of holding non-earning assets and target return on equity. Overhead costs previously included were advertising

costs, data processing services, software development costs, parts of legal fees, networking information technology and auditing, among others. But the CBN observed that such costs appear to be wrongly articulated and tended to impact negatively on the prime lending rates. Consequently, the CBN excluded overhead costs from subsequent modifications to the frameworks for computing the bank's cost of funds (Jibrin, et. al., 2015).

The 2014/2015 CBN Monetary, Credit, Foreign Trade and Exchange Policy Guidelines excluded overhead costs from the framework in determining banks' cost of funds and computed the cost of funds by employing the weighted average cost of funds computation framework. According to the guidelines, banks should include banks' interest cost on the different types of deposit liabilities, borrowings from the inter-bank funds market, payments in respect of deposit insurance premium and costs due to reserve requirements.

IV. Methodology and Data

This study adopted the Johansen (1991) and Johansen and Juselius (1992) methods of co-integration. The intention is to capture the impact of interest rate and the performance of the manufacturing sector in Nigeria in the long and short-run through the dynamics of the vector error correction methodology (VECM). The choice of this methodology is predicated on the fact that it is able to capture both the short and the long-term properties of the model. It also effectively captures the stability associated with the model which other methodologies are less efficient. To estimate the model, we first follow the procedure established by Sims (1980) by estimating an unrestricted vector autoregressive (VAR) process. The unrestricted VAR estimates jointly the dynamic relationships among endogenous variables with *k* lags and without any restriction such that;

$$X_t = \mu + A_1 X_{t-1} + \cdots + A_k X_{t-k} + \varepsilon_{1t} \qquad \varepsilon_{1t} \sim IN(0, \Sigma) \tag{4}$$

In equation (4) X_t is $(n \times 1)$ vector of endogenous variables while A_i is an $(n \times n)$ matrix of parameters. Also, k is the minimum lag length and ε_{1t} is a vector of white noise processes with non-diagonal covariance matrix. We, therefore, re-formulated equation (4) to derive the vector error correction model (VECM) such that:

$$\Delta X_t = \psi + \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi X_{t-k} + \varepsilon_{2t} \tag{5}$$

Where $\Gamma_i = -(1 - A_1 - \cdots - A_i); i = 1, \cdots, k-1$ and $\Pi = -(1 - A_1 - \cdots - A_k)$.

The parameter estimates of Γ_i and Π in equation (5) showed both the short- and long-run adjustments to changes in X_t. Also, $\Pi = \alpha\beta'$, where β is a matrix of long-run coefficients such that the term $\beta' X_{t-k}$ embedded in equation (5) represent up to $(n \times 1)$ co-integration relationships in the multivariate model, which ensures that X_t converges to their long-run steady state solutions; while α is the matrix containing error correction coefficients that measures the extent to which each variable in the system responds to deviations from the long-run equilibrium. The component part ΠX_{t-k} of equation (5) is the stationary long-run error correction relation, which must be stationary for $\varepsilon_{2t} \approx 1(0)$ to be white noise.

The data set for this study consists of annual time series data from 1981 to 2014. The variables employed include manufacturing capacity utilization, exchange rate, interest rate and the degree of trade openness (measured by the ratio of total trade to GDP). The choice of variables was informed by the literature, data availability, and the need to ensure a reliable degree of freedom in a typical VAR. The manufacturing capacity utilization index was the preferred measure of manufacturing. This, in our opinion, better reflects the of the sector, compared to the Purchasers Managers' Index (PMI)[1] as it captures the proportion of output that was actually realized. Also, the maximum lending rate was used to proxy the interest rate as it better reflects the cost of borrowing in the Nigerian economy. Based on economic linkages, changes in the nominal exchange rate are likely to affect the cost of intermediate inputs as well as the demand for manufactured exports, explaining the consideration of exchange rate as an intervening variable in the study. In addition, the 'Degree of Trade Openness' was included as an intervening variable given that Nigeria is a small open economy with a manufacturing sector that is import-dependent. It is derived by dividing total trade volume (exports plus imports) by nominal GDP. All data were sourced from various statistical publications of the CBN.

IV.1 Estimation Procedure

The variables were examined to ascertain their stationary properties and ensure appropriate specification of the VAR. Also, the optimal lag lengths were selected based on six (6) selection criteria to ensure a reliable degree of freedom in the VAR model, after which a stability test was conducted to determine the stability of the model. The co-integration test was undertaken to es-

[1] *Only 25% of actual production constitutes the PMI. Other constituents include: New orders (30%), Supplier delivery time (15%), Employment level (10%) and Raw materials inventory (20%).*

tablish the long-run relationship among the variables in the model. The preliminary results on the stationarity properties of the variables informed the choice of a VECM.

IV.2 The Unit Root Tests

As indicated in Table 1, both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were applied to check the stationary properties of the data in levels and in differences. The result of the unit root test showed that all variables in the model were I(1), although, PP test suggested LCAP to be I(0). But since ADF suggested the contrary, we, therefore, assumed that the variable was I(1) stationary. The Johansen co-integration test proved that non-stationary variables could possibly move together in the long-run. Thus, the Johansen co-integration test was carried out to oscertain whether to proceed to long-run estimation.

Table 1: ADF and PP Unit Root Test Results

Variables	Levels				First Difference			
	ADF 1	PP 1	ADF 2	PP 2	ADF 1	PP 1	ADF 2	PP 2
LCAP	-0.7712	-7.0905	-2.4483	-7.6258	-3.7672	-22.2331	-3.7733	-32.7071
LEXC	-2.1249	-2.0093	-1.1091	-0.9214	-3.5420	-4.8350	-4.2931	-5.3356
LINT	-2.1688	-2.3437	-1.8833	-2.0764	-5.0090	-6.5336	-5.2785	-6.6511
LDOP	-1.2680	-1.3957	-3.2189	-3.6470	-5.4423	-6.8974	-5.3427	-6.7698

Notes: ADF 1 and PP 1 represent= Unit root tests with constant, while ADF 2 and PP 2 = Unit root tests with constant and trend. *, ** and *** indicate statistical significance at the 1%, 5% and 10% levels respectively. With constant and trend: McKinnon (1991) critical values are -4.2846(1%), -3.5629 (5%) and -3.2153 (10%).

IV.3 Optimal Lag Length Selection Test

The appropriate lag length was chosen for the VAR model based on the optimal lag length selection test. Most of the criteria used (FPE, AIC, SIC, HQ and LR) suggested the optimum lag length of one (1). Indeed, the VAR model was stable and not explosive at the lag length of one (1).

Table 2: VAR Lag Order Selection Criteria

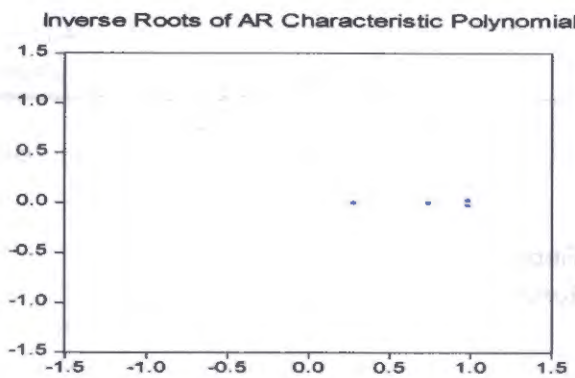
Lag	LogL	LR	FPE	AIC	SC	HQ
1	-36.79	NA	0.000399*	3.519334	4.266639*	3.758403*
2	-24.0812	18.63959	0.000521	3.738747	5.233357	4.216885
3	-11.654	14.91262	0.000758	3.976934	6.21885	4.694142
4	17.20887	26.93869*	0.000435	3.119409*	6.10863	4.075686

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error; AIC: Akaike information criterion; SIC: Schwarz information criterion; and HQ: Hannan-Quinn information criterion.

IV.4 Stability Test

We also tested the reliability of the VAR model at lag length of (1). The result of the autoregressive (AR) root stability test indicated that all roots had modulus less than one and lied inside the unit circle, which is an indication of stability of the model.



IV.5 Johansen Co-integration Test

Having satisfied the stability condition of the VAR model, we proceeded to examine the existence of a long-run relationship among the variables using the Johansen co-integration test. The results of both trace and maximum eigenvalue tests statistic of the co-integration test suggested the existence of one co-integrating vector at the 5.0 per cent level of significance, providing the basis for proceeding with the estimation of the VECM.

Table 3: Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.643257	56.1432	47.85613	0.0069
At most 1	0.332806	24.19027	29.79707	0.1925
At most 2	0.251664	11.64536	15.49471	0.1748
At most 3	0.082179	2.658353	3.841466	0.103

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level;

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

Table 4: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.643257	31.95293	27.58434	0.0128
At most 1	0.332806	12.54492	21.13162	0.4949
At most 2	0.251664	8.987005	14.2646	0.2872
At most 3	0.082179	2.658353	3.841466	0.103

Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

V. Empirical Findings

V.1 Long-run Result

Table 5 shows the long-run co-integrating equation. Normalising this relationship, the long-run equation was derived as in equation (6).

Table 5: Co-integrating Equation

Error Correction	LCAP	INT	LDOP	LEXC
Normalized β	1	0.03	1.06	-0.54
		[1.86]	[12.46]	[10.18]

$$LCAP = -0.03INT - 1.06LDOP + 0.54LEXC \quad (6)$$
$$(1.86) \quad (12.46) \quad (10.18)$$

The result of the long-run model indicated that interest rate has significant impact on manufacturing output in Nigeria. A percentage increase in interest rate would reduce output of manufacturing sector by 0.03 percent. It was expected that the degree of trade openness (LDOP) would have positive effect on manufacturing output. However, it turn-out to be negative contrary to expectation. This shows the uncompetitive nature of the manufacturing output in global trade. The impact of exchange rate was positive, indicating that one percent depreciation in exchange rate improves manufacturing output by 0.54 per cent, implying that currency depreciation improves price competitiveness

V.2 Short-run Model (Vector Error Correction Model)

The result of the short-run model showed that the speed of adjustment of the ECM was negative at 0.13 and was significant with the expected positive sign. This implied that about 13.0 per cent of the deviation from equilibrium was corrected every year. The short-run result also indicated that the degree of trade openness was significant in the short-run, while other variables such as interest rate and exchange rate do not impact significantly on manufacturing capacity utilisation in the short-run.

Table 6: Short-Run Model

Error Correction:	LCAP	LCAP(-1)	INT(-1)	LDOP(-1)	LEXC(-1)
CointEq1	**-0.13**	0.01	-0.01	-0.11	0.05
	(-4.56]	[0.27]	[-1.41]	[-2.24]	[1.20]

Figures in parenthesis are the t-statistics of the parameters

VI. Summary of Findings, Recommendations and Conclusion

The paper empirically examined the impact of lending rate on the performance of the manufacturing sector in Nigeria, using annual data from 1981 to 2014. The Johansen and Juselius (1992) method of co-integration and vector error correction methodology (VECM) were employed to verify both the long-run and short-run relationships in the model. The result of the long-run model indicated that lending rate has negative impact on manufacturing performance in Nigeria in the long-run. While the degree of trade openness impacted negatively on manufacturing performance, contrary to expectation. The impact of exchange rate was positive as depreciation improved price competitiveness. The result of the short-run indicated that about 13.0 per cent of the deviation from equilibrium was corrected every year and that only the degree of trade openness impacted significantly on manufacturing performance, while other exogenous variables had no significant impact.

The policy implication of this finding is that high lending rate could have negative impact on the performance of the manufacturing sector in the long-run.

This corroborates the earlier findings by Obamuyi et al., (2012), Udoh and Ogbuagu (2012) and Gideon et al., (2015), that bank's lending rates have significant impact on manufacturing output in Nigeria. It is in view of this finding that we recommend that policy makers should pursue policies that engender the competitiveness of the manufacturing sector by narrowing the lending rate in the banking system. This may include the provision of concessionary interest rates targeted at the manufacturing sector. Also, the observed negative impact of trade openness on the manufactured sector vilifies the uncompetitive nature of the sector. In this regard, monetary policy must work towards ensuring the stability of the exchange rate given its direct implication for the cost of production, the price of manufactures and the overall competitiveness of manufactured exports.

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