BANK CREDITS AND THE PERFORMANCE OF NIGERIA'S MANUFACTURING SUB-SECTOR

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Abstract
This study examined bank credit and Nigeria manufacturing subsector performance nexus using secondary data obtained from the Statistical Bulletin of Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) annual reports and publications. The objectives of the paper are to: determine the effect of bank demand deposit on manufacturing subsectors; ascertain the effect of bank lending rate to mass on manufacturing subsectors; evaluate the effect of interest rate on manufacturing subsectors; examine the effect of exchange rate on manufacturing subsectors; determine the effect of workers incentives on manufacturing subsectors and ascertain the effect of employment generation on manufacturing subsectors.

Ordinary Least Square techniques were applied after determining stationarity of the variables using the ADF Statistic, as well as the cointegration of variables using the Johansen approach. The study discovered that the variables are stationary and have a long term relationship among the variables in the model. Bank demand deposit, bank lending rate, bank interest rate, exchange rate, workers incentives and employment generation are major determinants of manufacturing subsectors in Nigeria. The study recommends that: cheap credit should be made available for manufacturing sector investment in Nigeria; this will encourage more investors in the manufacturing sector to access adequate loan facilities to enhance manufacturing sector output in the long run. The apex bank of Nigeria should reduce bank. This important because it will make the loans less expensive for the commercial banks, thus encouraging the public capacity to take credit and will gradually increased the volume of credit demanded for investment in the manufacturing sector. The government should engender a market force induced interest rate. This will enhance more investment by channeling saving to productive investment and stimulate real output. The need to stabilize the exchange rate is imperative because one unit increase in exchange rate volatility leads to decline in manufacturing output growth.
Keywords: *Bank credit, manufacturing subsector, performance, Nigeria.*

Introduction

The rapid socio-economic development of the advanced nations of the world has been largely attributed to the acquisition of industrial capacities which has led to the massive development of the manufacturing subsectors in those climes (Sokunle & Harper, 2018). The manufacturing sector has opened up various sectors of the economies of these nations and has led to export expansion and less dependent on imported products, creation of massive employment to fill up vacancies in these

industries, strong currency and a pool of foreign exchange earnings, high standard of living, increased investment capital and a strong per capita income. It is therefore projected that for any meaningful development to take place in the underdeveloped nations of the world, they need to embrace industrialization of which manufacturing is a subsector. Thus, it is expected that manufacturing will play a major role in rejigging these economies back on the path of growth and development. It is further expected that manufacturing will deepen industrialization that will bring about structural transformation and technological advancement (Sokunle & Harper, 2018; Amaefule, Okuneye & Ogunmuyiwa, 2017).

Nigeria's economy before the discovery of oil in commercial quantity at Oloibiri in present day Bayelsa State was based on exports from agricultural proceeds through which she earned some foreign exchange and undertook developmental processes at her early growth stage after independence (Elwerfelli & Benhin, 2018). Manufacturing at this stage was less capital intensive with light industries which were mainly agro based scattered across the major regions of the country. Such light industries as food processing, consumer goods and textile industries contributed to the Gross Domestic Product (GDP). These low capital ventures were undertaken mainly by private individuals up until mid-70s to early 80s when government set up large factories to accommodate activities of the then thriving downstream oil sector. This thus signified the commencement of core manufacturing activities in Nigeria.

The manufacturing sector is seen as critical to economic growth and sustainable development and a panacea for the mass unemployment currently faced by the Nigerian nation. It is a wealth creator and a sure path to becoming an industrialized nation. In the literature, it has been noted that Nigeria's quest for industrialization has been hampered by low level of investment in the manufacturing sector. This has been attributed to the reluctance by money deposit banks to extend credit facilities to the manufacturing subsector. High interest rates and other stringent loan acquisition conditions have made it difficult for manufacturers to access bank credit (Sokunle & Harper, 2018; Ebi & Nathan, 2014).

Bank credit relates to the amount of loan facility extended to a borrower by a commercial bank (CBN, 2012), and it usually involves making available collateral to guide against default. The ability of the manufacturing sector to fully meet its economic potentials is tied to the availability of bank credit (Adegbaju and Olokoyo, 2008; Sokunle & Harper, 2018). This in effect means that the banking subsector is relevant in bringing about economic growth by efficiently performing its roles among which is the provision of credit to the real sector of the economy. The extent to which bank credits propel the activities in the manufacturing sector cannot be overemphasized. Bank credits help to make up for the short falls in liquidity by manufacturers for business expansions and operational purposes (Yakubu & Affoi,

2014). Available evidence from the Central Bank of Nigeria revealed a continuous rise in the volume of bank credits from financial institutions to the real sector of the economy from about 15 billion in the mid-80s to over 21trillion in 2016 (CBN, 2017). The government through the central bank of Nigeria has equally intervened in the manufacturing sector with over 200 Billion Refinancing/Restructuring of SME/Manufacturing Fund made available as part of key interventions in the real sector (CBN, 2012). Despite all these, the manufacturing sector in Nigeria has not performed impressively suggesting the need to critically understudy the impact of bank credit on this sector (Galor, 2009, Omolara & John, 2016)

The role of the manufacturing sector in the economic transformation of nations is no longer in doubt. Many studies have also pointed out the significant intermediating roles played by financial institutions in extending credit facilities to booster activities in the manufacturing sector especially in Nigeria. In spite of these facts, the Nigerian manufacturing sector is yet to assert itself as a veritable vehicle for rapid industrialization of the country and a catalyst for socio-economic development. Its contributions to the Gross Domestic Product (GDP) is reportedly low and it has been unable to absorb a substantial number of the nation's jobless youths, neither has it helped in alleviating poverty (Adenekan, 2010). Successive government's interventions at revamping the sector through monetary interventions of the Central Bank of Nigeria (CBN) and credit facilities from financial institutions especially the commercial banks are yet to yield positive results as most manufacturing firms complain of paucity of funds for operational activities. Constraints facing the sector as reported in the literature include high interest and exchange rates, stringent lending conditions, lack of foreign exchange for imports and inability to quickly access funds where available (Tomola, Adebisi & Olawale, 2012). Others include poor nature of the country's infrastructural facilities, inability to access new technology and unfriendly business environment. The subsector also suffers from apathy by most money deposit banks which prefer to extend credits to players in the downstream sector seen as cash cow of the nation. This has created a huge challenge for the sector which is faced with the paucity of funds as expansion drive of most manufacturing firms have been slowed down or halted completely. Studies on impact of bank credit on the manufacturing subsector in Nigeria are rather scanty with major focus on the agro and allied industries, while the few that dwelt on the manufacturing sector did not incorporate bank demand deposit, bank lending rate, exchange rate, workers incentives and employment generation as variables to be investigated and so a gap exist which this study fills. The objectives of the paper are to: determine the effect of bank demand deposit on manufacturing subsectors; ascertain the effect of bank lending rate to mass on manufacturing subsectors; evaluate the effect of interest rate on manufacturing subsectors; examine the effect of exchange rate on manufacturing subsectors; determine the effect of workers

incentives on manufacturing subsectors and ascertain the effect of employment generation on manufacturing subsectors.

Hypotheses

Ho_1: Bank credit has no significant effect on manufacturing subsectors.
Ho_2: Bank demand deposit has no significant effect on manufacturing subsectors.
Ho_3: Bank lending rate has no significant effect on manufacturing subsectors.
Ho_4: Interest rate has no significant effect on manufacturing subsectors.
Ho_5: Exchange rate has no significant effect on manufacturing subsectors.
Ho_6: Workers incentives have no significant effect on manufacturing subsectors.
Ho_7: Employment generation has no significant effect on manufacturing subsectors.

Methodology

Model Specification

Bank credits to manufacturing subsectors, Bank demand deposit, bank lending rate, bank interest rate, exchange rate, workers incentives and employment generation are the explanatory variables, while manufacturing subsector is used as the dependent variable. Thus, the model for the study is specified as:

The functional form of the model is:

MASS = (BNC, BD3, BLR, INT, EXR, WIN, EMG) . . . (1)

The mathematical form of the model is:

$$MASS = \beta_0+\beta_1BNC+\beta_2BD3+\beta_3BLR+\beta_4INT+\beta_5EXR+\beta_6WIN+\beta_7EMG \quad (2)$$

The econometric form of the model is:

$$MASS = \beta_0+\beta_1BNC+\beta_2BD3+\beta_3BLR+\beta_4INT+\beta_5EXR+\beta_6WIN+\beta_7EMG+\mu_i \quad (3)$$

Where MASS = Manufacturing subsectors proxied by MASS output (aggregate)
BNC = Bank credits to Manufacturing subsectors (aggregate)
BD3 = Bank demand deposit
BLR = Bank lending rate to MASS (aggregate)
INT = Interest rate
E
X+R = Exchange rate
WIN = Workers incentives proxied by government expenditure on motivating MASS workers (aggregate)
EMG = Employment generation proxied by employment growth rate
β_o = Constant term
$\beta_1 – \beta_7$ = Coefficient of parameters
μ_i = Stochastic error term

Description of variables

Manufacturing subsectors (MASS): The manufacturing sector is part of the goods-producing industries super sector group. The Manufacturing subsector comprises

establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. Establishments in the Manufacturing sector are often described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. However, establishments that transform materials or substances into new products by hand or in the worker's home and those engaged in selling to the general public products made on the same premises from which they are sold, such as bakeries, candy stores, and custom tailors, may also be included in this sector.

Bank credits to Manufacturing subsectors (BNC)*:* The amount of credit available to a company or individual from the banking system. It is the aggregate of the amount of funds financial institutions are willing to provide to an individual or organization. In this study, bank credit to MASS will be determined to know whether it aids in generating self-employment, maintaining the sector to take advantage of economies of scale and help prevent an economic activity from total collapse in the event of a natural disaster as a result of enough funds in the sector.

Bank demand deposit (BDD): The sum of money that is given to a bank but can be withdrawn as per the requirement of the depositor. Amounts that are lying in the savings and current accounts are known as demand deposits because they can be used at any point of time. Funds held in an account from which deposited funds can be withdrawn at any time without any advance notice to the depository institution. BDD is used in this study to determine the power of the bank to give out credit to MASS for maximum productivity. When banks have high demand deposits, it means that they can give credit at will but reverse is the case when demand deposit is low. Hence, the study adopts the demand deposit in order to examine it impact on MASS performance.

Bank lending rate to MASS (BLR): The bank lending rate is the rate at which banks lends or borrow money to their most creditworthy customers, which are usually corporations. Bank lending rate to MASS is employed in this research to examine the rate at which the banks lend money or credit to MASS in Nigeria.

Interest rate (INT)*:* Interest rate is the rate which is charged or paid for the use of money. It is also the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets. Specifically, the interest rate is a percentage of principal paid a certain number of times per period for all periods during the total term of the loan or credit. The study adopts INT to ascertain the effects of interest rates on MASS performance.

Exchange rate (EXR): Exchange rate is the rate at which one currency may be converted into another. The exchange rate is used when simply converting one currency to another (such as for the purposes of travel to another country), or for engaging in speculation or trading in the foreign exchange market. An exchange rate

between two currencies is the rate at which one currency will be exchanged for another. It is used in the study to determine how the MASS produce will be affected in the foreign exchange market (internally and externally).

Workers incentives (WIN): An incentive is something that motivates an individual to perform an action. The study of incentive structures is central to the study of all economic activities (both in terms of individual decision-making and in terms of co-operation and competition within a larger institutional structure). The workers' incentives which this study has adopted as one of the variables in explaining the variations in the manufacturing subsector in Nigeria, does it lead to high productivity of the workers? Do workers' incentives help to facility and improve manufacturing subsector output in Nigeria? Thus, the study also seek to know whether credits to MASS have helped in given or providing incentives to workers in MASS in Nigeria.

Employment generation (EMG): Employment generation is a means of reducing unemployment and improving the standard of living of the citizens. It is therefore the target of every government to reduce the high rate of unemployment. Thus, employment generation is used as an explanatory variable in this study because the study wants to know whether supply of credits to manufacturing subsectors which probably results to its growth and development of MASS will create or generate employment opportunities and reduces the lengthy periods of unemployment in Nigeria.

Method of Data Analysis

The economic technique employed in the study is the ordinary least square (OLS). This is because the OLS computational procedure is fairly simple a best linear estimator among all unbiased estimation, efficient and shown to have the smallest (minimum variance) thus, it become the best linear unbiased estimator (BLUE) in the classical linear regression (CLR) model. Basic assumptions of the OLS are related to the forms of the relationship among the distribution of the random variance (μ_i).

OLS is a very popular method and in fact, one of the most powerful methods of regression analysis. It is used exclusively to estimate the unknown parameters of a linear regression model. The Economic views (E-views) software will be adopted for regression analysis.

Stationarity (unit root) test

The importance of this test cannot be overemphasized since the data to be used in the estimation are time-series data. In order not to run a spurious regression, it is worthwhile to carry out a stationary test to make sure that all the variables are mean reverting that is, they have constant mean, constant variance and constant covariance. In other words, that they are stationary. The Augmented Dickey-Fuller (ADF) test would be used for this analysis since it adjusts for serial correlation.

Decision rule: If the ADF test statistic is greater than the MacKinnon critical value at 5% (all in absolute term), the variable is said to be stationary. Otherwise it is non stationary.

Cointegration test

Econometrically speaking, two variables will be cointegrated if they have a long-term, or equilibrium relationship between them. Cointegration can be thought of as a pre-test to avoid spurious regressions situations (Granger, 1986). As recommended by Gujarati (2004), the ADF test statistic will be employed on the residual.

Decision Rule: if the ADF test statistic is greater than the critical value at 5%, then the variables are cointegrated (values are checked in absolute term)

Evaluation of Parameter Estimates

The estimates obtained from the model shall be evaluated using three (3) criteria. The three (3) criteria include:

1. The economic a priori criteria.
2. The statistical criteria: First Order Test
3. The econometric criteria: Second Order Test

Evaluation based on economic a priori criteria

This could be carried out to show whether each regressor in the model is comparable with the postulations of economic theory; i.e., if the sign and size of the parameters of the economic relationships follow with the expectation of the economic theory. The a priori expectations, in tandem with the manufacturing sector growth and its determinants are presented in Table 1 below, thus:

Table 1: Economic a priori expectations for the model

Parameters	Variables		Expected Relationships	Expected Coefficients
	Regressand	Regressor		
β_0	MASS	Intercept	+/-	$0< \beta_0 >0$
β_1	MASS	BNC	+	$\beta_1 > 0$
β_2	MASS	BD3	+	$\beta_2 > 0$
β_3	MASS	BLR	+	$\beta_3 > 0$
β_4	MASS	INT	-	$\beta_4 < 0$
β_5	MASS	EXR	+/-	$0< \beta_5 > 0$
β_6	MASS	WIN	+	$\beta_6 > 0$
β_7	MASS	EMG	+	$\beta_7 > 0$

Source: Researchers compilation

A positive '+' sign indicate that the relationship between the regressor and regressand is direct and move in the same direction i.e. increase or decrease together. On the

other hand, a '-' shows that there is an indirect (inverse) relationship between the regressor and regressand i.e. they move in opposite or different direction.

Evaluation based on statistical criteria: First Order Test

This aims at the evaluation of the statistical reliability of the estimated parameters of the model. In this case, the F-statistic, standard error, t-statistic, Co-efficient of determination (R^2) and the Adjusted R^2 are used.

The Coefficient of Determination (R^2)/Adjusted R^2

The square of the coefficient of determination R^2 or the measure of goodness of fit is used to judge the explanatory power of the explanatory variables on the dependent variables. The R^2 denotes the percentage of variations in the dependent variable accounted for by the variations in the independent variables. Thus, the higher the R^2, the more the model is able to explain the changes in the dependent variable. Hence, the better the regression based on OLS technique, and this is why the R^2 is called the co-efficient of determination as it shows the amount of variation in the dependent variable explained by explanatory variables.

However, if R^2 equals one, it implies that there is 100% explanation of the variation in the dependent variable by the independent variable and this indicates a perfect fit of regression line. While where R^2 equals zero. It indicates that the explanatory variables could not explain any of the changes in the dependent variable. Therefore, the higher and closer the R^2 is to 1, the better the model fits the data. Note that the above explanation goes for the adjusted R^2.

The F-test: The F-statistics is used to test whether or not, there is a significant impact between the dependent and the independent variables. In the regression equation, if calculated F is greater than the F table value, then there is a significant impact between the dependent and the independent variables in the regression equation. While if the calculated F is smaller or less than the table F, there is no significant impact between the dependent and the independent variable.

Evaluation based on econometric criteria: Second Order Test

This aims at investigating whether the assumption of the econometric method employed are satisfied or not. It determines the reliability of the statistical criteria and establishes whether the estimates have the desirable properties of unbiasedness and consistency. It also tests the validity of non-autocorrelation disturbances. In the model, Durbin-Watson (DW), unit root test, co-integration test are used to test for: autocorrelation, multicolinearity and heteroskedasticity.

Test for Autocorrelation

This test is carried out to see if the error or disturbance term (μ_t) is temporarily independent. That is, the values of μ_t at every different period are not the same. It tests the validity of non autocorrelation disturbance. The Durbin-Watson (DW) test

is appropriate for the test of First-order autocorrelation and it has the following criteria.

1. If d* is approximately equal to 2 (d* =2), we accept that there is no autocorrelation in the function.
2. If d*= 0, there exist perfect positive auto-correlation. In this case, if 0<d*< 2, that is, if d* is less than two but greater than zero, it denotes that there is some degree of positive autocorrelation, which is stronger the closer d* is to zero.
3. If d* is equal to 4 (d*=4), there exist a perfect negative autocorrelation, while if d* is less than four but greater than two (2<d*< 4), it means that there exist some degree of negative autocorrelation, which is stronger the higher the value of d*.

Test for Multicolinearity

This means the existence of an exact linear relationship among the explanatory variable of a regression model. It is use to determine whether there is a correlation among variables.

***Decision Rule*:** From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity. Also, reject the null hypothesis (H_0), if any two variables in the model are in excess of 0.8 or even up to 0.8. Otherwise we reject.

Test for Heteroscedasticity

The essence of this test is to see whether the error variance of each observation is constant or not. Non-constant variance can cause the estimated model to yield a biased result. White's General Heteroscedasticity test would be adopted for this purpose.

***Decision Rule**:* We reject H_0 if $F_{cal} > F_{tab}$ at 5% critical value. Or alternatively, we reject H_0 (of constant variance i.e., homoskedasticity) if computed F-statistics is significant. Otherwise accept at 5% level of significance.

Test for Research Hypotheses

This study will test the research hypothesis using t-test. The t-statistics test tells us if there is an existence of any significance relationship between the dependent variable and the explanatory variables. The t-test will be conducted at 0.05 or 5% level of significance.

Decision rule: Reject H_0 if $t_{cal} > t_{\alpha/2}$, (n-k). Otherwise, we accept.

Nature and Source of Data

All data used in this research are secondary time series data which are sourced from the Central Bank of Nigeria (CBN) statistical bulletin and National Bureau of Statistics annual reports.

Data Presentation and Data Analysis

The OLS results of the model are presented and the parameter estimates subjected to some economic a priori, statistical and econometric tests.

Summary of Stationary Unit Root Test

Establishing stationarity is essential because if there is no stationarity, the processing of the data may produce biased result. The consequences are unreliable interpretation and conclusions. We test for stationarity using Augmented Dickey-Fuller (ADF) tests on the data. The ADF tests are done on level series, first and second order differenced series. The decision rule is to reject stationarity if ADF statistics is less than 5% critical value, otherwise, accept stationarity when ADF statistics is greater than 5% criteria value. The result of regression is presented in table 2 below.

Table 2: Summary of ADF test results

Variables	ADF Statistics	Lagged Difference	1% Critical Value	5% Critical Value	10% Critical Value	Order of Integration
MASS	-6.379781	1	-3.653730	-2.957110	-2.617434	*I*(1)
BNC	-3.989956	1	-3.653730	-2.957110	-2.617434	*I*(1)
BD3	-6.155715	1	-3.653730	-2.957110	-2.617434	*I*(1)
BLR	-6.853553	1	-3.653730	-2.957110	-2.617434	*I*(1)
INT	-10.23662	1	-3.653730	-2.957110	-2.617434	*I*(1)
EXR	-5.163307	1	-3.653730	-2.957110	-2.617434	*I*(1)
WIN	-5.526057	1	-3.653730	-2.957110	-2.617434	*I*(1)
EMG	-7.790108	1	-3.653730	-2.957110	-2.617434	*I*(1)

Source: Researchers computation

Evidence from unit root table above shows that none of the variables are stationary at level difference, that is, *I*(0). All the variables are stationary at their first difference, that is *I*(1). Since the ADF absolute value of each of these variables is greater than the 5% critical value, they are all stationary at their different integrated differences. They are also significant at 1% and 10% respectively. Since one of the variables is integrated at level form and some at first difference, we go further to carry out the cointegration test. The essence is to show that although all the variables are stationary, whether the variables have a long term relationship or equilibrium

among them. That is, the variables are cointegrated and will not produce a spurious regression.

Summary of Cointegration Test

Cointegration means that there is a correlationship among the variables. Cointegration test is done on the residual of the model. Since the unit root test shows that none of the variable is stationary at level *I*(0) rather all the variables are at first difference *1*(1), we therefore test for cointegration among these variables. The result is presented in tables 3 below for Trace and Maximum Eigenvalue cointegration rank test respectively.

Table 3: Summary of Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.930032	285.6241	159.5297	0.0000
At most 1 *	0.837419	197.8536	125.6154	0.0000
At most 2 *	0.780507	137.9065	95.75366	0.0000
At most 3 *	0.707391	87.86419	69.81889	0.0009
At most 4	0.454874	47.30985	47.85613	0.0562
At most 5	0.433594	27.28747	29.79707	0.0948
At most 6	0.227752	8.528835	15.49471	0.4107
At most 7	4.23E-09	1.40E-07	3.841466	0.9997

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.930032	87.77049	52.36261	0.0000
At most 1 *	0.837419	59.94710	46.23142	0.0010
At most 2 *	0.780507	50.04235	40.07757	0.0028
At most 3 *	0.707391	40.55434	33.87687	0.0069
At most 4	0.454874	20.02239	27.58434	0.3396
At most 5	0.433594	18.75863	21.13162	0.1040
At most 6	0.227752	8.528835	14.26460	0.3275
At most 7	4.23E-09	1.40E-07	3.841466	0.9997

Source: Researchers computation

Table 3 indicates that trace have 4 cointegrating variables in the model while Maximum Eigenvalue indicated also 4 cointegrating variables. Both the trace statistics and Eigen value statistics reveal that there is a long run relationship between the variables. That is, the linear combination of these variables cancels out

the stochastic trend in the series. This will prevent the generation of spurious regression results. Hence, the implication of this result is a long run relationship between MASS and other variables used in the model.

Presentation of Regression Result

Having verified the existence of long-run relationships among the variables in our model, we therefore, subject the model to ordinary least square (OLS) to generate the coefficients of the parameters of our regression model. The result of the regression test is presented in table 4 below.

Table 4: Summary of regression results

Dependent Variable: MASS
Method: Least Squares
Sample: 1999 2022
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21.39482	9.097329	12.51769	0.0000
BNC	0.605847	0.008945	5.653702	0.0000
BD3	0.348385	0.421148	3.827227	0.0034
BLR	0.178778	0.563559	2.917230	0.0105
INT	-0.225220	0.457988	-4.491760	0.0001
EXC	0.173304	0.054769	3.164269	0.0038
WIN	0.573428	0.109624	5.230879	0.0000
EMG	0.902406	0.578999	2.558564	0.0107

R-squared	0.954408	F-statistic	80.74344
Adjusted R-squared	0.942587	Prob(F-statistic)	0.000000
S.E. of regression	6.861700	Durbin-Watson stat	1.820478

Source: Researchers computation

Evaluation of Findings

To discuss the regression results as presented in table 4, we employ economic a priori criteria, statistical criteria and econometric criteria.

Evaluation based on economic a priori criteria

This subsection is concerned with evaluating the regression results based on a priori (i.e., theoretical) expectations. The sign and magnitude of each variable coefficient is evaluated against theoretical expectations.

From table 4, it is observed that the regression line have a positive intercept as presented by the constant (c) = 21.39482. This means that if all the variables are held constant or fixed (zero), MASS will be valued at 21.39482. Thus, the a-priori

expectation is that the intercept could be positive or negative, so it conforms to the theoretical expectation.

It is observed in table 4.3 that bank credits to manufacturing subsectors, Bank demand deposit, bank lending rate, exchange rate, workers incentives and employment generation have a positive impact on manufacturing subsectors in Nigeria, although, exchange rate was expected to be either positive or negative. This implies that a unit increase in bank credits to manufacturing subsectors, Bank demand deposit, bank lending rate, exchange rate, workers incentives and employment generation will lead to an increase in the MASS in Nigeria. On the other hand, bank interest rate has a negative impact on manufacturing subsectors in Nigeria. This means that as bank interest rate is increasing MASS will be decreasing in Nigeria.

From table 4, it is observed that all the variables conform to the a priori expectation of the study. Thus, table 5 summarises the a priori test.

Table 5: Summary of economic a priori test

Parameters	Variables		Expected Relationships	Observed Relationships	Conclusion
	Regressand	Regressor			
β_0	MASS	Intercept	+/-	+	Conform
β_1	MASS	BNC	+	+	Conform
β_2	MASS	BD3	+	+	Conform
β_3	MASS	BLR	+	+	Conform
β_4	MASS	INT	-	-	Conform
β_5	MASS	EXR	+/-	+	Conform
β_6	MASS	WIN	+	+	Conform
β_7	MASS	EMG	+	+	Conform

Source: Researchers compilation

Evaluation based on statistical criteria

This subsection applies the R^2, adjusted R^2, the S.E and the f–test to determine the statistical reliability of the estimated parameters. These tests are performed as follows:

From our regression result, the coefficient of determination (R^2) is given as 0.954408, which shows that the explanatory power of the variables is very high and/or strong. This implies that 95% of the variations in the growth of the manufacturing subsectors are being accounted for or explained by the variations in bank credits to manufacturing subsectors, Bank demand deposit, bank lending rate, bank interest rate, exchange rate, workers incentives and employment generation in

Nigeria. While other determinants of MASS not captured in the model explain just 5% of the variation in manufacturing subsectors in Nigeria.

The adjusted R^2 supports the claim of the R^2 with a value of 0.942587 indicating that 94% of the total variation in the dependent variable (manufacturing subsectors are explained by the independent variables (the regressors)). Thus, this supports the statement that the explanatory power of the variables is very high and strong.

The standard errors as presented in table 4 show that all the explanatory variables were all low. The low values of the standard errors in the result show that some level of confidence can be placed on the estimates.

The **F-statistic:** The F-test is applied to check the overall significance of the model. The F-statistic is instrumental in verifying the overall significance of an estimated model. The hypothesis tested is:

H_0: The model has no goodness of fit
H_1: The model has a goodness of fit

Decision rule: Reject H_0 if $F_{cal} > F_{\alpha}$ (k-1, n-k) at $\alpha = 5\%$, accept if otherwise.
Where; V_1 / V_2 Degree of freedom (d.f)
V_1 = n-k, V_2 = k-1:
Where; n (number of observation); k (number of parameters)
Where k-1 = 8-1= 7
Thus, n-k = 35-8 = 27

Therefore, $F_{0.05(7,27)} = 2.01$ (From the F table) … F-table
F-statistic = 80.74344 (From regression result) … F-calculated

Since the F-calculated > F-table, we reject H_0 and accept H_1 that the model has goodness of fit and is statistically different from zero. In other words, there is significant impact between the dependent and independent variables in the model.

Evaluation based on econometric criteria
In this subsection, the following econometric tests are used to evaluate the result obtained from our model: autocorrelation, heteroscedasticity and multicolinearity.

Test for Autocorrelation
Using Durbin-Watson (DW) statistics which we obtain from our regression result in table 4, it is observed that DW statistic is 1.820478 or approximately 2. This implies that there is no autocorrelation since d* is approximately equal to two. 1.820478 tends towards two more than it tends towards zero. Therefore, the variables in the model are not autocorrelated and that the model is reliable for predications.

Test for Heteroscedasticity

This test is conducted using the white's general heteroscedascity test. The hypothesis testing is thus:

H_0: There is a heteroscedasticity in the residuals

H_1: There is no heteroscedasticity in the residuals

Decision rule: Reject H_0 if the computed f-statistics is significant.

Otherwise, accept at 5%level of significance. Hence, since the F-calculated is significant, we reject H_0 and accept H_1 that the model has no heteroscedasticity in the residuals and therefore, reliable for predication.

Test for Multicolinearity

This means the existence of an exact linear relationship among the explanatory variable of a regression model. This means the existence of an exact linear relationship among the explanatory variable of a regression model. This will be used to check if collinearity exists among the explanatory variables. The basis for this test is the correlation matrix obtained using the series. The result is presented in table 6 below.

Table 6: Summary of Multicollinearity test

Variables	Correlation Coefficients	Conclusion
BNC and BD3	-0.355885	No multicollinearity
BNC and BLR	0.107577	No multicollinearity
BNC and INT	0.360529	No multicollinearity
BNC and EXR	0.754336	No multicollinearity
BNC and WIN	0.712719	No multicollinearity
BNC and EMG	-0.059948	No multicollinearity
BD3 and BLR	0.615955	No multicollinearity
BD3 and INT	0.399306	No multicollinearity
BD3 and EXR	-0.301486	No multicollinearity
BD3 and WIN	-0.171593	No multicollinearity
BD3 and EMG	-0.160836	No multicollinearity

BLR and INT	0.727891	No multicollinearity
BLR and EXR	0.323525	No multicollinearity
BLR and WIN	0.449322	No multicollinearity
BLR and EMG	-0.460192	No multicollinearity
INT and EXR	0.500988	No multicollinearity
INT and WIN	0.591169	No multicollinearity
INT and EMG	-0.512462	No multicollinearity
EXR and WIN	0.705568	No multicollinearity
EXR and EMG	-0.137016	No multicollinearity
WIN and EMG	-0.331768	No multicollinearity

Source: Researchers computation

Decision Rule: From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity. We therefore, conclude that the explanatory variables are not perfectly linearly correlated.

Test of Research Hypotheses

The test is used to know the statistical significance of the individual parameters. Two-tailed tests at 5% significance level are conducted. The Result is shown on table 7 below. Here, we compare the estimated or calculated t-statistic with the tabulated t-statistic at $t_{\alpha/2} = t_{0.05} = t_{0.025}$ (two-tailed test).

Degree of freedom (df) = n-k = 35-8 = 27
So, we have:
$T_{0.025(27)} = 2.052$ … Tabulated t-statistic

In testing the working hypotheses, which partly satisfies the objectives of this study, we employ a 0.05 level of significance. In so doing, we are to reject the null hypothesis if the t-value is significant at the chosen level of significance; otherwise, the null hypothesis will be accepted. This is summarized in table 7 below.

Table 7: Summary of t-statistic

Variable	t-tabulated ($t_{\alpha/2}$)	t-calculated (t_{cal})	Conclusion
Constant	±2.052	12.51769	Statistically Significance
BNC	±2.052	5.653702	Statistically Significance
BD3	±2.052	3.827227	Statistically Significance
BLR	±2.052	2.917230	Statistically Significance
INT	±2.052	-4.491760	Statistically Significance
EXR	±2.052	3.164269	Statistically Significance
WIN	±2.052	5.230879	Statistically Significance
EMG	±2.052	2.558564	Statistically Significance

Source: Researchers computation

We begin by bringing our working hypothesis to focus in considering the individual hypothesis. From table 4.6, the t-test result is interpreted below;
For BNC, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that BNC have a significant impact on MASS.
For BD3, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, BD3 do have a significant impact on MASS.
For BLR, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that BLR do has a significant impact on MASS.
For INT, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that INT has a significant impact on MASS.
For EXR, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that EXR do has a significant impact on MASS.
For WIN, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, WIN does have a significant impact on MASS.
For EMG, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that EMG do has a significant impact on MASS.

Conclusion and Recommendations

From the result of the OLS, it is observed bank credits to manufacturing subsectors, Bank demand deposit, bank lending rate, exchange rate, workers incentives and employment generation have a positive impact on manufacturing subsectors in Nigeria, although, exchange rate was expected to be either positive or negative. This implies that a unit increase in bank credits to manufacturing subsectors, Bank

demand deposit, bank lending rate, exchange rate, workers incentives and employment generation will lead to an increase in the MASS in Nigeria. On the other hand, bank interest rate has a negative impact on manufacturing subsectors in Nigeria. This means that as bank interest rate is increasing MASS will be decreasing in Nigeria. From the regression analysis, the result show that all the variables conform to the a priori expectation of the study which indicates that bank credits to manufacturing subsectors, Bank demand deposit, bank lending rate, bank interest rate, exchange rate, workers incentives and employment generation are major determinants of manufacturing subsectors in Nigeria. The F-test conducted in the study shows that the model has a goodness of fit and is statistically different from zero. In other words, there is a significant impact between the dependent and independent variables in the model. The findings of the study also show that bank credits to manufacturing subsectors, Bank demand deposit, bank lending rate, bank interest rate, exchange rate, workers incentives and employment generation are statistically significant in explaining inflation in Nigeria. Finally, the study shows that there is a long run relationship exists among the variables. Both R^2 and adjusted R^2 show that the explanatory power of the variables is very high and/or strong. The standard errors show that all the explanatory variables were all low. The low values of the standard errors in the result show that some level of confidence can be placed on the estimates.

The study recommends that: Cheap credit should be made available for manufacturing sector investment in Nigeria; this will encourage more investors in the manufacturing sector to access adequate loan facilities to enhance manufacturing sector output in the long run. The apex bank of Nigeria should reduce bank. This important because it will make the loans less expensive for the commercial banks, thus encouraging the public capacity to take credit and will gradually increased the volume of credit demanded for investment in the manufacturing sector. The government should engender a market force induced interest rate. This will enhance more investment by channeling saving to productive investment and stimulate real output. The need to stabilize the exchange rate is imperative because one unit increase in exchange rate volatility leads to decline in manufacturing output growth. Manufacturing companies should recognize and rewards employees. This will help engage and retain best people for the duration of their careers.

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