



Commercial Bank Credit and Manufacturing Sector Output in Nigeria

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Abstract

This study examines the effect of bank credits on the manufacturing sector output in Nigeria economy for the period 1981 to 2019 with data from Central Bank of Nigeria (CBN) Statistical Bulletin (2020) and World Bank Report (2020). In order to achieve the objectives of this study, the study employs Dynamic Ordinary Least Squares techniques, Error Correction Model as well as subjecting the data to various diagnostic and pre-regression tests. The results revealed that bank loans to manufacturing sector and government expenditure on economic services exhibit a direct and significant relationship with manufacturing output while lending interest rate exhibits an inverse and significant relationship with manufacturing sector output. The speed of adjustment of the manufacturing sector output to equilibrium in the event of a distortion is 51%. The recommendation of this study is the necessity for promoting bank credits to support manufacturing sector of the country while keeping lending interest rate as minimal as possible.

Keywords: Bank Loan, Lending Rate, Economic Services

1. Introduction

The obvious disequilibrium between the deficit unit and the surplus unit especially within an institutional framework is solved basically by the concept of finance and by extension, bank credit (Ezrim, 2005). Deposit money banks especially the commercial banks play a essential role as they tend to pool together funds from the surplus economic units and direct these resources to the deficit economic units. With this, bank credits play a significant and fundamental role in boosting the manufacturing sector performance through purchasing machinery required to boost production.

Successive governments in Nigeria have always recognized the prominent role of Manufacturing sector leading to the various policies that are being rolled out on regular basis to achieve industrial growth incentive and sufficient finance support. The unending list of programmer and strategies aimed at realizing formidable growth in the Nigerian Economy through the manufacturing sector include World Bank SME II Loan Scheme (1987), Small Scale Industries Credit Scheme (1971), established Industrial Development Centre, National Economic Reconstruction Fund (NERFUND), Nigerian Bank for Commerce and Industries, Nigerian Industrial Development Bank all aimed at improving



and sustaining the performance of the sector. The federal government of Nigeria through the Central Bank of Nigeria availed Manufacturers a total sum of N200 billion as Manufacturers' Intervention Fund. The primary aim of the fund was to fast-track developments in the manufacturing sector of the economy which was carried out by means of granting access to manufacturers which has the tendency of increasing their output; generating employment; diversifying the revenue base, as well as increasing foreign exchange earnings. It is also meant to provide inputs for the industrial sector on a sustainable basis (CBN, 2018).

Notwithstanding the high liquidity of the Nigerian financial institutions, Deposit money banks had always considered high risks in the manufacturing sector as an impediment to granting loans to the sector. However, the meager credit granted to the sector is equally greeted with high lending rate which is sometimes above thirty percent (Olorunsola, 2001). This has however continued to make such loans unattractive to investors in the manufacturing. The perceived high-risk cuts across difficulty in obtaining information on a firm's true financial condition and performance, inadequacies in the legal environment including long delay in adjudicating cases of debtor delinquency and problems with contract enforcement and unfriendly economic environment. Consequently, banks charge high interest rate, demand high level of security and make few loans less than the loan requests.

As with the case of most under developing countries, Nigeria's challenges of poor access to manufacture funds have been attributed to the near absence of growth of the developed sector (Adelegan, 2011). Managers of firms often complain that inadequate finance and high interest rates are major constraints to doing business in Nigeria. The critical role of banks in the development of the industrial sector has not been completely addressed and the impact has not been completely felt. Manufacturing sector has been experiencing a stunted growth and its contribution to gross domestic product has remained low whilst bank credits and advances were increasing and being allocated yearly to the manufacturing sector in Nigeria. The unimpressive performance of the manufacturing sector in Nigeria has also been characterized to massive importation of semi- finished and finished goods from countries and inadequate financial support for the manufacturing sector, which ultimately has contributed to the reduction in capacity utilization of the manufacturing sector in Nigeria and many other African countries.

It is however expedient to highlight the disregard of bank credit in the pursuit of appreciable growth in this very important sector of an economy by the monetary authorities in Nigeria. This plays out well knowing fully well that all manufacturing credits are subjected to regular interest rate regime with other sectors. The question of the significance if any, of the bank credits on the sectoral output of the manufacturing sector readily comes to mind. This has continually beckoned for an all-encompassing research that will examine this supposed fact. This study has its broad objectives as examining the various challenges that the manufacturing sector faces in its drive at ensuring increased output in the face of



inadequate bank credit. It investigates how the interest rate on such credits has affected the level of growth in the manufacturing sector.

The study seeks to fill some salient gaps observed in similar studies reviewed. Okere, Cletus and Nwaneto (2020) as well as Andabai &Eze, (2018) did not include other necessary variables such as government expenditure on economic services which is considered as impetus to stimulate manufacturing outputs. More so, this study provides a more recent review of the subject matter. Finally, the application of appropriate econometric tools in line with type of variables is not considered; meanwhile, this study shall tell us the appropriate econometric tools as well as conduct necessary diagnostic tools

2. Literature Review

Theoretical Literature

Endogenous growth theory: A bigger and more relevant theory that has considered the concept of growth as a result of credits from the banking sector is the endogenous growth theory. The theory suggests that a strong banking sector promotes economic growth and holds that policy measures can have an impact on the long run growth rate of an economy. Within these models, Romer (1986, 1990) enhanced the definition of investment to contain human capital and allow for externalities in investment. Given that he suggested that return on investment are slightly diminishing or even non-diminishing. Following this idea, it is financial institutions, when properly fulfilling their tasks that can generate externalities in investment and by these secure non-diminishing returns to investment in the endogenous growth model. The main implication of this theory therefore, is that banking policies which embraces openness, competition, change and innovation will promote economic growth.

Financial Intermediation Theory: Financial institution loans play serious role in fiscal intermediation which channel resources to units in the economy that make use of them for productive usage. The conceptual framework that initiates the relations between productive sector, fiscal intermediation and growth is enclosed in the research of Goldsmith (1969), Schumpeter (1934) & Shaw (1973). Of which they showed the important roles financial mediation displays or executes in boosting economic growth and rapid development. Bencivenga and Smith (1991) stated that the banking industry advancement in boosting financial mediation plays a pivotal role in the development of a nation by moving savings to serious productivity

Solow-Swan Growth Model: Solow & Swan (1956) present what was later seen as growth model for economics during the 1950s. This concept opined that there are decreasing returns to capital and labour. Capital from savings is gathered as output of workers decreases because of population increase and depreciation. The decreasing returns in capitalist economy may get to a situation where progress in technology and worker per capital will be constant and growth will discontinue. This stage is known as steady state. The proponent of the framework says that nations can conquer this level and continue to experience growth by making use of modern/new technology. Even in the long-run output of capital will rely on the savings level though output growth does not rely on savings



level. The situation by which nations continue to experience growth despite the decreasing returns is exogenous which leads to new technology creation that allows production with resources that are available, and makes a nation to grow. The intriguing prediction of the concept is that developing nations can grow quicker and catch-up with developed nations if the nations operation on almost the same savings and technology level.

The Loanable Funds Theory of Interest Rate: Another important theory in this study is the loanable funds theory of interest rate. The theory explains the dynamics of bank credit and the cost of the credit vis a vis investment decisions. According to the theory, the rate of interest is the price of credit which is determined by the demand and supply of loan able funds. The demand for loanable funds has primarily three sources; government, businessmen and consumers who need them for purposes of investment, hoarding and consumption. The government borrows money for constructing public works or for war preparations. The businessmen borrow for the purchase for capital goods and good starting investment projects. Such borrowings are interest elastic and depend mostly on the expected rate for profit as compared with the rate of interest. The demand for loanable funds on the part of consumers is for the purchase of durable consumer goods. Individual borrowings are also interest elastic. The tendency to borrow is more at a lower rate of interest than at a higher rate. Therefore, the demand curve for investment funds according to this theory slopes downward showing that less funds are borrowed at a higher rate and more at a lower rate of interest.

The theory of loanable funds provides a link between commercial bank credits and manufacturing sector output in that, it buttresses the fact that borrowing for investment in the manufacturing sector is interest rate elastic since it is determined by the existing rate of interest.

Empirical Literature

The first category of similar studies are those dealt precisely with bank credit and manufacturing product output while the second category deals with effect of bank credit on economic growth. This becomes necessary having explained the prominent role played by the manufacturing sector of the economy in the introduction of this paper. Elijah (2018) examined the impact of bank credits on manufacturing sector outputs in the deregulated Nigerian economy for the sample period 1986-2016. The study analysed its data using Autoregressive Distributed Lag (ARDL) models. It revealed that that banks credits contributed positively to manufacturing sector output in both short-run and long-run. It also conducted Granger Causality tests and observed that Exchange rate, Savings and Lending Rate granger cause Manufacturing Sector Output. The study concluded that the main determinants of Manufacturing Sector Output are Exchange Rate, Savings and Lending Rate. It recommended that the Central Bank and other monetary authorities alike should make policy that will lead to increase in bank credit to the manufacturing sector. As this will play a catalytic role for growth in the sector in particular and the economy in general.



Okere, Okere, Cletus and Nwaneto (2020) examined the effects of bank credits on the manufacturing sector output in Nigeria from 1981-2018 using Auto-Regressive Distributed Lag (ARDL) bound co-integration test approach and error correction. The study shows that bank credits possess an optimistic and significant relationship with the presentation of manufacturing sector in Nigeria. It however recommended that policies geared towards deepening the financial sector and enhancing the healthy and soundness of banks should be vigorously pursued. Andabai and Eze, (2018) examined a causality investigation of bank credit and manufacturing sector growth in Nigeria for the period of 1990-2016. Secondary data were used and sourced from Central Bank of Nigeria Statistical Bulletin. Vector Error Correction Model was used and it revealed that bank credit had no short-run equilibrium significant relationship with manufacturing sector growth in Nigeria. Causality test indicated that bank credit had no causal relationship with manufacturing sector growth in Nigeria. The study concluded that bank credit had not significantly contributed to manufacturing sector growth in Nigeria.

Ebele and Iorember (2016) investigated the effect of commercial bank credit on the manufacturing sector output in Nigeria from 1980 to 2015 using Cochrane-Orcutt method. The study employed five variables of manufacturing sector output, inflation rate, interest rate, loans and advances and broad money supply, using the Augmented Dickey Fuller approach; and were found to be stationary at levels. The study observed that, inflation rate and interest rate have negative effect on manufacturing sector output while loans and advances and broad money supply have positive effect with manufacturing sector output in Nigeria. It therefore recommended formulation and implementation of policies that aim at reducing both inflation and interest rates on one hand and on the other hand, increasing both loans and advances as well as broad money supply so as to enhance improvement in the sector's output. Mesagan, Olunkwa and Yusuf (2018) focused on financial sector development and manufacturing performance in Nigeria over the period of 1981 to 2015. Error Correction Model was used and the study observed that credit to the private sector and money supply positively but insignificantly enhanced capacity utilization and output, but negatively impacted value of the manufacturing sector in the short run. Presents slight development in the long where both currency supply and credit to confidential sector exert positive crash artificial output.

Olanrewaju, Aremoand and Aiyegbusi (2015) empirically studied the effect of banking sector reforms on the output of developed sector in the Nigerian financial system between 1970 and 2011 with a view to investigative the extent of the impact of banking sector reforms on the developed sector. The study utilized yearly time series data from 1970 to 2011; adopted the addition analysis and error correction mechanism (ECM). The result revealed that Bank assets, lend rate, Exchange rate (EXR) and genuine attention rate have low and absolutely significant effect on developed output while financial deepening and interest rate have negative and significant crash on the output growth of developed sector in Nigeria. Ebi and Nathan (2014) investigated the impacts of commercial bank credit on Nigeria industrial subsectors between 1972 and 2012 using the Error Correction Model



(ECM). They found that commercial bank credits impacted positively and significantly on the manufacturing sub-sector in Nigeria, commercial bank credits to mining and quarry is a positive and significant determinant of the current year Mining and Quarry output in Nigeria, previous year bank credits to real estate and construction is a positive determinant of the current year real estate and construction output, bank credits to manufacturing, mining and quarry as well as bank credits to real estate and construction correlated positively with aggregate industrial output with bank credits to real estate and construction having greater and a significant impact on industrial output. Interest rate was not an important determinant of industrial sector and industrial sub-sectors outputs, exchange rate is a negative and significant determinant of industrial sector's outputs in Nigeria. These results point to the conclusion that, increase bank credits to industrial sector is indispensable in stimulating industrial sector growth in Nigeria.

Similarly, Imoughele and Ismaila (2013) investigated the impact of commercial bank credit accessibility and sectoral output performance in Nigerian economy for the period which spanned between 1986 and 2010. They found that, commercial bank credit has direct and insignificant impact on sectoral output performance but cumulative supply and demand for credit in the previous period has direct and significant impact on the growth of agriculture, manufacturing and the services sectors output. Somoye (2008) investigated the performance of commercial banks in post-consolidation period in Nigeria. The paper analysed published audited accounts of twenty (20) out of twenty-five (25) banks that emerged from the consolidation exercise and data from the central bank of Nigeria (CBN). The results revealed that consolidation programme has not improved the overall performance of banks significantly and also has contributed marginally to the growth of the real sector for sustainable development. Adegbaaju and Olokoyo (2008), investigated the lending of commercial banks to the real sector in Nigeria and found that the main key profitability ratio such as the yield on earnings assets (YEA), return on equality (ROE) and Return on Asset (ROA) were significant meaning that there are statistical differences between the mean of the bank before 2001 recapitalization and after 2001 recapitalizations. This suggested that banks also increased their lending to the real sector in order to in turn increase their profits and develop the real sector. Also, Kul and Khan (1999) in their study, assessed the impact of long-run relationship between financial sector development and real sector growth using frame works of bivariate for different county samples. The outcome was that the causality pattern varies across countries according to the success of financial generalization policies implemented in each country and the level of development of the financial sector.

This study attempts to fill gaps observed in the various studies reviewed. Some of the studies, such as Elijah (2018) excluded the seemingly most important variable in the study which is the total bank credit availed to manufacturing sector. Furthermore, the scopes of some of the studies appear distanced and obsolete, which is an invitation to a more recent work like this. Appropriate econometric model is also deemed necessary in some of the



studies, however, this study clearly utilized the Error Correction Model as well as the Ordinary Least Squares for long run relationship.

3. Methodology

Model specification

This study focuses on the impact of bank credit on manufacturing sector of the Nigerian economy while also considering effect of the lending rate, exchange rate and government expenditure on economic services. The theoretical Framework employed in the study is the Loanable fund theory that highlights the effect of interest determination on demand and supply of money and by extension its effects on outputs generated in this relationship. The study adapted and modified the model used by Ebele and Iorember (2016). The model used in the study is as follows:

$$MO_t = b_0 + b_1LA_t + b_2LR_t + b_3INF_t + b_4M2_t + U_t \dots\dots\dots 1$$

Where MO is Manufacturing output, LA is Loans and Advances, LR is Lending Rates, INF is Inflation Rates and M2 is Broad Money Supply.

The model was modified as follows

$$MSO = f(BKLM, LR, EXR, GEEC) \dots\dots\dots 2$$

Where MSO is Manufacturing Sector Output, BKLM is the Bank Loan to Manufacturing Sector, LR is the Lending Rate, EXR is the exchange rate, GEEC is government expenditure on economic services.

The model is further simplified using natural logarithm as follows:

$$LNMSO_t = \alpha + \phi \ln BKLM_t + \gamma LR_t + \mu EXR_t + \pi LN GEEC_t + U_t \dots\dots\dots 3$$

Restriction $\alpha > 0, \phi > 0, \gamma < 0, \mu < 0, \pi > 0$

α is a constant parameter and U_t is the white noise error term.

This study utilizes historical and quantitative data. It employs annual time series data spanning the period 1981 to 2019. Sources of the data include Central Bank of Nigeria Statistical Bulletins and National Bureau of Statistics. The study adopts the Dynamic Ordinary Least Squares technique after test for stationarity and co-integration using unit root test techniques. The method is adopted following the behaviour of the series. The unit root test, when it reveals 1st difference result necessitates the use of an error correction technique, hence the combination of Dynamic OLS and Error Correction Model. Necessary diagnostic tests are also conducted in the study



4. Result

Dynamic OLS is adopted, following the behaviour of the series. The unit root test, when it reveals 1st difference result necessitates the use of an error correction technique, hence the combination of Dynamic OLS and Error Correction Model. Necessary diagnostic tests are also conducted in the study.

Descriptive Statistics

Table 1 below shows the descriptive statistics result of the variables used in the analysis.

Table 1: Descriptive Statistics

	LNMSO	LNBLM	LR	EXR	LNGEEC
Mean	6.502736	4.640986	17.51128	94.25897	3.995006
Median	6.716631	4.950848	17.5	102.11	5.133502
Maximum	9.728006	7.797447	29.8	306.92	6.901928
Minimum	3.291754	0.978251	7.75	0.61	-0.41552
Std. Dev.	2.044483	2.358753	4.583414	92.86488	2.361402
Skewness	-0.18391	-0.24422	0.244029	0.806523	-0.59905
Kurtosis	1.757812	1.607963	3.725635	2.846214	1.715254
Jarque-Bera	2.727266	3.536551	1.242713	4.266544	5.014761
Probability	0.25573	0.170627	0.537215	0.118449	0.081481
Sum	253.6067	180.9984	682.94	3676.1	155.8052
Sum Sq. Dev.	158.8367	211.4213	798.2918	327707.6	211.8964
Observations	39	39	39	39	39

Source: Author's Computation

Table 1 explains the mean, median, maximum, minimum and standard deviation of the series. The mean for LNMSO, LNBLM, LR, EXR and LNGEEC are 6.502736, 4.640986, 17.51128, 94.25897 and 3.995006 respectively. LNMSO, LNBLM and LNGEEC have negative skewness values while LR and EXR have positive skewness values. The Kurtosis of LR and EXR have values close to 3, indicating mesokurtic and normal distribution. Furthermore, Jarque-Bera probabilities of all the series reveal percentages that are greater than 5% indicating normal distribution of the series.

Unit Root Test

This study conducted a test of order of integration for each variable using Augmented Dickey-Fuller (ADF). This becomes necessary as put by Granger and Newbold (1974), and Granger (1986) that if time series variables are non-stationary, all findings with these time series will be at variance with the conventional theory of regression with stationary series. That is, coefficients of regression derived from such non-stationary variables will be spurious and deceptive. The results of the unit root test are presented in Table 2



Table 2: Unit Root Test

Variable	ADF calculated value in Level	ADF calculated value at 1st Difference	McKinnon 5% Critical value	Order of Integration
LNMSO	-0.550016	-4.512361	-2.948404	1(1)
LNBLK	-1.00419	-4.813799	-2.948404	1(I)
LR	-2.431764	-3.870602	-2.951125	1(1)
EXR	1.393716	-4.263008	-2.951125	1(1)
LNGEEC	-0.669383	-6.496044	-2.948404	1(1)

Source: Author's Computation

From Table 2, Time series of Manufacturing Sector Output, Bank Loan to Manufacturing Sector, Lending Rate, Exchange Rate and Government expenditure on economic services are stationary at first difference as can be seen in column 2, indicating that the variables are integrated of order one i.e. I (I).

Lag Length Criteria

The test results of the different lag selection methods are reported in the Table 3. After meticulous examination of the different lag lengths by estimating the VAR at each lag length and diagnosing the whiteness of resulting residuals, one lag length, as recommended by sequential modified LR test statistic, was chosen.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-401.5943	NA	2413.303	21.97807	22.19576	22.05482
1	-216.2001	310.6606*	0.420282*	13.30811*	14.61426*	13.76859*
2	-194.6273	30.31849	0.546912	13.49337	15.88798	14.33758

* indicates lag order selected by the criterion

Source: Author's Computation

Co-integration Test

Johansen Co-integration Method is adopted here especially as the series are stationary at 1st difference. This will reveal the presence of a long run relationship among the variables. It tests for the existence of co-integrating equation.

Table 4: Johansson co-integration Test Result

Hypothesized No. of CE(s)	Eigen Value	Trace Statistics	Critical Value @ 5%	Prob.**
None *	0.950757	184.5464	69.81889	0.0000
At most 1 *	0.552834	73.13976	47.85613	0.0000
At most 2 *	0.441097	43.36125	29.79707	0.0008
At most 3 *	0.350056	21.83543	15.49471	0.0048
At most 4 *	0.147241	5.893276	3.841466	0.0152

Source: Author's Computation



Table 4 indicates the existence of at least five co-integration equations as revealed in the Probabilities of None and at most 1 hypothesized no of CEs. Trace values at these points exceeds Critical Values at 5%. This shows that there exists a long run relationship between the dependent variable (LNMSO) and the independent variables (LNBLK, LR, EXR, LNGEEC)

Long Run Statistic Regression

The result of the Dynamic Least Squares (DOLS) model is presented in Table 5. It could be observed that Bank Loan to Manufacturing Sector and Government expenditure on Economic Services have direct and significant relationship with Manufacturing Sector Output. A 1% increase in the loan to manufacturing sector and government expenditure on economic services will yield 93% and 49% growth in the level of Manufacturing sector output. This is consistent with the result by Ebele and Iorember (2016). More so, Lending rate has an inverse and significant relationship with Manufacturing sector output such that a 1% increase in the lending rate will reduce Manufacturing Sector Output by 69%. These findings conform to the findings of Imoughele and Ismaila (2013) and Ebi and Nathan (2014). Exchange rate does not exact significant relationship with Manufacturing Sector Output It further buttresses the fact that the Nigeria’s over dependence on imported raw materials and stocks for SMEs ultimately leads to a reduction in economic growth. The coefficient of determinations R^2 of 0.995986 indicates that about 99 percent of the total variations in Manufacturing Sector Output can be accounted for by the dependent variables.

Table 5: Dynamic Least Squares (DOLS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBLM	0.938000	0.160381	5.848575	0.0000
LR	-0.696435	0.177612	-3.921103	0.0004
EXR	0.000141	0.002489	0.056671	0.9554
LNGEEC	0.490663	0.124699	3.934794	0.0004

Source: Author’s Computation

Short Run Estimation

Given the fact that the variables of the model are co-integrated, the next step is the estimation of the short-run dynamics in order to capture the speed of adjustment to equilibrium in the case of any shock to any of the independent variables. Based on the general to the specific framework, an over parameterized error correction model of Manufacturing Sector Output was estimated. As such the parsimonious equations were obtained.

The empirical evidence shows that a short run change in Government expenditure on economic services, 1 year-lag in bank loan to manufacturing sector and exchange rate exacts direct and significant relationship with Manufacturing Sector Output. A 1% increase in 1 year-lag of bank loan to manufacturing sector and exchange rate increases Manufacturing Sector Output by 26% and 5.2% respectively. This result is consistent with



Table 6: Display of the Over Parameterized Error Correction Estimates.

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	0.133599	0.048613	2.748222	0.0107
D(LNBLM)	0.129453	0.151186	0.856251	0.3997
D(LR)	-0.003374	0.005762	-0.585546	0.5632
D(EXR)	-0.000850	0.001325	-0.641776	0.5266
D(LNGEEC)	0.170693	0.036917	4.623696	0.0066
D(LNMSO(-1))	0.100335	0.243172	0.412612	0.6833
D(LNBLM(-1))	0.269629	0.048349	5.576723	0.0027
D(LR(-1))	-0.042599	0.015256	-2.792311	0.6252
D(EXR(-1))	0.052104	0.011199	4.652558	0.0317
D(LNGEEC(-1))	0.038732	0.037035	1.045821	0.3053
ECM(-1)	-0.516854	0.145426	-0.803532	0.0411

Source: Author's Computation

that of Gbadebo et al (2017) with ECM statistics of 63%. The coefficient of the error correction term which measures the speed of adjustment of RGDP towards long-run equilibrium is well-behaved as it is negatively signed and significant at 5% level. The result shows that the coefficient of ECM is -0.516854 which shows that about 52 percent disequilibria in the surge in Manufacturing Sector Output in the previous years are corrected for in the current year. The significance of the ECM is an indication and a confirmation of the existence of a long run equilibrium relationship between Manufacturing Sector Output and the explanatory variables.

Diagnostic Test

To confirm the robustness, the study performs diagnostic test as below.

Normality Test: This test is required to know if the error term is normally distributed. The null hypothesis is that the error term follows normal distribution. From Figure 4 below, the Jarque-Bera Statistic is 1.305885 and P value as 0.520521. The probability is greater than 0.05, hence we accept the null hypothesis which implies that the errors are normally distributed. This conclusion is equally supported by the Kurtosis statistics of 3.041720 which implies that the distribution is mesokurtic and hence normally distributed.

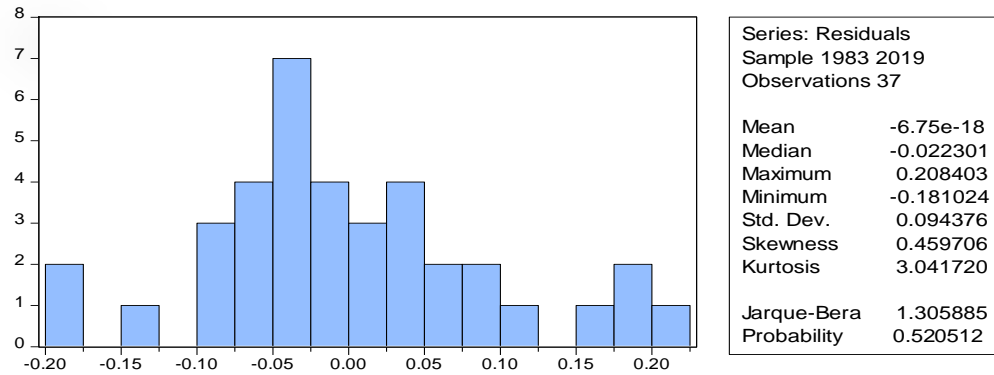


Fig 1: Normality

Heteroscedasticity Test: This test is conducted to check if errors have constant variance or not. The null hypothesis is that the errors are homoscedastic (no heteroscedasticity)

Table 7: Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.043806	Prob. F(10,26)	0.4368
Obs*R-squared	10.59903	Prob. Chi-Square(10)	0.3896
Scaled explained SS	5.342883	Prob. Chi-Square(10)	0.8671

Source: Author's Computation

In Table 7, Breusch-Pagan-Godfrey Heteroscedasticity Test was carried out. The probability was 0.4368 which is greater than 0.05. This indicates that we reject the null hypothesis and conclude that there is absence of heteroscedasticity in the MSO model.

Serial Correlation Test: This test is conducted to check if errors are serially correlated or not. The null hypothesis is that the errors are serially correlated.

Table 8: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.126479	Prob. F(2,24)	0.8818
Obs*R-squared	0.385908	Prob. Chi-Square(2)	0.8245

Source: Author's Computation

In Table 8, Breusch-Pagan-Godfrey Serial Correlation LM Test was carried out. The probability was 0.8818 which is greater than 0.05. This indicates that we reject the null hypothesis and conclude that there is absence of serial correlation in the model.

Stability Test: Stability test is performed using Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUM Q) of residual of the DOLS model as shown in figures 2 and 3 below. The existence of parameter instability is established if the Cumulative Sum of the residual goes outside the area between the critical (dotted bounded) lines. It is estimated at 5 percent critical level. From figures, it can be inferred that the model at 5 percent level of significance has been stable over time. The decision rule is that, all the coefficients of the error correction are stable and the null hypothesis cannot be rejected provided that the plots



stay within 5% range of the significance level (i.e. within the two straight lines), if otherwise we reject the null hypothesis (Pesaran & Smith 2001). As shown in Figures 2 and 3, both plots lies within the critical boundaries, this implies that the long run coefficients of the unemployment function is stable.

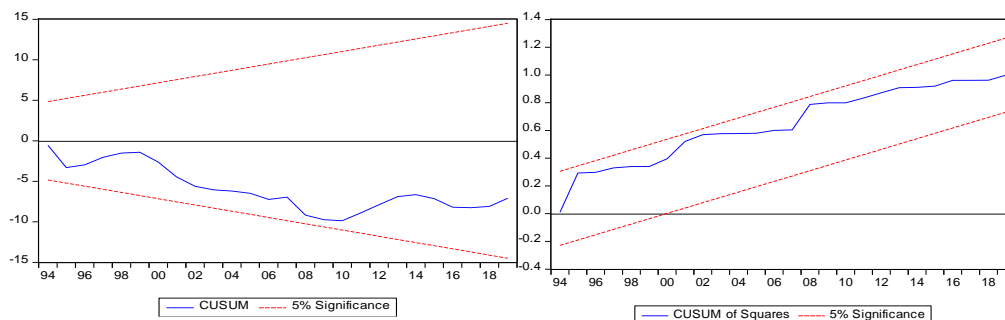


Fig. 2: Plot of Cumulative Sum of Recursive Residual

Fig.3: Plot of Cumulative Sum of Square of Recursive Residual Results

5. Conclusion and Recommendations

The findings from this study show that bank loan to manufacturing sector. Lending rate as well as government expenditure on economic services is very instrumental in influencing manufacturing sector output in Nigeria. The study observed that the premium is basically on bank loan to the sector, hence the need to focus on it by the government of a nation such as Nigeria. It recommends that government should further encourage and stimulate bank credits to manufacturing sector based on the results observed in the study. Lending rate on such loans should however be kept very low as it exhibits an indirect relationship with manufacturing sector output. In the same vein, government spending on economic services should further be encouraged as it possesses a direct relationship with manufacturing sector output in Nigeria.

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