Journal of Economics Library
www.kspjournals.org
Volume 5 December 2018 Issue 4

An empirical analysis of the impact of bank credit on the manufacturing sector output in Nigeria (1986-2016)

By Sunday ELIJAH [†]

Abstract. This study examined the impact of bank credits on manufacturing sector outputs in the deregulated Nigerian economy for the sample period 1986-2016. The data collected were analysed using Autoregressive Distributed Lag (ARDL) models. It was found out that banks credits contributed positively to manufacturing sector output in both short-run and long-run. For causality relationship, EXR, SAV and LR granger cause MSO. Hence, the main determinants of MSO are EXR, SAV and LR. Therefore, it was recommended amongst other things, 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.
Keywords. Bank credit, manufacturing sector, Autoregressive Distributed Lag Model, Bound Test, Lending rate.
JEL. E51, L16, F31.

1. Introduction

The primary concern of many developing nations, including Nigeria, during the early stages of nationhood is often the desire to stimulate domestic output growth through the development of a vibrant financial sector capable of supporting economic activities. In this regard, since the attainment of political independence in 1960, Nigeria has vigorously pursued the development of a vibrant financial system, starting with the establishment of the Central Bank of Nigeria and development of relevant institutions and legislations. Such institutions include financial intermediaries like commercial banks. Prior to financial sector deregulation in Nigeria under the Structural Adjustment Programme (SAP) adopted in 1986, the monetary policy of the government was development-oriented as banks were required to lend at concessionary rates to priority sectors like agriculture and manufacturing. The policy thrust of the government was to promote real sector development by offering low rates of interest on loans to the sectors (Nwokoro, 2017).

The attempt to strengthen the private sector (manufacturing sector inclusive) by the government led to the implementation of financial liberalisation policy in 1986 as part of the Structural Adjustment Programme (SAP). The Structural Adjustment Programme (SAP) was an economic reform programme aimed at restructuring the economy and averting economic collapse. The key objectives of SAP are to lay the basis for sustaining non-inflationary or minimal inflationary growth and improve the efficiency of the public and private sectors. Therefore, the financial liberalization (reform) policy entails the provision of an appropriate legal and regulatory framework for effective private participation in the economy (Tomola *et al.*, 2011). Tomola *et al.*, (2011) furtheropined that even the financial sector reform of the Structural Adjustment Programme (SAP) in 1986, which was meant to

[†] Department of Economics, Federal University, Gusau, Nigeria.
. +2348066929820
. elijahsundayecons@gmail.com

correct the structural imbalance in the economy and liberalize the financial systems did not achieve the expected results.

In Nigeria like most developing countries, poor access to production funds has been blamed for the near-absence of growth of the manufacturing sector (Adelegan, 2011). He opined that managers of firms complain that inadequate finance and high interest rates are major constraints to doing business in Nigeria. Funding has made it difficult for firms to invest in modern machines, information and communication technology and human resources development which are essential factors in trimming down costs, raising productivity and improving competitive strength. Even when credit is available, high lending rate which is sometimes go over 30%, make such credits unattractive, given the fact that returns on investments in the sub-sector have been below ten percent (10%) on the average (Nwasilike, 2006). Omankhanlen & Owonibi (2012) observed that this sector is riddled with multifarious challenges. Outside infrastructure, there are other challenges such as the suffocating high interest rate and banks' unwillingness to lend to the sector even though the monetary authorities classify it as a priority sector. The manufacturing sector's contribution to GDP, following the negative state of the economic indicators, stood at 4.23% in 2013 (Kalu, *et al.*, 2017).

Even though, a far reaching effort has been made by several authors to investigate the impact ofbank credit on manufacturing sector output in Nigeria during the Structural Adjustment Programme (SAP). None of studies were able satisfy the Central Limit Theorem (CLT) of minimum requirement of 30 observations for robust and reliable result is rare in the previous literature. According to CLT, if there is population with mean and standard deviation, the mean of a sample data will be closer to the mean of the overall population in question as sample size increases with replacement, notwithstanding the actual distribution of the data. As a general rule, sample size equal to or greater than 30 are considered sufficient for the CLT to hold, meaning the distribution of the sample is fairly normally distributed (Gujarati, 2007).

In view of the above situations this study seeks to examine the impact of bank's credit on the manufacturing sector in the deregulated Nigerian economy for the sample period 1986-2013. The rest of the paper is arranged in sections, namely: conceptual clarification, theoretical framework, empirical review of related literature, research methodology, data presentation and analysis, summary of findings, and recommendations.

2. Conceptual clarification of credit

The word "credit" has been derived from the Latin word "credo" which means "I believe" or "I trust", which signifies a trust or confidence reposed in another person. The term credit means, reposing trust or confidence in somebody. In economics, it is interpreted to mean, in the same sense, trusting in the solvency of a person or making a payment to a person to receive it back after some time or lending of money and receiving of deposits etc.In other words, the meaning of credit can be explained as, A contractual agreement in which, a borrower receives something of value now and agrees to repay the lender at some later date. The borrowing capacity provided to an individual by the banking system, in the form of credit or a loan. The total bank credit the individual has is the sum of the borrowing capacity each lender bank provides to the individual. Creditis the money from the lender to the borrower (Nwanyanwu, 2010).

Spencer (1977) noted that creditimplies a promise by one party to pay another formoney borrowed or goods and services received. credit to private sector banks refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central bank), such as through loans, purchases of non-equity securities, trade credits and other accounts receivable, that establish a claim for repayment.

3. Trend analysis of banks' credit and manufacturing sector output in Nigeria

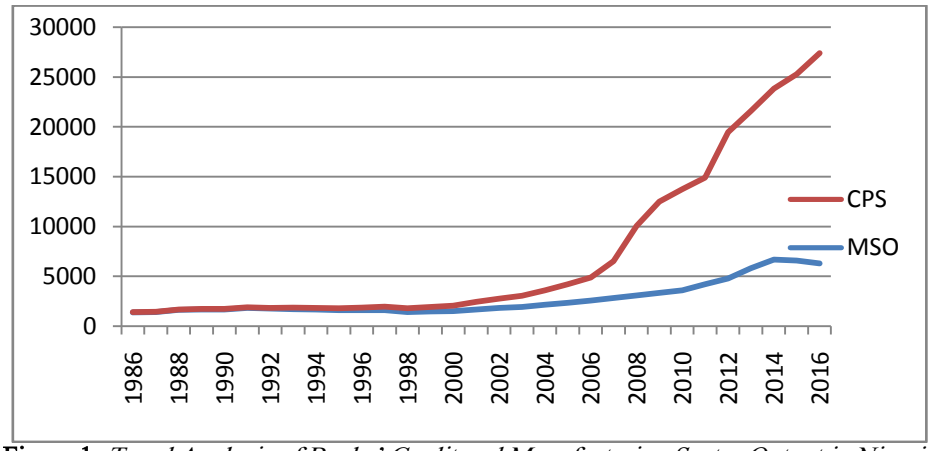


Figure 1. *Trend Analysis of Banks' Credit and Manufacturing Sector Output in Nigeria (1986-2016)*

Over the years in Nigeria, the volume of credit into the economy has continued to increase as shown by the trend in figure 1. Figure 1 reveals that the volume of credit to the private sector increased from mere ₦15.25billion in 1986 to ₦21082.72 billion in 2016. Credit to private sector as a percentage of Gross Domestic Product (GDP) increased from 7.5 in 1986 to 20.8 percentage point in 2016 (CBN, 2016). The fluctuation value recorded by the total credit share in GDP is as a result of various monetary policy by the monetary authority to regulate the supply of money by bank to the public and private sector in order to stemmed inflation in the Nigerian economy. The average value indicates that there is poor financial development in the Nigerian economy despite the various reforms to restructure the sector and facilitate credit accessibility by the private sector. The same figure reveals thatthe volume of manufacturing sector output increased from mere ₦1373.66 billion in 1986 to ₦6302.23 billion in 2016 (CBN, 2016).

4. Theoretical framework

Theoretical studies have established the relationship that exists between financial intermediation and economic growth which are hypothesized under the finance led growth theory. Some these include.

4.1. Classical theory of saving and investment

The classicists believe in the existence of a fully employed economy where saving and investment are always equal. According to them, saving and investment are a function of the rate of interest. When the rate of interest rises, saving rises and investment declines. On the other hand, with a fall in the rate of interest, saving falls and investment increases. If at any time, saving is less than investment, a rise in interest rate brings a decline in investment and increase in saving till savings equal investment. On the contrary, when saving is more than investment, the interest rate falls, investment increases and saving declines till the two are equal at the new interest rate (Jhingan, 2003).

4.2. Neoclassical theory of credit market

A model of the neoclassical credit market postulates that the terms of credits clear the market. If collateral and other restrictions (covenants) remain constant, the interest rate is the only price mechanism. With an increasing demand for credit and a given customer supply, the interest rate rises, and vice versa. It is thus

believed that the higher the risk of failure of the borrower, the higher the interest premium (Imoughele & Ismaila, 2013).

4.3. Monetary theory of bank credit

There are different transmission channels through which monetary policy affects economic activities and these channels of transmissions have been broadly examined under the monetarist schools of thought. The monetarist postulates that change in the money supply leads directly to a change in the real magnitude of money. An expansive open market operations by the Central Bank, increases stock of money, which also leads to an increase in Commercial Bank reserves and ability to create credit and hence increase money supply through the multiplier effect. In order to reduce the quantity of money in their portfolios, the bank and non-bank organizations purchase securities with characteristics of the type sold by the Central Bank, thus stimulating activities in the real sector. Credit is an important aspect of financial intermediation that provides funds to those economic entities that can put them into the most productive use. Theoretical studies have established the relationship that exists between financial intermediation and economic growth which is hypothesis under the finance led growth theory(Onyeiwu, 2012).

5. Empirical literature

Andabai & Eze (2018) examined a causality investigation of bank credit and manufacturing sector growth in Nigeria from 1990-2016. The variables used for the study includes manufacturing Sector Output Broad Money Supply, Credit to the Private Sector, Interest Rate and Inflation Rate. Vector Error Correction Model 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.

Kalu *et al.,* (2017) examined the relative impact of Bank credit on the manufacturing sector in Nigeria from 1986 to 2013. The using Autoregressive Distributed Lag (ARDL. They found that volume of bank credit, credit to private sector and exchange rate all exert long-run positive and significant effect on the output of manufacturing sector at 5% level of significance while interest rate in consistency with theoretical expectation share negative but significant relationship with volume of bank credit the endogenous variable also at 5% significance level.

Ogar *et al.,* (2014) investigated commercial bank credit and its contributions on manufacturing sector in Nigeria from 1992 to 2011 using ordinary least square of multiple regression model. They found that commercial bank credit had a significant relationship onmanufacturing sector.

Tomola (2011) investigated the effect of bank lending and economic growth on the manufacturing output in Nigeria from 1973-2009 using Vector Error CorrectionModel (VECM) techniques. They found that manufacturing capacity utilization and bank lending ratessignificantly affect manufacturing output in Nigeria. However, the relationship between manufacturing output and economicgrowth could not be established in the country.

Oluwafemi (2014) investigated the impact of bank credit to output growth in the manufacturing and agricultural subsectors of the economy over the period 1980-2010. Using the error correction modeling techniques, theresults show that bank credit has significant impact on manufacturing output growth both in the short runand long run but not in the agricultural sub sector. Inflation and exchange rate depreciation have negative effects on manufacturing output growth in both short run and long run.

Bada (2017) examined the effect of banks' credit on agricultural and manufacturing outputs on the Nigerian economy from 1984-2014 using Vector Auto-regressive models. It was found out that banks' credits have the significant impact on the agricultural and manufacturing sector in Nigeria

Imoughele & Ismaila (2013) investigated the impact of commercial bank credit accessibility and sectoral outputperformance in Nigerian economy for the period

which spanned between 1986 and 2010. Anaugmented growth model was estimated via the Ordinary Least Square (OLS) techniques toascertain the relationship between various commercial bank credits and sectoral outputgrowth. The variables were tested for stationarity and co-integration analysis was also carriedout using the Augmented Dickey-Fuller test. Also error correction test was performed. Thestudy found that the various commercial bank credit supply and other included variables has along run relationship with sectoral output performance i.e agricultural, manufacturing andservices sector output and the main demand for credit facility in Nigeria is the manufacturingsector. The study also reveals that commercial bank credit has direct and insignificant impacton sectoral output performance but cumulative supply and demand for credit in the previousperiod has direct and significant impact on the growth of agriculture, manufacturing and theservices sectors output.

Nnamocha & Charles (2015) investigated the effect of Bank Credit on Agricultural Output in Nigeria from 1970 to 2013 using the Error Correction Mode (ECM). The analysis showed that all the variables were integrated of order one I (1)and long-run relationship existed among them. However, following the empirical findings in thisstudy, it showed that, in the long-run bank credit and industrial output contributed a lot toagricultural output in Nigeria, while; only industrial output influenced agricultural output in theshort-run.

6. Methodology

6.1. Theoretical framework and model specification

Model specification involves the representation of the hypotheses in a mathematical sense to achieve the objective of a quantitative study. Following the workof Kalu *et al.,* (2017) the study employed Autoregressive Distributed Lag with modification. Hence, the functional relationship that exists between the dependent variable and its respective independent variables is presented as:

$$MSO = f(CPS, MS, LR, SAV, EXR) \quad (1)$$

Put in an explicit form, the LM model becomes:

$$MSO_{t-1} = \beta_o + \beta_1 CPS_{t-1} + \beta_2 MS_{t-1} + \beta_3 LR_{t-1} + \beta_4 SAV_{t-1} + \beta_5 EXR_{t-1} + \epsilon t \quad (2)$$

Where:
MSO = Manufacturing Sector Output(Dependent variable)
β_o = Constant parameter
β_1-β_6 = Coefficient of independent variables
CPS_{t-1}= Lag value of credit to private sector
MS_{t-1} = Lag value of money supply
LR_{t-1} = Lag value of lending rate
SAV_{t-1} = Lag value of savings
EXR_{t-1} = Lag value of exchange rate
ϵt= *error term*

6.2. Type, source of data, sample size and sampling technique

The study utilized annual time series secondary data sourced from the Central Bank of Nigeria's statistical bulletin (2016). The sample size employed for the study covered a period of 31 years (1986 - 2016). The justification for the choice of this period is that it corresponds to the period when Nigeria economy was deregulated and exchange rate was liberalized and consistent data on the relevant variables are available. The selection of this period also conforms to time series research requirement of a minimum of thirty (31) observations (Gujarati, 2007).

6.3. Technique of estimation

The ARDL approach to co-integration analysis involves estimation of Unrestricted Error Correction Model (UECM). Hence the ARDL model for testing the relationship between balance of payment and its determinants is stated as follows:

$$\Delta \ln MSO_{t-1} = \beta_0 + \delta_1 \ln CPS_{t-1} + \delta_2 \ln MS_{t-1} + \delta_3 \ln LR_{t-1} + \delta_4 \ln SAV_{t-1} + \delta_5 EXR_{t-1} + \sum_{t=1}^{n} \emptyset_i \Delta \ln MSO_{t-1} + \sum_{t=0}^{m} \varphi_j \Delta \ln CPS_{t-1} + \sum_{t=0}^{m} \gamma_1 \Delta \ln MS_{t-1} + \sum_{t=0}^{m} \alpha_m \Delta \ln LR_{t-1} + \sum_{t=0}^{m} \omega_k \Delta \ln SAV_{t-1} + \sum_{t=0}^{m} \partial_f \Delta \ln EXR_{t-1} + \varepsilon_t \quad (3)$$

Where δi is the long run multipliers, c0 is the intercept and εt are white noise errors. The first step in the ARDL bounds testing approach is to estimate equation (3) by Ordinary Least Squares (OLS) in order to test for the existence of a long run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables, that is: H_0; δ1= δ2= δ3= δ4 = δ5= δ6=δ7= 0 against the alternative

$$H_1; \delta 1 \neq \delta 2 \neq \delta 3 \neq \delta 4 \neq \delta 5 \neq \delta 6 \neq \delta 7 \neq 0$$

We denote the test which normalizes on MSO by F_{BOP} [(MSO|CPS, MS, LR, SAV, EXR)]. Two asymptotic critical value bounds provide a test for cointegration when the independent variables are I(d) [where 0≤d≤1]: a lower value assuming the regressors are I(0) and an upper value assuming purely I(1) regressors. If the F-statistic is above the upper critical value, the null hypothesis of no long run relationship can be rejected irrespective of the orders of integration for the time series. Conversely, if the t-statistic falls below the lower critical value, the null hypothesis cannot be rejected. Finally, if the statistic falls between the lower and upper critical values, the result is inconclusive. The approximate critical values for the F-statistic test were obtained from Pesaran, Shin & Smith (2001). Once cointegration is established the conditional ARDL (n, m_1, m_2, m_3, m_4, m_5, m_6) long run model for HD_t can be estimated as:

$$\Delta \ln MSO_t = \beta_0 + \delta_1 \ln CPS_{t-1} + \sum_{t=0}^{m} \delta_2 \ln MS_{t-1} + \sum_{t=1}^{m} \delta_3 \ln LR_{t-1} + \sum_{t=1}^{m} \delta_4 \ln SAV_{t-1} + \sum_{t=1}^{m} \delta_5 \ln EXR_{t-1} + \varepsilon_t \quad (4)$$

This involves selecting the orders of the ARDL (P, q1, q2, q3, q4, q5, q6) model in the sevenvariables using Aikaike Information criteria (AIC) and Schwartz information criteria (SIC). The next step is to obtain the short run dynamic parameters by estimating an error correction model associated with the long run estimates. This is specified as:

$$\Delta \ln MSO_t = \beta_0 + \sum_{t=1}^{n} \emptyset_i \Delta \ln CPS_{t-1} + \sum_{t=0}^{m} \varphi_j \Delta \ln MS_{t-1} + \sum_{t=1}^{m} \gamma_1 \Delta \ln LR_{t-1} + \sum_{t=1}^{m} \alpha_m \Delta \ln SAV_{t-1} + \sum_{t=1}^{m} \omega_k \Delta \ln EXR_{t-1} \text{---} + \text{--} \varepsilon_t \quad (5)$$

Here,$\phi,\varphi,\varpi,\eta,\theta$ and γ are the short run dynamic coefficients of the model's convergence to equilibrium and ϑ is the speed of adjustment. Where ε_t is the error correction mechanism represent the coefficient of the *ecm* term.

6.4. Methods of data analysis

The study utilized secondary data in the form of time series spanning the period of thirty one (31) years as earlier mentioned. As widely known time series macro-economic data are notably not stationary due to change in their trend. Thus the desire to have models which combine both short run and long run features and maintain stationarity in all the variables is a process this study cherish and tend not to discard. Since the study used time series secondary data, it began its empirical analysis by testing the statistical properties of the variables to ascertain its statistical adequacy. Our diagnostic tests involved: (i) Descriptive statistics (ii) Checking the temporal properties of the variables in the model via unit root tests to determine the stationarity of the variables in order not to obtain spurious result using Augmented Dickey-Fuller (Dickey & Fuller, 1979) test and Philip Perron test; (iii) Determination of a meaningful long-run equilibrium relationship among the variables, that is, to determine if the variables in the equation are co-integrated using ARDL Bound testing; (iv) optimal lag selection; (v) Vector Error Correction Model was estimated to model the short-run dynamics; (vii) the VEC Granger Causality Block/Exogeneity Wald tests was conducted to determine the causality relationships among variables; (viii) and lastly, in addition to the VECM estimates, post-diagnostic tests such as, Breusch-Godfrey LM test for autocorrelation, Breusch-Pagan-Godfrey heteroskedasticity, Jarque-Bera (JB) test for Normality and Ramsey RESET test were also employed to test the, adequacy, reliability and validity of the data and model. Student *t* test and Wald test were used to test for significance and to compare hypothesized coefficient. All these models were used in order to avoid a number of challenges in econometric studies. Some of these challenges include the issue of subjectivity and spurious and bias of result.

6.5. Data presentation and analysis and discussion of results

Table 1. *Descriptive statistics*

Variables	Obs.	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
MSO	31	2694.890	1666.293	1.393329	3.573061	10.45458
CPS	31	4476.244	6594.423	1.311135	3.243367	8.958396
MS	31	4842.205	6626.223	1.235272	3.133355	7.906774
LR	31	18.80806	3.833962	0.922709	4.466333	7.176109
SAV	31	2736.734	3988.955	1.336507	3.380414	9.415885
EXR	31	95.99774	64.99030	0.046544	2.428607	0.432909

Table 1 indicates the descriptive statistics result of the data covering the period under study using thirty one observations in each of the variables to estimate the impact of floating exchange rate on balance of payment in Nigeria from 1986 to 2016. It provides information about the Mean, Standard deviation, Skewness, Kurtosis and Jarque-Bera of the variables. The Mean provides the average value in the series, the Standard deviation provides the volatility of the data or amount of variation of the data from the average, the skewness measures whether the distribution of the data is symmetrical or asymmetrical and the Kurtosis measures the peak of the data compared to normal data.

The variables MSO, CPS, MS, LR, SAV and EXR with skewness of 1.393329, 1.311135, 1.235272, 0.922709, 1.336507and0.046544respectively are positively skewed or are rightward skewed, indicating that the distribution of the data is symmetrical and have a long tail toward large value within the study period. The fact that the values of skewness fall between the range -1.96 and +1.96, shows that the data are normally distributed. The kurtosis of 3.573061 for MSO,3.243367for CPS, 3.133355for MS, 4.466333for LR,3.380414for SAV2.428607and for EXR suggested that the data used for the study are normally distributed.

Table 2. *Unit root test result*

	ADF Test		PP Test	
Variables	Level	1st Diff.	Level	1st Diff.
Manufacturing Sector Output (MSO)	-5.299568	-5.509985**	-2.380101	-4.421371**
Credit to Private Sector (CPS)	-4.356263	-.97190*	4.087546	-4.603073*
Money Supply (MS)	-2.689626	-6.445711**	3.204254	-6.356631**
Lending Rate (LR)	-4.471259*	5.475478**	-4.591429	-10.00073**
Savings	-2.173516	-6.566314**-	-2.695375	-6.421521**
Exchange Rate (EXR)	0.8011995	3.444076**	0.713576	-3.304719**

Source: Author's computation using EVIEWS software. *, ** and *** denote level of significance at 1%, 5%and 10% respectively.

Table 2 presents the results of both Augmented Dickey-Fuller (ADF) and Philip-Peron (PP) test. Based on the fact, that Bounds test is on the assumption that variables are either integrated of 1(0), 1(1) or combination of both. Before performing the bounds test, it is essential to check for the stationarity of the data series to be used. This is also important in order not to obtain an unbiased estimation from the granger causality tests. However, the summary of the result reveals that all the variables are non-stationary at the level, with the exception of interest rate (INT). According to Chigusiwa *et al.,* (2011), in the presence of 1(2) variables the computed F-statistics of the bounds test are rendered invalid. Hence, with the existence of series into 1(1) lead to the application of ARDL as theoretically supported.

Table 3. *Bounds F-test results for cointegration*

Dependent variable	Function	F-statistic
MSO	F_{MSO}(MSO,CPS,MS,LR,SAV,EXR)	6.384301*
CPS	F_{CPS}(CPS,MSO,MS,LR,SAV,EXR)	10.76372*
MS	F_{MS}(MS,MSO,CPS,LR,SAV,EXR)	13.39719*
LR	F_{LR}(LR,MSO,CPS,MS,SAV,EXR)	4.681325*
SAV	F_{SAV}(SAV,MSO,CPS,MS,LR,EXR)	36.44299*
EXR	F_{EXR}(EXR,MSO,CPS,MS,LR,SAV)	3.773976*
Asymptoticcritical value	10% 5%	1%
Lower bound	2.082.39	3.06
Upper bound	3.003.38	4.15
F-statistic	Value = 13.59203*	K = 5

Table 3 tests whether long-run relationship existsamong the variables. The result of the bound tests for cointegration is presented in all functional models. The fact is that, the computed F-statistic for various functional models was discovered to be greater than both lower and upper bounds at 1%, 5% and 10% levels of significance. Hence, this suggests the rejection of null hypothesis that there is no long-run relationship between banks' credit and manufacturing sector output in Nigeria. However, as stated earlier, the bound test results also indicate that when all the independent variables are taken as dependent variables, the computed F-statistic is higher than both lower and upper bound critical value at all levels. This also indicates the rejection of null hypothesis of no long run relationship among the variables under study.

Table 4. *Results of estimated long run coefficients using ARDL approach ARDL, (2, 2, 1, 0, 2, 0) selected based on Akaike information criterion*

Regressor	Coefficient	Standard error	T-ratio
Dependent variable: MSO			
CPS	9.334175	34.298252	0.272147
MS	9.377473	34.274272	0.273601
LR	-331.04788	1162.217959	-0.284841
SAV	-29.767175	110.305722	-0.269861
EXR	-44.768466	160.279761	-0.279315
C	10229.6487	30377.736453	0.7407

Source: author's computation using EVIEWS software. *,**,*** indicate the level of significance at 1%, 5% and 10% respectively.

Table 4 indicates the existence of a long run relationship between the dependent variable (BOP) and independent variables. The long run coefficients are estimated using the ARDL. The ARDL model is estimated by setting the maximum lag length to be 2 and using Akaike Information Criterion in selecting the optimum lag order for the model. This was based on automatic selection. From the model, the estimate shows that holding all variables constant, MSO was positively influenced by 10229.6487. The coefficient of CPS is positively related to MSO but notstatistically significant. This means that 1% increase in credit to private sector in Nigeria will result into 9.33% increase in the level of manufacturing sector output, which is in line with monetary theory. The coefficient of MS is positively related to MSO but not statistically significant, indicating that 1% increase in money supply in Nigeria will result to 9.38% increase in the level of manufacturing sector output, which is in line with monetary theory. This result is in line with the findings of Kalu *et al.,* (2017), Bada (2017) and Imoughele & Ismaila (2013)

More so, the coefficient of LR is negatively related to MSO and not statistically significant, showing that 1% increase in lending rate in Nigeria will result into -331.0%a decline in the level of manufacturing sector output. The negative relationship conforms to the classical theory thatwhen the rate of interest rises, saving rises and investment declines. This result is in line with the findings of Kalu *et al.,* (2017)

The coefficient of SAV is negatively related to MSO but not statistically significant. This indicates that 1% increase in savings in Nigeria will result into 29.7 % decrease in the level of manufacturing sector output. The negative relationship conforms to the classical theory that when the rate of interest rises, saving rises and investment declines. The coefficient of EXR is negatively related to MSO but not statistically significant, indicating that 1% increase in exchange rate in Nigeria will result into 44.8% a decrease in the level of manufacturing sector output.This result is in line with the findings of Kalu *et al.,* (2017).

Table 5. *Error correction representation for the selected ARDL model ARDL, (2, 2, 2, 1, 2, 2, 1) selected based on Akaike information criterion*

Regressor	Coefficient	Standard error	T-ratio
Dependent variable: ΔBOP			
ΔCPS	0.437977	0.134051	3.267246
ΔMS	0.368667	0.116215	3.172282***
ΔLR	0.392881	7.815618	0.050269
ΔSAV	-1.296599	0.350816	-3.695953
ΔEXR	-1.288995	0.890263	-1.447881*
ECM (-1)	-0.024550	0.152215	-0.161285*
R^2	91%		
D.W	2.16		

Source: author's computation using EVIEWS software. *,**,*** indicates the level of significance at 1%, 5% and 10% levels respectively. Δ represents all short run coefficients at their first difference, while the values in the parentheses are the p-values.

Table 5 shows an estimated coefficient value of ECM (-1) (-0.024550) implying that the variables are well defined given the usual negative sign of (-0.024550) which enables it to adjusts to equilibrium position whenever the system is out of equilibrium. The ECM value is less than unity and statistically significant at 1%. The estimated coefficient shows that about 2% of this disequilibrium in the economy is corrected annually. In other words, almost 2% of the equilibrium of the previous year's shock is adjusted back to the long-run equilibrium in the current year. The negative sign confirms our earlier findings that MSO and its independent variables are cointegrated. The value of Durbin-Watson (2.16), which falls between the range 1.7 and 2.3 and that the value of DW is greater than R^2 (91%), means that the model is adequate and not spurious. The coefficient of determination R^2 is 0.635367 indicating that about 91% of the variation of MSO was explained by the variables controlled in the model between the year 1986 and 2016 while the

remaining 9% were explained by other variables not captured by the model, which is represented by the error term. In addition, the result shows that the F-statistic is 13.59203 showing statistical significance at 1% level.

The short-term dynamic of the model has been examined by estimating an error correction model. In the short run, the deviations from the long run equilibrium can occur as a result of the shocks in any of the variables in the model. Table 5 shows the result of the short run dynamic coefficients associated with the long-run relationships obtained from error correction model. The signs of the dynamic impacts in the long-run coefficients are maintained in the long run with the exception of (LR) lending rate.

Table 6. *Results of Granger causality tests*

Null Hypothesis	Lags	Obs	F-statisic	P-value
CPS does not Granger cause MSO	2	30	9.45167	0.0048
MS does not Granger cause MSO	2	30	8.79045	0.0063
MSO does not Granger cause LR	2	30	3.12342	0.0885
MSO does not Granger cause SAV	2	30	4.64279	0.0403
MSO does not Granger cause EXR	2	30	5.73203	0.0098
CPS does not Granger cause MS	2	30	7.72688	0.0054
CPS does not Granger cause LR	2	30	3.61862	0.0679
CPS does not Granger cause SAV	2	30	12.9136	0.0013
CPS does not Granger cause EXR	2	30	4.89361	0.0356
MS does not Granger cause LR	2	30	4.12002	0.0523
SAV does not Granger cause MS	2	30	6.99501	0.0135
MS does not Granger cause EXR	2	30	5.06436	0.0328
EXR does not Granger cause MS	2	30	4.01664	0.0552
SAV does not Granger cause LR	2	30	3.65317	0.0666
EXR does not Granger cause LR	2	30	7.87754	0.0092
SAV does not Granger cause EXR	2	30	6.03626	0.0207

Source: author's computation using EVIEWS software.

6.6. Interpretation of results of Granger causality test

Table 4.6 provides the results of granger causality tests. The decision on the direction of causality was made from the probability values of the test. The results indicate an evidence of unidirectional causality running from CPS to MSO, MS to MSO, MSO to EXR, CPS to MS, CPS to SAV and from EXR to LR all at 1% level of significance. The results also indicate an evidence of unidirectional causality running from MSO to SAV, CPS to EXR, SAV to MS and from SAV to EXR all at 5% level of significance. The results also indicate an evidence of unidirectional causality running from SAV to LR, CPS to LR, MS to LR and from SAV to LR all at 10% level of significance. The results also indicate an evidence of bidirectional causality running from MS and from EXR both 5% and 10% levels of significance. It is noteworthy that the main determinants of MSO are EXR, SAV and LR. The main determinant of SAV which in turn influences MSO is LR.

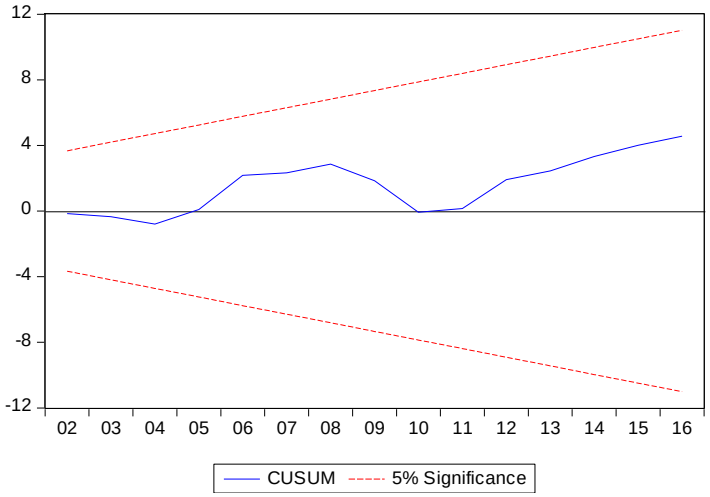
Table 7. *Post-estimated diagnostic test results for VECM*

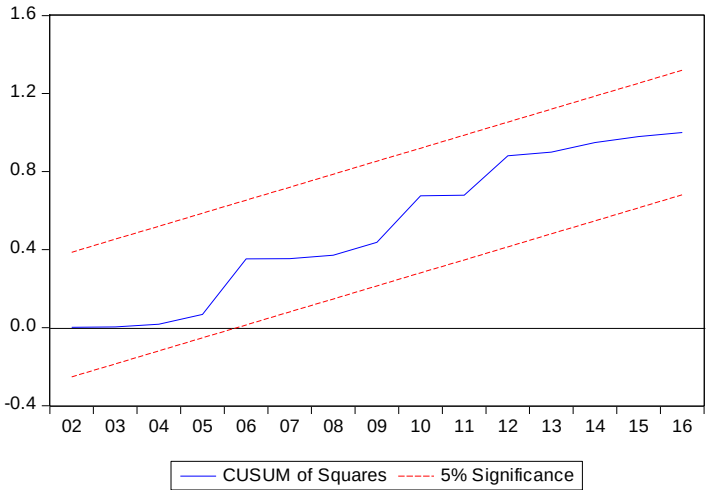
Tests	Coefficient/JarqueBera	P- Value
Serial Correlation LM Test	1.963921	0.3746
Residual Heteroskedasticity Test	6.234996	0.9038
Jarque-Bera Residual Normality Test	1.746697	0.417551

As presented in table 7, there is no evidence of diagnostic problem with the model. The lagrange multiplier (LM) test of serial correlation indicates the evidence of no serial correlation with P-value of 0.3746. The Breusch-Pagan test (BP) for heteroskedasticity shows that the disturbance term in the model is homoskedastic with P-value of 0.9038. Also, the Jargue-Bera normality test implies that the residuals are normally distributed with P-value of 0.417551 and thus, the ARDL model is correctly specified given that all the P-values are greater than 5% level of significance.

7. Stability of the estimated parameters

Model stability is necessary for prediction and economic inference. This is regarded as a sufficient condition, hence the study employed stability test for estimated parameters by using the cumulative sum of recursive residual (CUSUM) and cumulative sum of square (CUSUMS Q) tests. The graphical presentation of these tests is presented in the figures 3 and 4.





The results of the CUSUM and CUSUMSQ test are represented in figures 3 and 4 for the short run equilibrium respectively. Figure 3and 4 indicate that the model is stable, since CUSUM and CUSUM square lines are both within the 5 percent critical bound. This indicates that the coefficients of the error correction model are stable.

8. Conclusion and recommendation

The main topic of discussion was not only to empirically investigate the impact of banks' credit on manufacturing sector output, but also to relate the findings of this study to the theoretical propositions related to this study as well as the related previous studies. However, based on the findings of this study, we conclude that bank credit contributed positively to manufacturing sector output in both short-run and long-run. For causality relationship, EXR, SAV and LR granger cause MSO. Hence, the main determinants of MSO are EXR, SAV and LR

Noteworthy is the fact that the policy implication of this is that banks' credit which has been preponderant in Nigeria especially since 1986 has not been very

useful in promoting the manufacturing sector output due to its insignificance. It is important to stress that the results of the study are based on the proxies employed and that the findings may be country-specific.

Therefore it was recommended amongst other things 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.

References

Adelegan, O.J. (2011). Infrastructure deficiencies and investment in manufacturing firms in Nigeria. *Journal of Economics and International Finance*, 3(9), 542-552.

Andabai, P.W. & Eze, G.P. (2018). Bank credit and manufacturing sector growth in Nigeria: A causality investigation. *International Journal of Economics, Commerce and Management*, 6(3), 326.

Bada, O.T. (2017). The effect of banks' credits on the development of manufacturing and agricultural sectors of Nigeria's economy. *International Journal of Advanced Studies in Economics and Public Sector Management*, 5(1), 114-130.

Kalu, E.U., Alice, C.O., Chioma, D.O., Augustina, O.N. & Chinwe O. (2017). The relative impact of bank credit on manufacturing sector in Nigeria. *International Journal of Economics and Financial Issues*, 7(2), 196-201.

Gujarati, D. (2007). *Basic Econometrics*; 3rd Edition, McGraw. Hill, New York.

Imoughele, L.E. & Ismaila, M. (2013). Commercial bank credit accessibility and sectoral output performance in a deregulated financial market economy: Empirical evidence from Nigeria, *Journal of Financeand Bank Management*, 1(2), 36-59.

Jhingan, M. L (2003). *Macroeconomic Theory*. Vrinda Publications Ltd.

Nnamocha, P.N. & Charles N.E. (2015). Bank credit and agricultural output in Nigeria. *British Journal of Economics, Management & Trade*, 10(2), 1-12.

Nwanyanwu, O.J. (2010). An analysis of bank credit on the Nigeria economic growth (1992-2008). Jos J. Econ., 4, 43-58.

Nwokoro, A.N. (2017). An analysis of banks' credit and agricultural output in Nigeria. *International Journal of Innovative Finance and Economics Research*, 5(1), 54-66.

Ogar, A., Nkamare, S.E., & Effiong, C. (2014). Commercial bank credit and its contributions on manufacturing sector In Nigeria. *Research Journal of Finance and Accounting,* 5(22), 188-196.

Oluwafemi, O., Enisan, A.A. & Elumilade, D.O. (2014). Impact of bank credit on the real sector: Evidence from Nigeria, *Global Journal of Business Research*, 8(3), 39-47.

Spencer, H.M. (1977). *Contemporary Macroeconomics*. 3rd Eds., Worth Publishers, New York.

Tomola, M.O., Adebisi, T.E., & Olawale, F.K. (2011). Bank lending, economic growth and the performance of the manufacturing sector in Nigeria. *European Scientific Journal,* 8(3), 19-36.

Udoka, C., Anyingang, R.A., & Tapang, A.T. (2012). An empirical analysis of the effect of interest rate management policies in Nigeria 1970-2010. *Journal of Business and Management*, 4(6), 5-10. doi. 10.9790/487X-0460510

Onyeiwu**,** C. (2012). Monetary policy and economic growth of Nigeria**.** *Journal of Economics and Sustainable Development*, 3(7), 62-71.

Pandey, L. (1999). *Financial Management.* 3rd Ed. London: McGrraw-Hill Inc.