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**IMPACT OF BANK CREDIT ON THE MANUFACTURING SECTOR IN NIGERIA.**

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**Abstract:**

*This study assess the effect of credit on the manufacturing sector and its impact on output growth in Nigeria from 1995-2020. The study relies mainly on secondary data. This study adopts both descriptive and inferential statistical methods in the data analysis. The OLS estimation test results show that all the explanatory variables are correctly signed according to the a priori expectation. Maximum lending rate, exchange rate and inflation are negatively signed, as expected, although insignificant. For bank credit, results establish a negative relationship between maximum lending rate and bank credit, implying that a decline in lending rate will lead to an increase in bank credit, as economic agents take advantage of the lower cost of funds.. For the Johansen test, findings show the existence of a unique and stable long-run relationship between growth of the manufacturing sector and interest rate, exchange rate, unemployment, inflation, real GDP and credit to the private sector. The results also established a long-run relationship between bank credit and manufacturing sector performance, interest rate, exchange rate, unemployment rate, inflation rate and real gross domestic product. However, the null hypothesis of no Granger causality was accepted for MLR, LNBDC, LNGDP and LNCREDIT. For the Granger causality tests collectively, the combination of all the variables were found to Granger-cause manufacturing sector growth at the 10 per cent level of significance. The Granger causality test on revealed bidirectional causality between real GDP and bank credit. This implies that the level of domestic output in Nigeria determines the level of bank credit and vice versa. The null hypothesis of no causality was accepted for MO, MLR, LNBDC, UNEM and INF as they collectively did not Granger-cause bank credit. The findings of this study have implications that are important for policy makers, investors and researchers on how to improve the performance of the manufacturing sector.*

**Keywords:** Bank credit; manufacturing sector; time series; Nigeria.

## 1. INTRODUCTION

Every nation, developing or developed, desires economic growth. Most commonly, developing economies strive for economic growth due to its rejuvenation property. Rodik (2007) asserted that “nothing has worked better than economic growth in enabling societies to improve the life chances of their members, including those at the very bottom”. **This suggests that** economic growth can create opportunities for developing countries such as Nigeria to reduce poverty and income inequality. **By way of definition**, economic growth can be described as the rise in the output of any economy over a specified period of time. It involves the expansion of the production capacity of an economy to meet the various needs of economic agents (individuals, firms and government). Friedman (2006) defines growth as an expansion of the system in one or more dimension and a change in the economic structure. Sustained economic growth in the various sectors of the economy can generate positive impact on national income and employment levels resulting in an increase in social welfare and standard of living.

Economic growth can be positive or negative depending on a number of factors such as trade deficit, high inflation rates and alterations in policies of government. Basic classical theory indicates that growth is a function of physical capital, human capital, and technology. This simply implies the adequate combination of these factors in the right quantity and quality can optimally increase output. That is, an increase in the labor force due to increase in the working population, combined with increase in the level of capital stock in addition to the high rate of technological advancement, can serve as the ultimate driving force for economic growth.

Statisticians and researchers have measured economic growth in a number of ways such as Gross Domestic Product (GDP), Gross National Product (GNP), or GNP per capita, amongst others. However, the most common measure is GDP, although some economists have highlighted its limitations such as double counting, illiteracy, inadequate data, etc. Gross Domestic Product is an analytical measure in which we compute economic growth in terms of monetary expenditures. It is defined as the final market value of all goods and services produced within the borders of domestic economy over a specified period, usually a year. It is the most common indicator used to track the economic health of an economy and the most important measure of economic growth employed by most economists today. For an even development, growth must be encompassing. This implies that it must be felt in every sectors of the economy. Gross Domestic Product (GDP), as an important economic indicator, depicts the aggregate output coming from each sectors of the economy. Therefore, for any economy to be productive, it is desirable to ensure that each sectors of the economy

are growing.

The Nigerian economy is typically divided into three sectors: agriculture, manufacturing and services. The manufacturing sector, which is a sub-sector of the industrial sector, is regarded as the true essence of the secondary sector in the economy. The sector is seen to have accompanied the agricultural sector since the latter has to with all the activities involving the exploration/extraction of raw materials from the ground, sea and earth. Unlike other sectors, the manufacturing sector serves as the highest facilitator for other sectors to thrive.

According to Libiano (2006), the manufacturing sector is regarded as the engine growth of any economy. This is because, despite being one of the underrated sectors in Nigeria, the manufacturing sector produces the finished products required for output growth. The manufacturing sector is a key contributor to Nigeria's economic growth. The sector also provides jobs for people in the tertiary and service sectors, thus contributing to poverty reduction. The significance of the manufacturing sector can also be seen in its role in economic stability including balance of payments equilibrium. Furthermore, it expands the market space thereby enabling economic growth and development. Despite all these advantages, the Nigerian manufacturing sector has recorded minimal sectorial growth over the years.

Bank credit is widely acknowledged to play a catalytic role in boosting manufacturing output. The financial intermediation role of the banking system affects the allocation of credit, thereby improving productivity, technical change and the rate of economic growth, hence played a pivotal role in economic development (Sanusi, 2011). Amongst all the other policies initiated by the Nigerian government to enhance output growth in the manufacturing sector, limited access to credit facilities is usually cited as one of the most important constraints to manufacturing sector performance. Credit to the industrial sector include bank loans and advances supplied by various financial institution in order to increase industrial growth and consequently economic growth.

Bank credit is widely considered as the lifeblood of any economy particularly in developing countries such as Nigeria. Credit is a sensitive variable that is managed by the monetary authority (Tawose, 2012). Given the abundant labor force and the agrarian nature of the Nigerian economy, the Nigeria's manufacturing sector has enormous economic development potential (Adebiyi, 2011). However, this has been futile considering the crawling rate of growth over the years, despite country's rich human and natural resources. Consequently, in view of the above and the growing concerns over the decline in industrial sector performance and output in general, this study attempts to provide an empirical evidence by assessing the effect of credit to the manufacturing sector and its impact on output growth in Nigeria from 1995-2020.

Arising from the background to the study, this research attempts to analyze the determinants of bank credit and manufacturing sector performance in Nigeria from 1995 to 2020. It also seeks to understand why the manufacturing sector has registered sub-optimal performance over the years which has led to a downturn in industrial and aggregate output in Nigeria. This study intends to analyze the determinants of bank credit and manufacturing sector performance in Nigeria from 1995 to 2020. Specifically, it aims at, examining the impact of bank loans on manufacturing sector output, analyzing the effect of interest rate, exchange rate, employment rate, inflation, Gross Domestic Product and credit on manufacturing performance in Nigeria, and ascertaining the determinants of interest rate in Nigeria.

This study is significant in many aspects. First, it examines one of the most critical sectors of the Nigerian economy- the manufacturing sector. Given that Nigeria's growth performance is currently less than desirable and below population growth, any study that seeks to evaluate how this could be further enhanced is not a wasted effort. Most importantly, findings from this study are expected to provide policy makers with news insights and a basket of policy menus that can be deployed to improve the performance of the manufacturing sector. In addition, this study uses new and current data set that spans up to 2020, and thus provides an addition to the body of knowledge in this regard. Future researchers and other academics, and even firms, may find the outcome of this work as a useful reference material.

The remaining sections of the study is structured as follow: Section two reviewed related literature on the subject including the theoretical and empirical studies. Section three, the research philosophy, methodology and method guiding the study. Section four presents and discusses the results of the research findings. Finally, section five concludes by providing the summary of findings, contributions to knowledge, policy recommendations and suggestions of research gaps for further study.

## **LITERATURE REVIEW**

### **Empirical Review**

There have been different studies which have empirically investigated/analyzed the impact of bank credit on the manufacturing sector's performance in Nigeria. Some of these studies are summarized in Table 1.

Sunday (2008) used the Auto-Regressive Distributed Lag Models and Granger-causality tests to investigate the impact of bank credit on Nigeria's manufacturing sector. It was found out that bank credit contributed greatly to manufacturing output in both short run and long run. Consequently, it recommended that the central bank should make policies to increase bank credit so as to play a catalytic role for output

growth.

In another study for Nigeria, Obamuyi, Adebisi and Olawale (2012) analyzed the effect of bank lending and output growth on the manufacturing output in Nigeria, using the Vector Error Correction Model (VECM) technique. Their findings indicated that manufacturing capacity utilization and bank lending rates have significant impact on manufacturing output, suggesting that lending rates should be reviewed downward to unlock the potentials of the sector, while improving the business environment to encourage investment.

Ogunmuyiwa et al (2017) used the ARDL approach to examine the effect of bank credit on growth of the manufacturing sector in Nigeria. Using data from 1999 to 2014, the study found that banking credit to the private sector had a positive impact on the manufacturing sector, indicating the existence of a connection between bank credit and manufacturing output performance. Their findings suggest that monetary policy instruments could be used to increase credit to the private sector in order to boost output and move the economy toward attaining economic growth and development.

Tokunbo (2017) examined the effect of bank credit on the development of manufacturing and agricultural sectors of Nigeria's economy from 1984-2014 using the Vector Auto-Regressive Model and Causality test. Results from the study showed that bank credit has significant impact on the manufacturing and agricultural sectors in Nigeria, which agrees with the findings by Ogunmuyiwa, Okuneye and Ahamefule (2017).

In another study, Attah, Dalis and Eziel (2019) examined the nexus of bank credit and manufacturing sector output in Nigeria from 1986-2017. Using Granger's causality analysis, they showed that there was a unique long-run equilibrium between bank credit and manufacturing sector output. It also showed that both positive and negative components of bank credit have a significant impact on manufacturing output. Causality was found to run from the bank credit to manufacturing output which indicates the presence of the supply-leading hypothesis in Nigeria. Their findings suggested that the monetary authority should employ a direct monetary policy strategy in ensuring specific sectors are given timely interventions to boost growth while the lending interest rate should be kept at a sustainable and affordable level to increase manufacturing sector output and growth.

In a more recent study, Thomas & Olaitan (2020) investigated the impact of bank lending rate on the manufacturing sector performance in Nigeria from 1986-2018. Using the Auto-Regressive Distribution Lag (ARDL), they found that bank lending rate

had a negative but insignificant impact on the manufacturing sector performance. Their results tend to suggest that bank lending rate may not be a significant factor that could explain manufacturing sector growth.

John and Terhempa (2019) used the Cochrane-Orcutt Method, Augmented Dickey Fuller Approach and Durbin Watson Tests to examine the impact of commercial bank credit on the manufacturing sector output in Nigeria. Their results showed that inflation and interest rates have negative impact on manufacturing output while loans and advances as well as broad money supply have positive effect. The study recommended the adoption of policies that would reduce both inflation and interest rates while increasing both loans and advances, in order to boost output growth in the sector.

Akpasiog and Babalola (2011) also evaluated the relationship between banking sector credit and economic growth in Nigeria from 1970-2008 using the Granger-causality test and Two-stage Least Square Estimation Technique. The Granger causality test revealed unidirectional causal relationship from economic growth to private sector credit and from industrial production index to growth. Furthermore, their regression results revealed that private sector credit has a positive impact on economic growth, while lending interest rate undermined economic growth. The paper proposed the need for more financial market development that favored more credit to the private sector with minimum interest rate to speed economic growth.

Okere, Okere & Ugonma (2020), also examined the effect of bank credit on the manufacturing sector in Nigeria from 1981-2018. Using the Auto-Regressive Distributed Lag (ARDL) approach, their study revealed that bank credits exhibited a significant relationship with the performance of manufacturing sector in Nigeria. The study therefore proposed that policies geared towards deepening the financial sector and enhancing the healthy and soundness of banks should be vigorously pursued while the Central Bank of Nigeria should also review downwards the lending interest rate in view of the COVID-19 pandemic threatening the whole world.

Oni, Akinlo, & Oladepo (2014) examined the impact of bank credit to output growth in the manufacturing and agricultural sub-sectors of the economy over the period 1980-2010 using the Error correction modeling techniques. The paper showed that bank credit has significant impact on manufacturing output growth both in the short run and long run but not in the agricultural sub-sector. Inflation and exchange rate depreciation were revealed to exert negative effects on manufacturing output growth in both short run and long run. It was therefore recommended that to accelerate output growth in the real sector, more bank credit should be made available to the real sector especially the manufacturing sector.

In a similar study, Akpan, Yilkudi and Opiah (2016) investigated the impact of lending rate on manufacturing subsector output from 1981-2014. Deploying the Vector Error Correction Model (VECM), they discovered that an increase in lending rate threatened manufacturing output, thus stifling real-sector growth. According to their results, a 1.0 per cent increase in lending rate brings down manufacturing output by 0.03 per cent. As a result, the study recommended that deposit money banks should implement investment-friendly policies that reduce lending rate.

Furthermore, using the Granger causality approach, Ogbonna (2018) investigated the impact of bank funding on manufacturing sector growth in Nigeria, from 1987-2015. The paper established that there is a bidirectional relationship between bank funding and manufacturing sector growth and the impact of bank funding is with a lapse of time while the impacts of interest and inflation rates are immediate. Factor analysis of stakeholders' responses confirmed this result and further revealed that weak public infrastructure, insurgencies, harsh fiscal and monetary policies adversely affect manufacturers' growth.

Imoughele, Ehikioya, Ismaila & Mohammed (2013) examined the impact of commercial bank credit accessibility and sectoral output performance in Nigerian economy from 1986-2010. Ordinary Least Square Techniques (OLS), Augmented Dickey-Fuller test and Error correction test were used for data analysis. Their results indicated that there was a long run relationship between commercial bank credit and agricultural, manufacturing and services sectors' output. However, the impact was found to be insignificant.

Ifenowo (2020) investigated the impact of bank credits on the performance of manufacturing sector in Nigeria from 2006-2016. Using the Ordinary Least Square method, the study found insignificant relationship between bank credits to manufacturing sector and manufacturing output. The paper concluded that sufficient credit to the manufacturing sector could enhance the sector's growth and therefore, the economic overall growth. As a result, the paper recommended more funding of the manufacturing sector in order to boost their contribution to the economic growth and employment creation.

In another study for Nigeria, Gbadebo, *et al.*, (2017) examined the impact of banks credits on manufacturing growth from 1978 to 2015 using the co-integration test. Results indicated a long-run positive and significant relationship between the variables. Similar conclusions were obtained in a study by Anyanwaokoro, Ogbu, and Gerald (2018) who analyzed the effect of commercial bank credits on the output of agricultural and manufacturing sectors in Nigeria from 1986-2016. The study adopted ex-post facto research design and employed the Autoregressive Distributed

Lag (ARDL) bound test and Ordinary least squares multiple regression analysis considering necessary diagnostic tests such as unit root test, test of normality, heteroskedasticity test, and cointegration test. Findings revealed that commercial bank credits have significant positive effect on the productivity of agricultural and manufacturing sectors in Nigeria. The implication of the findings was that more credits to agriculture and manufacturing sectors in Nigeria will increase output in the respective sectors. Hence, it was proposed that there should be an increase in lending to agricultural and manufacturing sectors so as to boost productivity of these sectors.

Gaiya, et al. (2018) estimated the threshold level of credit to the real sector, beyond which there exists an inverse relationship between finance and economic growth in Nigeria from 2014-2019. Using a two-regime threshold regression model, the authors found that the relationship between the ratio of credit to private sector /GDP ratio (TO) and the growth of real GDP has a turning point of about 71.8 per cent. This implies that the relationship between finance and economic growth is positive up to when TO is 71.8 per cent, but negative beyond that point.

Oburota and Okoi (2017) investigated the relationship between manufacturing output and economic growth from 1981-2013. Findings indicated that manufacturing output, capital and technology were the major factors determining economic growth. Results also show that quality of institutions and labor force does not exercise any impact on economic growth. The study concluded that the provision of capital in the form of financial resources to fund the manufacturing sector will greatly enhance manufacturing activities in Nigeria.

Bagshaw, et al. (2012) examined the performance of the Nigerian manufacturing sector since independence in 1960 using such performance indices as percentage contribution to the Gross Domestic Product, index of manufactured products, percentage growth rate, manufacturing value added, employment growth rate, and percentage of capacity utilization within this period from 1960-2012. The main finding from the study was that despite many policies and developmental initiatives undertaken by successive civilian and military administrations since independence, the Nigerian manufacturing sector has grossly underperformed in relation to its potentials. Some daunting challenges faced by the sector were identified to include unfavorable business environment, erratic power supply, poor and decaying physical infrastructures, multiple taxations, obsolete technology, high interest rates and inconsistency in government policies.

From the foregoing, there appears to be ample evidence which suggest that lending rate is an important variable that influence the performance of the Nigerian manufacturing sector. This equally indicates that economic growth can be enhanced by



incentivizing the manufacturing sector through the provision of credit incentives and lowering the interest rate. Table 1 provides a summary of the empirical studies.

## Conceptual Review

### An Overview of the Nigerian Manufacturing Sector

According to Mbelede (2012), the manufacturing sector is engaged in the process of adding value to raw materials by turning them into products. Manufacturing refers to the value- chemical and biological processing, or formulation (Attah 2019). The manufacturing sector is made up of establishments involved in the mechanical, physical, or chemical added production of merchandise for use or sale using labor and machines, tools, renovation of substances, components or materials into new products (United States Bureau of Labor Statistics, 2017).

Nigeria is a country in West Africa whose manufacturing sector comprises of mainly cement, building materials, food and beverages, tobacco, chemicals and fertilizers, textiles, wood, etc. Manufacturing activities is largely concentrated in large cities such as Lagos, Ibadan and Port Harcourt. Millions of people all over Nigeria have been seen to engage in activities such as Agriculture, Mining, Cement and Building Materials. Although according to recent studies, it has been justified that only 3 sub-sectors (Food & Beverage, Cement and Textile) account for 77% of manufacturing output which comprises of the highest value. In 2019, value added in manufacturing for Nigeria was 16,781,064 million. Value added in manufacturing of Nigeria rose from 3,141 million in 1970 to 16,781,064 million in 2019 growing at an average annual rate of 20.19%.

According to Dipak and Ata (2003), the effects of the trade restrictions caused by the oil price crisis were evident in the form of a 25 per cent drop in the real manufacturing output between 1982 and 1986. Although the Nigerian manufacturing sector grew by 15 per cent between 1977 and 1981, the trade restrictions imposed by the government caused significant slowdown in the sector's growth rate. During the period, the manufacturing sector's share in GDP of the country declined. However, in 1977, the sector's share in GDP rose by 4 per cent, reaching 13 per cent in 1981, before it dropped to less than 10 per cent thereafter. Dipak and Ata (2003), and Adenikinju and Chete (2002) indicated that firms' limited access to necessary raw material and spare parts were among the major contributing factors to the decline in the growth rate of the manufacturing sector, particularly after 1981.

Due to all these problems, the Nigerian government took some steps to ensure the manufacturing industry became vibrant again. Policies such as the introduction of a flexible exchange rate mechanism along with some trade liberalization policies,

brought some major changes to the sector as these steps assisted in reducing tariffs and trade rates. At the same time, duties on the importation of foreign goods were also raised, especially of those competing with domestic products in order to increase local production and make them more productive and efficient. In the same way, there were also some steps taken to reduce import duties on many of the raw materials and spare parts that were used in the manufacturing sector, the factor pinpointed for the previous years' decline. Various concerns therefore have moved the government towards industrial reconstruction.

In general, the manufacturing sector is thus a wealth-producing sector of an economy, and hence, a very vital sector that ensures economic growth. It provides important material support for national infrastructure. Roughly, the various indicators used to capture the performance in the manufacturing sector are average manufacturing capacity utilization, manufacturing value added as a percentage of the gross domestic product (GDP), manufacturing contribution to GDP (that is manufacturing sector output) and the manufacturing sector's contribution to GDP growth rate.

## Theoretical Review

### 2.1.1 The Loanable Funds Theory of Interest Rate

In the 1930s, British economist Dennis Robertson and Swedish economist Bertil Ohlin, proposed the neo-classical or loanable funds doctrine. **According to the theory**, interest rate is the price paid for loanable funds demanded by economic agents, with the supply of loanable funds coming from their savings. The loanable funds doctrine extends the classical theory, which determined the interest rate solely by saving and investment, in that it adds bank credit. The total amount of credit available in an economy can exceed private saving because the bank system is in a position to create credit out of thin air.

The supply of funds available for lending (credit) is influenced by savings incentives and money supply through credit creation by commercial banks. Consequently, saving is composed of the supply of loanable funds ( $S$ ), and new money supply created by commercial banks ( $M$ ). The total supply of loanable funds equals  $S + M$ , while the total demand for loanable funds is made up of the demand for investment expenditure ( $I$ ) and the demand for hoarding money ( $H$ ). If the amount of hoarded money rises, the supply of funds falls, and vice versa.

According Hansen (1951), the equilibrium interest rate is determined by the intersection of the demand for loanable funds ( $I + H$ ) and the supply of loanable funds ( $S + M$ ). Mathematically, this can be written as;  $r \text{ -- } (S + M) = (I + H)$ ; where  $r$

denotes the equilibrium interest rate,  $I$  denotes investment,  $S$  denotes savings,  $M$  denotes credit creation by banks, and  $H$  denotes the demand for hoarded money. At higher interest rates, more loanable funds are available, 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. This theory is related to this study in the sense that it seeks to examine how the interest rate can positively or negatively affect the demand for credit in the manufacturing sector.

### Research Methodology

This study employs quarterly data with a data set on manufacturing credit, interest rate, inflation rate, employment rate, exchange rate, interest rate, and Gross Domestic Product (GDP) for the period 1995 to 2020. Manufacturing credit and the other explanatory variables are the independent variables and aggregate output is the dependent variable. The study relies mainly on secondary data. Data was obtained externally. Data will be gotten from Central Bank of Nigeria (CBN) Statistical Bulletin and the database from World Bank (World Development Indicators). This study adopts both descriptive and inferential statistical methods in the data analysis.

### 3.1 MODEL SPECIFICATION

Based on the study's objectives, the model is expressed explicitly in mathematical form as:

$$MO = (EXC, EMP, INT, INF, GDP, CRT, FD)$$

$MO$  = Manufacturing output growth rate.

$EXC$  = Exchange rate

$EMP$  = Employment rate

$INT$  = Interest rate

$INF$  = Inflation rate

$GDP$  = Gross Domestic Product

$CRT$  = Credit Rate

$FD$  = Fiscal deficit

The econometric model is expressed in stochastic form as:

$$CRT = b_0 + b_1MO + b_2INT + b_3EXC + b_4EMP + b_5INF + b_6GDP + U \dots \dots \dots (1)$$

| APRORI EXPECTATION |     |     |     |     |     |
|--------------------|-----|-----|-----|-----|-----|
| MO                 | INT | EXC | EMP | INF | GDP |
| +                  | -   | -   | +   | -   | +   |

$$MO = b_0 + b_1INT + b_2EXC + b_3EMP + b_4INF + b_5GDP + b_6CRT + b_7FD + U \dots \dots \dots (2)$$

| APRORI EXPECTATION |     |     |     |   |    |
|--------------------|-----|-----|-----|---|----|
| INT                | EXC | EMP | INF |   | FD |
| -                  | -   | +   | -   | + | -  |

**3.2 Estimation Technique**

The estimators will be implemented using the econometric software EVIEWS 10 for data analysis which provides convenient visual ways to enter the data, create new variables from existing ones and analyze the statistical relationships. The tool is useful in estimating the unit root test, Granger causality tests, OLS regression and cointegration analysis amongst other techniques. The t's and f's statistics obtained would be used to draw inference on the relationships among the variables of interest.

**3.2.1 Unit Root**

The Unit Root Test is used to examine whether a time series is stationary and has a unit root. The null hypothesis ( $H_0$ ) assumes the presence of a unit root while the alternative hypothesis ( $H_1$ ) assumes no unit root or stationary. A variable can be stationary at level or first difference with or without intercepts and trends. When a series is not stationary, its long-run path is said to be explosive. In general, the approach to unit root testing implicitly assumes that the time series to be tested. This tries to capture the relationship between the value of a time series at a particular time and the value it takes in the past. Given a random-walk process,  $Y_t = eY_{t-1} + U_t$  if the value of  $P$  is 1 the time series has a unit root. If the value of the time series has a unit root. If the value of  $P$  is greater than one, the series is said to be explosive and non-stationary (has unit root). This test will be used to discover the presence of unit root in our quarterly time series 1995-2020.

**3.2.1 Ordinary Least Square Regression**

The Ordinary Least square method is a statistical method used to estimate the

relationship that exists between two or more variables. The method estimates the relationship by minimizing the sum of the squares of residuals (i.e., in the difference between the observed and predicted values of the dependent variable). There are various assumptions underlying the OLS. First is the linearity of the regression model in its coefficients and the error term. Second, the error term has a population mean of zero and a constant variance (no heteroscedasticity). Thirdly, the independent variables are uncorrelated with the error term and the error term are uncorrelated with each other. There is no relationship between the explanatory and independent variables and the error term is normally distributed. This study hopes to derive best linear unbiased estimators (BLUE) such that these various assumptions estimates obtained would converge with the actual population parameters. A major disadvantage of the OLS technique however is that a large data set is necessary in order to obtain reliable results and the regression results and interpretation are sensitive to functional form of the regression equation, which could lead to varying conclusions. This test will be used to find out if there is a relationship between the regressors and the response variable.

### 3.2.2 Granger Causality Test

The identification of casual relationships is an important part of scientific research and it is essential for understanding the consequences when moving from empirical findings to actions. The Granger causality test portends that if variable X (Granger) causes variable Y, then changes in X should precede changes in Y. Therefore, if we include past values of X in a regression of Y on other variables and it significantly improves the prediction of Y, then we can say that X (Granger) causes Y. A similar case can be applied if Y(Granger) causes X. It is a statistical hypothesis for determining whether one time series is important for determining another. A time series X is said to Granger-cause Y if it can be shown, usually through a series of t-tests and f-tests on lagged values of X (and with lagged values of Y also included), that those X values provide statistically significant information about future values of Y. According to Granger, the causality relationship is based on two principles:

- a.) The cause happens prior to its effect.
- b.) The cause has unique information about the future values of its effect.

This test will be very relevant to this study in that it will help understand the cause-effect relationship of the predictor variables (interest rate, exchange rate, employment rate, inflation rate and GDP) on the outcome variable (manufacturing credit and manufacturing output). Given that correlation does not infer causation, causality cannot be inferred from the regression output. This test will be used to find out if there is a causality relationship between the regressors and the response variable.

## 4. ESTIMATION OF RESULTS AND DESCRIPTION

### 4.1 Unit Root Tests

To avoid a spurious regression resulting from the non-stationarity of the variables, all the time series used in this study were tested against the null hypothesis of no unit root. The unit root test for stationary is applied using Augmented Dickey – Fuller (ADF) test and the Phillips-Perron (PP) test.

**Table 2: Augmented Dickey-Fuller (ADF)**

|                       | At Level            |          |          |          |       |        |         |        |       |
|-----------------------|---------------------|----------|----------|----------|-------|--------|---------|--------|-------|
|                       |                     | lnEXC    | lnCRT    | lnGDP    | MO    | INT    | UNEM    | INF    | FD    |
| With Constant         | t-Statistic         | 0.00     | -1.40    | -1.36    | -3.30 | -1.65  | -1.09   | -5.64  | 2.46  |
|                       | Prob.               | 0.96     | 0.58     | 0.60     | 0.02  | 0.45   | 0.72    | 0.00   | 1.00  |
|                       |                     | n0       | n0       | n0       | **    | n0     | n0      | ***    | n0    |
| With Constant & Trend | t-Statistic         | -1.87    | -2.98    | -1.00    | -3.13 | -1.95  | -1.90   | -5.61  | 0.19  |
|                       | Prob.               | 0.66     | 0.14     | 0.94     | 0.11  | 0.62   | 0.65    | 0.00   | 1.00  |
|                       |                     | n0       | n0       | n0       | n0    | n0     | n0      | ***    | n0    |
| None                  | t-Statistic         | 1.94     | 4.71     | 1.60     | -2.47 | 0.28   | 0.59    | -1.23  | 3.67  |
|                       | Prob.               | 0.99     | 1.00     | 0.97     | 0.01  | 0.76   | 0.84    | 0.20   | 1.00  |
|                       |                     | n0       | n0       | n0       | **    | n0     | n0      | n0     | no    |
| With Constant         | At First Difference |          |          |          |       |        |         |        |       |
|                       |                     | d(lnEXC) | d(lnCRT) | d(lnGDP) | d(MO) | d(INT) | d(UNEM) | d(INF) | d(FD) |
| With Constant         | t-Statistic         | -7.14    | -13.67   | -2.33    | 10.94 | -7.20  | -10.94  | -7.40  | -9.46 |
|                       | Prob.               | 0.00     | 0.00     | 0.17     | 0.00  | 0.00   | 0.00    | 0.00   | 0.00  |
|                       |                     | ***      | ***      | n0       | ***   | ***    | ***     | ***    | ***   |
| With Constant & Trend | t-Statistic         | -7.18    | -13.72   | -2.56    | 11.05 | -7.16  | -10.90  | -7.43  | 10.26 |
|                       | Prob.               | 0.00     | 0.00     | 0.30     | 0.00  | 0.00   | 0.00    | 0.00   | 0.00  |
|                       |                     | ***      | ***      | n0       | ***   | ***    | ***     | ***    | ***   |
| None                  | t-Statistic         | -6.78    | -5.48    | -1.63    | 10.98 | -7.20  | -10.81  | -7.44  | -8.71 |
|                       | Prob.               | 0.00     | 0.00     | 0.10     | 0.00  | 0.00   | 0.00    | 0.00   | 0.00  |
|                       |                     | ***      | ***      | *        | ***   | ***    | ***     | ***    | ***   |

Notes: (\*)Significant at the 10%; (\*\*)Significant at the 5%; (\*\*\*) Significant at the 1%. and (no) Not Significant

The ADF test suggested that all the variables were stationary at first difference, except lnMO and INF which indicated stationary at levels. Therefore, based on the ADF test lnMO, INF are stationary at levels while lnEXC, EMP, INT, lnGDP and FD and lnCRT are stationary at first difference.

### 4.2 Ordinary Least Square Results (1995Q1-2020Q4)

#### 4.2.1 Manufacturing Sector

The results of the OLS estimation on the determinants of the manufacturing sector

output are presented in Table 4.2. The results show that all the explanatory variables are correctly signed according to the a priori expectation. Maximum lending rate, exchange rate and inflation are negatively signed, as expected, although insignificant. This implies that a reduction in the interest rate will lead to an increase in investment in the manufacturing sector, which will in turn improve manufacturing sector performance. Thus, a 1 per cent increase in the MLR will lead to 0.40 per cent decrease in the manufacturing sector performance. Similarly, a 1 per cent depreciation of the naira exchange rate will reduce manufacturing output by 3.02 per cent, as an increase in the naira exchange rate (depreciation) will make inputs of the manufacturing sector more expensive. This will negatively affect manufacturing output. In relation to unemployment, a higher unemployment implies under-utilization of capacity, which also negatively impacts on manufacturing significantly. Excessively high increase in prices also acts as a disincentive to manufacturers, as it increases input prices and affects their future production plans. Consequently, a unit increase in unemployment and inflation will lead to 0.48 per cent and 0.06 per cent decline in manufacturing output, respectively.

Government deficit financing has a negative and significant relationship with the manufacturing sector output. A 1 per cent increase in government deficit financing, reduces manufacturing output significantly as seen in Table 4.2. The policy implication is that government's fiscal operations tends to raise overall deficits, usually sourced through the CBN. For instance, the CBN is required by law to underwrite un-subscribed debts issues and provide direct credit to government in the form of Ways and Mean Advances (Ojo, 2001). This mode of deficit financing tends to crowd-out private investment which negatively affects manufacturing sector output.

On the other hand, real GDP, bank credit and lagged manufacturing output had a positive relationship with manufacturing sector performance, as expected, although insignificant. A 1 unit increase in GDP and bank credit, would lead to 2.32 per cent and 2.35 per cent increase in the output of the manufacturing sector. The findings of this study are similar to Akpan, Yilkudi and Opiah (2016), John and Terhemba (2019) and Ifenowo (2020). The insignificance of the results, as seen in Imoughele, Ehikioya, Ismaila and Mohammed (2013) and Ifenowo (2020), could be attributed to other variables that drive manufacturing sector performance such as infrastructure and insecurity that are not captured in the model due to data unavailability.

Table 3: Determinants of Manufacturing Sector Performance Using OLS (1995Q1-2020Q4)

| Dependent Variable | Explanatory Variable | Coefficient | Std. Error | t-Statistic | Probability |
|--------------------|----------------------|-------------|------------|-------------|-------------|
| MO                 | C                    | 2.04        | 1.95       | 1.05        | 0.30        |
|                    | MLR                  | -0.40       | 0.53       | -0.76       | 0.45        |
|                    | BDC(-2)              | -3.02       | 7.45       | -0.40       | 0.69        |
|                    | UNEM                 | -0.48       | 0.23       | -2.05       | 0.04        |
|                    | INF                  | -0.06       | 0.13       | -0.47       | 0.64        |
|                    | GDP                  | 2.32        | 6.64       | 0.35        | 0.73        |
|                    | CREDIT               | 2.35        | 4.23       | 0.55        | 0.58        |
|                    | FD                   | 0.00        | 0.00       | -2.34       | 0.02        |
|                    | MO(-1)               |             | 0.08       |             |             |
|                    |                      | 0.81        |            | 10.73       | 0.00        |

R<sup>2</sup> = 0.74, Adj. R<sup>2</sup> = 0.71, DW = 1.85, F-statistic = 23.42, Prof (F-statistics) = 0.00

#### 4.2.2 Banking Sector Credit

In relation to the determinants of banking sector credit, most of the results presented in Table 4.3 are correctly signed and conform to a priori expectation. The results establish a negative relationship between maximum lending rate and bank credit, implying that a decline in lending rate will lead to an increase in bank credit, as economic agents take advantage of the lower cost of funds. Specifically, a 1 per cent increase in the maximum lending rate will decrease bank credit by 0.01 per cent. The result also reveals negative relationships between bank credit and unemployment rate and inflation rate. This implies that an increase in unemployment rate will reduce bank credit as a higher proportion of the labour force will be unable to obtain or service loans. As regards the inflation rate, a higher rate of inflation is a disincentive to borrowers, as cost of borrowing will increase, which will reduce their real income and makes it difficult to service loans. Therefore, a 1 per cent increase in unemployment rate and inflation rate would reduce bank credit by 0.001 per cent and 0.001 per cent, respectively.

Table 4: Determinants of Bank Credit Using OLS (1995Q1-2020Q4)

| Dependent Variable | Explanatory Variable | Coefficient | Std. Error | t-Statistic | Probability |
|--------------------|----------------------|-------------|------------|-------------|-------------|
| CREDIT             | C                    | -3.05       | 1.36       | -2.23       | 0.03        |
|                    | MLR                  | -0.01       | 0.01       | -0.52       | 0.61        |
|                    | BDC(-2)              | 0.13        | 0.18       | 0.73        | 0.47        |
|                    | UNEM                 | -0.001      | 0.01       | -0.14       | 0.89        |
|                    | INF                  | -0.001      | 0.00       | -0.40       | 0.69        |
|                    | GDP                  | 0.29        | 0.12       | 2.37        | 0.02        |
|                    | MO                   | 0.001       | 0.00       | 0.55        | 0.58        |
|                    | CREDIT(-1)           | 0.88        | 0.05       | 19.22       | 0.00        |

R<sup>2</sup> = 0.99, Adj. R<sup>2</sup> = 0.99, DW = 2.49, F-statistic = 1608.68, Prof (F-statistics) = 0.00



The growth in manufacturing sector output and real GDP had a positive relationship with bank credit, as increases in output would improve deposit mobilization by banks, which would in turn increase funds available to banks to lend. Increase in output is also an incentive to businesses to increase production plans through credit sourced from banks. Consequently, a 1 per cent increase in real GDP growth and manufacturing output will increase bank credit by 0.29 per cent and 0.001 per cent, respectively. Lagged bank credit was also found to have a positive relationship with bank credit. Most of the results were not significant, except for real GDP and lagged bank credit. Exchange rate exhibited a positive relationship bank credit, which could be attributed to the increasing demand for credit to meet up with higher prices of imports of capital goods for firms when the exchange rate depreciates. The findings of this study were similar to Akpasiong and Babalola (2011). The insignificance of some of the results could be as a result of other drivers of bank credit, such as savings rate, total deposits and financial inclusion that are not included in the model.

#### 4.3 Johansen Cointegration Results

To determine whether the variables in the equations exhibited long run relationships, the Johansen cointegration tests were conducted and the following results were obtained.

##### 4.3.1 Manufacturing Output Cointegration Test

The Johansen cointegration tests on the determinants of the growth of the manufacturing sector indicate the existence of one cointegrating equation. The results suggest that for both the trace and maximum eigenvalue tests, the null hypothesis of no cointegration between manufacturing sector output and the set of regressors was rejected at the 5 per cent level of significance. This implies that there is an existence of a unique and stable long-run relationship between growth of the manufacturing sector and interest rate, exchange rate, unemployment, inflation, real GDP and credit to the private sector.

Table 5: Johansen Maximum Likelihood Cointegration Test Results

| Hypothesized<br>No. of CE(s) | Eigenvalue | Max-eigenvalue |                                |         | Trace     |                                |         |
|------------------------------|------------|----------------|--------------------------------|---------|-----------|--------------------------------|---------|
|                              |            | Statistic      | 5 Percent<br>Critical<br>Value | Prob.** | Statistic | 5 Percent<br>Critical<br>Value | Prob.** |
| None *                       | 0.49       | 65.33          | 46.23                          | 0.00    | 150.51    | 125.62                         | 0.00    |
| At most 1                    | 0.28       | 32.79          | 40.07                          | 0.26    | 85.18     | 95.75                          | 0.21    |
| At most 2                    | 0.25       | 27.91          | 33.88                          | 0.22    | 52.38     | 69.82                          | 0.53    |
| At most 3                    | 0.10       | 10.21          | 27.58                          | 0.98    | 24.47     | 47.86                          | 0.93    |
| At most 4                    | 0.07       | 7.15           | 21.13                          | 0.95    | 14.26     | 29.80                          | 0.83    |
| At most 5                    | 0.06       | 6.37           | 14.26                          | 0.57    | 7.10      | 15.49                          | 0.57    |
| At most 6                    | 0.07       | 0.73           | 3.84                           | 0.39    | 0.73      | 3.84                           | 0.39    |

Max-eigenvalue and Trace tests indicate 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

#### 4.3.2 Bank Credit Cointegration Test

In relation to the determinants of bank credit, the Johansen cointegration test found the existence of one cointegrating equation at the 5 per cent level of significance. The results established a long-run relationship between bank credit and manufacturing sector performance, interest rate, exchange rate, unemployment rate, inflation rate and real gross domestic product.

Dependent variable: LNCRECREDIT

| Excluded | Chi-sq   | Df | Prob.  |
|----------|----------|----|--------|
| MOGROWTH | 0.058186 | 1  | 0.8094 |
| MLR      | 0.049281 | 1  | 0.8243 |
| LNBDG    | 0.643381 | 1  | 0.4225 |
| UNEM     | 0.586276 | 1  | 0.4439 |
| INF      | 0.392829 | 1  | 0.5308 |
| LNGDP    | 4.516730 | 1  | 0.0336 |
| All      | 5.696600 | 6  | 0.4580 |

#### 4.5 Policy Implications

The findings of this study have implications that are important for policy makers, investors and researchers on how to improve the performance of the manufacturing sector. The negative relationship established between interest rates and manufacturing sector, reveals that higher rates are inimical to the growth of the manufacturing sector. Consequently, the monetary authorities should reduce interest rates in order to spur the growth of the manufacturing sector. In relation to the exchange rate, further depreciation of the exchange rate would hamper manufacturing GDP growth, therefore, the monetary authorities should stabilize the foreign exchange market and prevent the exchange rate from increasing significantly. The monetary authorities should also increase their efforts to rein in inflation since higher inflation hurts the growth of the sector. As regards the fiscal authorities, programs and efforts should be put in place to increase the employment rate since the reduction in the unemployment rate was found to improve the performance of the manufacturing sector.

In order to increase the total bank credit, the monetary authorities should reduce the interest rates because higher interest rates were found to be a disincentive to borrowers. The lower cost of repayment would encourage economic agents to demand for more bank credit. The fiscal authorities should create employment programmes and make efforts to improve the ease of doing business in Nigeria to reduce the unemployment rate, due to its inimical effect on bank credit. The increase in

employment would lead to further mobilization of savings, which banks can lend to borrowers.

Further studies should also be conducted on the impact of savings rate, deposit rates and financial inclusion on the volume of bank credit.

## 5. Conclusion and Policy Recommendations

Based on the analysis above, findings of the OLS estimation on the determinants of the manufacturing sector output are presented in Table 4.2. The results show that all the explanatory variables are correctly signed according to the a priori expectation. Maximum lending rate, exchange rate and inflation are negatively signed, as expected, although insignificant. This implies that a reduction in the interest rate will lead to an increase in investment in the manufacturing sector, which will in turn improve manufacturing sector performance. In relation to the determinants of banking sector credit, most of the results presented in Table 4.3 are correctly signed and conform to a priori expectation. The results establish a negative relationship between maximum lending rate and bank credit, implying that a decline in lending rate will lead to an increase in bank credit, as economic agents take advantage of the lower cost of funds.

The results suggest that for both the trace and maximum eigenvalue tests, the null hypothesis of no cointegration between manufacturing sector output and the set of regressors was rejected at the 5 per cent level of significance. This implies that there is an existence of a unique and stable long-run relationship between growth of the manufacturing sector and interest rate, exchange rate, unemployment, inflation, real GDP and credit to the private sector. In relation to the determinants of bank credit, the Johansen cointegration test found the existence of one cointegrating equation at the 5 per cent level of significance. The results established a long-run relationship between bank credit and manufacturing sector performance, interest rate, exchange rate, unemployment rate, inflation rate and real gross domestic product.

The Granger causality test in Table 4.6 reveals that only unemployment Granger-causes manufacturing sector performance at the 5 per cent level of significance. Inflation was also found to Granger-cause output of the manufacturing sector at the 10 per cent level. It implies unidirectional causality from unemployment and inflation to the manufacturing sector. These findings suggest that the sub optimal performance of the manufacturing sector may be linked to the high level of unemployment and the inflation rate. However, the null hypothesis of no Granger causality was accepted for MLR, LNBDC, LNGDP and LNCREDIT. Collectively, the combination of all the variables were found to Granger-cause manufacturing sector growth at the 10 per cent level of significance. The Granger causality test on the determinants of bank credit in Table

4.7 revealed bidirectional causality between real GDP and bank credit (See the Appendix XX). This implies that the level of domestic output in Nigeria determines the level of bank credit and vice versa. The null hypothesis of no causality was accepted for MO, MLR, LNBDC, UNEM and INF as they collectively did not Granger-cause bank credit.

### **Conclusion**

Bank credit is widely considered as the bloodstream of any economy especially in developing countries such as Nigeria (Tawose,2012). Given the abundant labor force and the agrarian nature of the Nigerian economy, the manufacturing sector has enormous potential in propelling the nation's economic development (Adebiyi, 2011). However, this has been futile considering the crawling rate of growth over the years, despite country's rich human and natural resources. Consequently, in view of the above and the growing concerns over the decline in industrial sector performance and output in general, this study attempts to provide an empirical evidence by assessing the effect of credit to the manufacturing sector and its impact on output growth in Nigeria from 1995-2020.

### **Recommendations**

Based on the findings from the study and policy implications, the following recommendations are proffered. The monetary authorities should formulate policies that stimulate growth in credit to the manufacturing sector and increase the volume of disbursements in existing interventions. More intervention funds should be allocated by the fiscal and monetary authorities to the manufacturing sector in order to boost its contribution to GDP and to reduce the rate of unemployment in Nigeria. Efforts should also be made to stabilize the foreign exchange market and reduce foreign exchange volatility. Recent policies and efforts to engender stability of the forex market and narrow the premium between rates, such as the restriction of forex supply to 41 items, development of the Investors and Exporters (I&E) window and stoppage of forex sale to BDCs are steps in the right direction. The CBN should also formulate policies that lower interest rate which will enable manufacturers to obtain credit at a reduced cost. Furthermore, the government should also minimize deficit financing as much as possible. In case it becomes necessary to budget for deficit, it should not be financed through the Ways and Means of Central Banks to avoid inflation. In addition, since high interest rate in Nigerian reflects the prevalence of structural factor, infrastructural deficit and weak institutions, the government should provide infrastructures such as power, good road network, rails, among others. The government should also focus on improving the efficiency of existing policy instruments and developing new policy measures that take into account entrepreneurship and the

level of financial inclusion in the economy. Lastly, the monetary authorities should ensure adequate monitoring of funds disbursed to the manufacturing sector to ensure that they are not misappropriated.

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