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Commercial Bank Credits and Industrial Subsector's Growth in Nigeria

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ABSTRACT

This study investigates the impacts of commercial bank credit on Nigeria industrial subsectors between 1972 and 2012. Econometric Error Correction Model (ECM) was employed to estimate the output response of the three subsectors namely: the manufacturing; mining and quarry; and real estate and construction subsectors to commercial bank credits, as well as the response of aggregate output of the entire industrial sector to subsector's output and their commercial bank credits. The results of estimation indicate the following: 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 indispensible in stimulating industrial sector growth in Nigeria.

Key word: Bank, Credits, ECM, Industrial subsectors, Nigeria

I.INTRODUCTION

The industrial sector is a major catalyst for sustainable growth and development and banks as the credit providers have crucial role in the production facilities in the sector. According to demand following hypothesis, economic growth leads to financial developments, while the reverse relationship is suggested by supply – leading hypothesis (King and Levine, 1993; Levine and Zervos ,1998; Rajan and Zingales,1998; Levine and Loayza, 1999; Kar and Penecost, 2000; Levine, 2004; Kelly and Everett ,2004; Favara, 2007; Mishra, and Pradham, 2009; etc).

However, the recent global financial crisis has stressed the importance of studying in a more careful way the interrelationships between real economy, banking sector and financial system, thus, banks have the expertise in extending credit to borrowers, especially those who do not have access to other type of credit. If banks adjust their loan supply following a change in the stance of monetary policy, it is expected that such an adjustment should influence the real sector activity to the extent that some borrowers should have to reschedule their spending decisions, but to what extent is this case in Nigeria's industrial subsectors?

Commercial bank credit and industrial sector growth link is not a recent discovery. Its debate has a long pedigree and is marked with conflicting conclusions. The difference in conclusions is due not only to difference in theoretical perspectives, but also to the way in which the link between them is taken into account by researchers. Although most research works favour positive effect of bank credits on industrial sector growth (Gurley and Shaw ,1955;; McKinnon,1973; Shaw,1973; Diaku ,1972; Adve, 1980; Idowu, 1993; Nkurunziza, 2005b; Vazakidis and Adamopoulos, 2009; etc).

On the other hand, a numbers of studies concludes that the prevalence of insignificant positive and negative correlation over time between financial development and real sector growth in individual countries clearly poses a serious challenge to those who claim a general positive relationship between the two important variables (Schatz, 1964; Ajayi, 2000; Ho, 2002; Bloch and Tang, 2003; Loayza and Ranciere, 2006; Ovia, 2008; etc).

Following bank consolidation policy in 2004, commercial banks in Nigeria are now highly liquid but they believe that giving credit to the industrial sector is very risky because of political instability, incessant Bombings by Boko Haram, Kidnappings in the Niger Delta by the Militants. Uncertainty of some of these industries surviving to repay back their facilities (loans).Consequently, banks charge high interest rates, demand high levels of collateral and make few loans of more than a year term. In addition to the above, high interest rate in the Nigerian financial system is a reflection of the extremely poor infrastructural facilities and inefficient institutional framework necessary to bring about substantial reduction in the risk associated with financing an extremely traumatized economy ((Saint-Paul, 1992; and Nkurunziza, 2005a).

The controversy surrounding financial credits versus real sector-cum-economic growth nexus as well as the new challenging economic environment as articulated above and the overall fact that economic events have a way of

changing economic models makes this study pertinent in taking bank credits-real sector nexus to three subsectors of Nigeria's industrial sector namely:
Manufacturing, mining and quarry, and real estate and construction which to the best of our knowledge has not been investigated at least using a dynamic technique such as the Error Correction Model (ECM).

2.0 Review of Related Literature

2.1 The Concept of Bank Credit

Credit is the extension of money from the lender to the borrower**.** Ajayi (2000) noted that credit implies a promise by one party to pay another for money borrowed or goods and services received. Credit cannot be divorced from the banking sector as banks serve as a conduit for funds to be received in form of deposits from the surplus units of the economy and passed on to the deficit units who need funds for productive purposes. Banks are therefore debtors to the depositors of funds and creditors to the borrowers of funds.
According to CBN (2003), the amount of loans and advances given by the banking sector to economic agents constitute bank credit. Credit is often accompanied with some collateral that helps to ensure the repayment of the loan in the event of default. Credit channels savings into investment thereby encouraging economic growth. Thus, the availability of credit allows the role of intermediation to be carried out, which is important for the growth of the economy.

2.2 Bank Credit – Real sector and Economic Growth Nexus

Starting from the relationship between bank credit and economic growth as a whole, King and Levine (1993), which was followed by Levine and Zervos (1998) which argued that bank credit and growth are positively correlated. Once it was established that bank credit is important for the economic growth, one of the following challenges in the economic literature is the importance of banking market structure and its effect on economic growth.
Rajan and Zingales (1998) put a cornerstone in the research about financial markets and growth. They find that industries in need of external finance grow faster in countries with more developed financial markets. They use U.S. firm level data to estimate the external financial dependence of different manufacturing sectors. Their basic assumption is that financial markets are well developed in the U.S., so the firms can borrow at the desired amount, which is determined only by the demand of the firm for external finance. Their view suggests that markets with concentrated and less competitive banks are not growing at their best potential, since firms do not have access to credit, which leads to less growth.
Levine and Loayza (1999), Anders identified strong causal impact of real per capita GDP growth and per capita productivity growth on banking sector development. He saw loans as capable of altering the path of economic progress by affecting the allocation of savings and not necessarily affecting the saving rate.
Kar and Penecost (2000), using several proxies for financial development and economic growth, search for a cointegrating relationship between these variables over the period of 1963–1995 with annual data for Turkey. They estimate a vector error correction model for non-stationary variables and a cointegrated relationship. Their results reveal that all causal relationships between finance and growth depend on the measures of financial development. Although on balance the demand-following hypothesis is stronger. The proxies for bank deposit, private sector credit and domestic credit are all indicating that economic growth causes financial development. In all their results are inconclusive.
Kelly and Everett (2004) in Ireland were of the view that ready availability of credit can itself be a factor in the growth process. The growth of the Irish Economy in the 1990s was linked to the private sector credit made available to sectors which were relatively important to employment creation. Growth in these sectors namely – Manufacturing, Building and Construction, Hotels and Catering and Education in turn helped to maintain the strong real growth in the economy. He cautioned, however, that monetary growth in excess of potential could be inflationary, as over extension of credit could lead to financial crises. He opted for a balance between Macro-Economic policies-bank regulation, legal framework and corporate governance.
Favara (2007) examines the empirical relationship between financial development and economic growth. He has two main conclusions. First cross section and panel data instrumental variables regressions reveal that financial development and economic growth are correlated but financial development does not cause economic growth. Second, there is evidence that this relationship is quite heterogeneous across countries. However, he states that there is no clear indication that finance spurs economic growth.
Mishra, Das and Pradham (2009) examine the credit market development and the direction of causality that runs between credit market development and the economic growth in India for the period of 1980 – 2008. They found the evidence in support of the fact that credit market development spurs economic growth. The empirical investigation also indicates positive effects of economic growth on credit market development of the country.

In spite the positive bank credit – real sector/economic growth nexus by authors reviewed above and others, that bank credits can foster real sector growth and economic development. Some scholars still maintain a negative nexus or at best no relationship between the two important variables. For instance, Ho (2002), in his studies in Macao, a visible correlation between economic growth and financial intermediation seems not to exist. But, given the level of total cost, if one assumes that the availability of bank credit allows firms to stock fewer raw materials in warehouses, their output would increase as a result.

Bloch and Tang (2003) reach the conclusion that the prevalence of insignificant positive and negative correlation over time between financial development and economic growth in individual countries clearly poses a serious challenge to those who claim a general positive relationship between the two important variables.

Loayza and Ranciere (2006) have provided evidence for the argument that there is a negative and significant impact of banking credit on economic growth in the short-run but the impact becomes positive and significant in the long run.

The heterogeneous and inconclusive result on this subject Mather is also evidence in some studies conducted in Nigeria. For instance, Schatz (1964) saw the importance of capital in different perspective. He raised the issue of capital shortage in the finance of manufacturing sub–sector in Nigeria. Most of the Nigerian businessmen believe that inadequate capital is their main business handicap, but Schatz revealed that what really existed in Nigeria were the shortage of viable projects and not the issue of capital. He provided empirical evidence using loans operations of the Federal Loans Banks (FLB), which gave loans only to firms that had been well established. He introduced concept of effective demand (for capital) where he mentioned that those with projects which the potential lenders adjudged unworthy have a desire for capital but not effective demand for capital. The security rejectees have a desire but not an effective demand for capital. In his analysis he showed that the large false demand for capital creates the illusion that there is a shortage of capital. But the record indicates that true situation is the converse of capital shortage. Instead of a large number of viable projects variety seeking capital, the situation has been one of capital variety seeking viable private projects. He concluded by generalizing the thesis and applying it to the country (Nigeria) as a whole by saying that the prevalence of false demand for capital throughout the entire country is virtually beyond dispute.

However, Diaku (1972) could not reason with Schatz in this direction. He pointed out that the problem facing manufacturing industries in Nigeria is that of shortage of capital and not capital variety seeking viable private projects as demonstrated by Schatz. He gave four assumptions under which Schatz's thesis could not hold and he showed that all the assumptions could not be upheld. He developed another concept of effective demand and in the conclusion of his analysis he said we must discard the thesis (Schatz' thesis) as providing no satisfactory operational foundation for either evaluating the capital situation in Nigeria or in any other developing country. At best it is an appealing but misleading empirical hypothesis which by the logic of the author's methodology is incapable of proof.

Diaku (1972) in explaining alternative sources of capital surplus illusion showed that there was an error in fact and logic in Schatz's thesis and that he placed more emphasis on effect rather than causation. For example, with regards to viable projects, where Schatz argues that the shortage could be caused by a lack of entrepreneurial capacity, using this term to refer to experience, training, knowledge and everything else that goes to make up the ability of the business man himself, he explained that the significant shortages in the Nigerian private industrial sectors are entrepreneurial training and knowledge, managerial skill and infrastructure and that once these shortages are removed most viable projects will be revealed. He, concluded that it was not viable project per se that are in short supply in Nigeria, but the factors preventing the detection of viable projects, and these factors were in themselves broader aspects of capital shortage. Perhaps one way of redressing this could be through credit from commercial banks.

Idowu (1993) studies economic significance of information savings and credit in contemporary Nigeria. Their finding was that savings and credits of low income group in Nigeria do have significant impact on capital formation and economic development. The study was however limited to South-Western Nigeria.

Saint-Paul (1992) With regard to external finance in Nigeria, harsh environment hinders financial institutions in developing manufacturing sub-sector. Commercial banks' ability to pool risks across many investment projects promotes growth by promoting higher and safer returns to individual investors. If the risk from sectoral shocks is efficiently shared portfolio diversification may also encourage specialization, and thus productivity growth. Furthermore, the presence of banks or insurance companies reduces the need to hold savings in liquid and thus secures additional funds for investment in productive capital.

The inconclusive nature of results of studies on the relationship between bank or financial institution credits and real sector growth in the face of dynamic economic phenomena underscored the importance of this study in Nigeria's context with a new emphasis on specific subsectors of the industrial sector for policy articulation.

3.0 Data model and research Techniques

3.1 Data and Sources

The data employed in this study were obtained from Central Bank of Nigeria (CBN) Statistical Bulletin (CBN, 2012) and National Bureau of Statistics (NBS) Annual Abstract of Statistics (various issues). The empirical analysis covers the period 1970 to 2011 (41 observations). Time series data were employed in the estimation of the models. They include time series data on: Industrial Gross Domestic Products (INDGDP), Manufacturing Gross Domestic Products (MANGDP), Mining and Quarry Gross Domestic Products (MINGDP), Real Estate and Construction Gross Domestic Products (RECGDP), Bank Credits to Manufacturing sub-sector (MANBC), Bank Credits to Mining and Quarry (MINBC), Bank Credits to Real Estate and Construction (RECBC), Interest rate (INTR) and Real Exchange rate (EXR).

3.2 Model Specification

3.2.1 Impact of bank credits on manufacturing sub- sector in Nigeria

The models are specified based on conceptual framework/ theories of bank credit and interest rate. Many studies establish relationship between bank credits and real sector growth (Rajan and Zingales,1998; Levine and Loayza, 1999; Kar and Penecost, 2000; Levine, 2004; Kelly and Everett ,2004; Favara, 2007; Mishra, and Pradham, 2009; etc). Again interest rate and exchange rate are important in real sector borrowing and growth (Rao, 1988; Lane, 1989; Usman, 1999; etc). Accordingly, we specify that:

MANGDP = f(MANBC, INTR, EXR, U) ---------- (1a)

Where,

MANGDP = Manufacturing Gross Domestic Products
MANBC = Bank Credits to Manufacturing sub-sector
INTR = Interest rate
EXR = Real Exchange rate
U = Stochastic error term.

Expressing equation (1a) in linear form, we have:

$MANGDP = a_0 + a_1 MANBC + a_2INTR + a_3EXR + U$---------- (1b)

Thus, a_1, a_2---------a_3 are coefficients of economic relationships.

The apriori expectation is that $a_1 > o$, a_2 and $a_3 < o$,

3.2.2 Impact of bank credits on mining and quarry sub- sector in Nigeria.

Similarly, we specify that:

MINGDP = f(MINBC, INTR, EXR, U) ---------- (2a)

Where,

MINGDP = Mining and Quarry Gross Domestic Products
MINBC = Bank Credits to Mining and Quarry sub-sector

Other variables apply as defined earlier

Expressing equation (2a) in linear form, we have:

$MINGDP = b_0 + b_1MINBC + b_2INTR + b_3EXR + U$---------- (2b)

b_1, b_2---------b_3 are coefficients of economic relationships

The apriori expectation is that $b_1 > o$, b_2 and $b_3 < o$,

3.2.3 Impact of bank credits on real estate and construction in Nigeria.

Again, we specify that:

RECGDP = f(RECBC, INTR, EXR, U) ---------- (3a)

Where,

RECGDP = Real estate and construction Gross Domestic Products
RECBC = Bank Credits to Real estate and construction sub-sector

Other variables apply as defined earlier

Expressing equation (3a) in linear form, we have:

$RECGDP = c_0 + c_1RECBC + c_2INTR + c_3EXR + U$---------- (3b)

c_1, c_2---------c_3 are coefficients of economic relationships

The apriori expectation is that $c_1 > o$, c_2 and $c_3 < o$,

3.2.4 Impact of bank credits on industrial sector in Nigeria.

We also specify that:

INDGDP = f(MANBC, MINBC, RECBC, INTR, EXR, U)----------(4a)

Where,

INDGDP = Industrial sector Gross Domestic Products

Other variables apply as defined earlier

Expressing equation (4a) in linear form, we have:

$INDGDP = d_0 + d_1 MANBC + d_2MINBC + d_3RECBC + d_4INTR + d_5EXR + U$------ (4b)

d_1, d_2---------d_5 are coefficients of economic relationships

The apriori expectation is that $d_{1,}$ d_2 and d_3 > o, d_4 and d_5 < o

3.3 Estimation Techniques

In this subsection, we examine the time series characteristics of the variables to be modeled, testing for stationarity and cointegration of the variables in all the equations under consideration.

3.3.1 Unit Root Tests

We need to know the underlying process that generates our time series variables that is, whether the variables are stationary or non-stationary. Non-stationary variables might lead to spurious regression. In this case the results may suggest statistically significant relationships between the variables in the model, when in fact this is just evidence of contemporaneous correlations (Engle and Granger, 1987). A series is stationary if it has a constant mean and constant finite variance. For example, a time series X_t is stationary if its mean $\Sigma(X_t)$ is independent of time and its variance $\Sigma(X_t - \Sigma(X_t)$ is bounded by some finite number and does not vary systematically with time. It tends to return to its mean with the fluctuation around its mean having a constant amplitude.

In contrast, a non-stationary series has a time varying mean (or variance) and cannot normally be referred to without reference to some particular time period. We would use the augmented Dickey Fuller (ADF) tests to examine our variables for the presence of a unit root (an indication of non-stationarity) since it can handle both first order as well as higher order auto-regressive processes by including the first difference in lags in the test in such a way that the error term is distributed as white noise (that is stationary) through the inclusion of additional length (Dickey and Fuller, 1981). The ADF test for unit roots requires the following regression:

$$\Delta Y_t \quad = \quad \alpha + \beta Y_{t-1} + \sum_{i=1}^{di} \Delta Y_{t-i}\, 1 + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where

ΔY_t = the first difference of Y_t

β = test coefficient

e_t = white noise

A unit root test implies testing the significance of β against the null that β = 0.

The decision rule states that the t-statistics on the coefficient of the variable (β) which is expected to be negative, must be significantly different from the critical values for a given

sample size if the null hypothesis is to be rejected. The null hypothesis is that the variable of interest is non stationary. That is, integrated of order one. If this is accepted, the series is non-stationary. In this case, differencing the series will yield a stationary series that is the process is difference stationary. A series is said to be integrated of order d if it becomes stationary after differencing d times. It is written as 1(d). A stationary series is an 1(0) series.

3.3.2 Co Integration Analysis

In a regression involving non-stationary variables, spuriousness can only be avoided if a stationary cointegration relationship is established between the variables. The concept of cointegration states that if there is a long-run relationship between two variables then the deviation from the long-run equilibrium path should be bounded and if this is the case then the variables is cointegrated. Two conditions must be met for variables to be cointegrated. First, the series must have the same order of integration. Second, there must be some linear combination (r) of variables which must be almost of order one less than the number of individual variables (n) that is r=n-1. If r = n, then the series are stationary and cointegrated (Adams, 1993).

The co-integration test helps determine the existence of long-run equilibrium relationship among the set of variables in the model. Johansen test is the most widely used techniques for testing co-integration.

3.3.3 Error Correlation Model (ECM)

If the null for no co-integration is rejected, the lagged residual from the co-integrating regression are imposed as the error correction model (ECM).

The (ECM) has been shown to better capture the short-run dynamics of the relationship. In estimating an error-correction model, one takes the residuals from the co-integrating equation and includes them as an error correction term (ECM_{t-1}) with one period lag. A statistically significant coefficient of the error correction term implies disequilibrium in the long run relationship and provide speed of adjustment from short-run to long-run equilibrium.

4.0 Results

4.1 Results of Stationarity Tests

Testing for the existence of unit roots is a principal concern in the study of time series models and cointegration. The presence of unit root implies that the time series under investigation is non-stationary; while non-existence of unit root show that the stochastic process is stationary (Iyoha and Ekanem, 2002). The time series behaviour of each of the series using the Augmented Dickey-Fuller and Philips-Peron test are presented in table 1.

The results in table 1 show that all the variables except interest rate "INTR" in both ADF and PP tests are non stationary at levels but became stationary at first difference 1(1) in both ADF and PP test. This is deduced from the fact that the absolute values of both the ADF and PP test statistics of INTR before differencing is greater than the critical values at 10 percent significance levels. For the other variables, this is the case only after differencing once.

Table 1: Showing results of stationarity tests

Variable	ADF	Decision	Philip Perron	Decision
INDGDP	-5.4217*	1(1)	-7.0228*	1(1)
MANGDP	-68197*	1(1)	-11.9117*	1(1)
MINGDP	-4.3304*	1(1)	-5.0664*	1(1)
RECGDP	-4.4131**	1(1)	-6.4199**	1(1)
MANBC	4.4634*	1(1)	-4.6501*	1(1)
MINBC	-4.9052*	1(1)	-5.2145*	1(1)
RECBC	-4.3201*	1(1)	-3.6630*	1(1)
EXR	-4.0211*	1(1)	-6.3099*	1(1)
INTR	-2.6162	1(0)***	-2.7711***	1(0)

Source: Extracted from Unit Root Results Provided by E-view Econometric software.

Note: (i) 1(0) represents decision at level and 1(1) represents the first difference operator (ii) critical values, ADF test: 1 percent = -3.6067, 5 percent = -2.9378 and 10 percent = -2.6069. Philips-Peron: 1 percent = -3.6019, 5 percent = -2.9358 and 10 percent = -2.6059 (iii) *, ** and *** means significant at 1, 5 and 10 respectively.

4.2 Results of Impact of bank credits on manufacturing sub- sector in Nigeria

Johansen cointegration test results in table 2 showed that there is one co integrating equation at 5 percent significance level. The normalized estimation of the unrestricted cointegrating equation(s) suggests that a unique long-run relationship exist between the dependent variable MANGDP and the regressors (MANBC, INTR and EXR). The identified cointegration equation(s) was used as an error correction term ECM (-1) in the error correction model estimation. This series formed the error correction variables. Table 3 show results of parsimonious estimation of the impact of bank credits on the manufacturing subsector model. Results revealed that the error correction term ECM (-1) is well specified. The coefficient and t-statistic values of ECM (-1) are -0.053387 and -3.979353 respectively. The ECM (-1) had a correct sign and highly significant at 1 percent significance level as indicated by the p-value of 0.0011. The coefficient of ECM (-1) term implied that about 5.33 percent of the disequilibrium

of the previous year's shock adjusted back to long run equilibrium in the current year.

Table 3 also showed that adjusted R^2 obtained from the model estimation is 0.797062. The figure suggests that about 79.7 percent of the variation in the dependent variable (MANGDP) is explained by the combined effects of the explanatory variables. The result show F-statistic figure of 39.29427. It indicates that the overall regression is significant at 1 percent level, while the Durbin Watson statistic figure of 1.801874 indicates absence of serial correlations in the model.

Table 2: Showing results of Johanson cointegration test for manufacturing sub- sector Series: MANGDP, MANBC, INTR, EXR

Test assumption: No. deterministic trend in the data

EigenValue	Likelihood Ratio	5percent critical value	1percent critical value	Hypothesized no of CEs
0.444701	39.94260	47.21	54.46	None
0.253696	17.00087	29.68	35.65	At most 1
0.125651	5.588621	15.41	20.04	At most 2
0.008981	0.351854	3.76	6.65	At most 3

Normalized cointegrating coefficients, 1 cointegrating equation(s)

MANGDP	MANBC	INTR	EXR	C
1.000000	0.017001	-465.2473	-282.0757	2685.458
	(0.00609)	(123.289)	(60.6989)	

Log likelihood -1171.013

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.
L.R. test indicates 1 cointegrating equation(s) at 5% significance level.

Source: *Researcher's Computation*

Table 3: showing results of parsimonious error correction estimation for impacts of bank credits on manufacturing sub-sector.

Dependent Variable: D(MANGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MANBC)	0.576032	0.077733	7.410382	0.0000
INTR	0.013553	0.011913	1.137658	0.2630
EXR	-0.017018	0.004108	-4.142798	0.0002
ECM1(-1)	-0.053387	0.013416	-3.979353	0.0011
C	4.001564	0.518598	7.716124	0.0000
R-squared	0.817876	Adjusted R-squared	0.797062	
Durbin-Watson stat	1.801874	F-stat 39.29427		

Source: *Researcher's Computation*

The results in table 3 show that the coefficient and t-statistic values of bank credits to manufacturing subsector (MANBC) are 0.576032 and 7.410382 respectively. The figures implied that bank credits impacted positively and significantly on the manufacturing sub-sector in Nigeria. This result is in line with Diaku 1972, that it was not viable project per se that are in short supply in Nigeria, but the factors preventing the detection of viable projects, and these factors were in themselves broader aspects of capital shortage. Table 3 also showed that the coefficient of interest rate is 0.013553 and t-statistic figure of 1.137658. The figures implied that contrary to the apriori expectation, interest rate (INTR) impacts positively, but it impacts was insignificant on manufacturing sub-sector in Nigeria.

The results in table 3 also showed that the coefficient of exchange rate (EXR) was -0.017018 and a t-statistic value of -4.142798. These figures implied that exchange rate impacted negatively and significantly on the manufacturing sub-sector in Nigeria. This suggests that exchange rate policy is an important factor in the manufacturing sub-sector of Nigeria economy, and should be considered serious by government. Over-valued exchange rate could be detrimental to Nigeria manufacturing sub-sector.

4.3 Results of Impact of bank credits on mining and quarry sub- sector

Johansen cointegration test results in table 4 showed that there is one cointegrating equation at 5 percent significance level. The normalized estimation of the unrestricted cointegrating equation(s) suggests that a unique long-run relationship exist between the dependent variable MINGDP and the regressors (MINBC, INTR and EXR). The identified cointegration equation(s) was used as an error correction term ECM(-1) in the error correction model estimation. This series formed the error correction variables.

Table 5 show results of parsimonious estimation of the impact of bank credits on mining and quarry subsector model. The results in table 5 revealed that the error correction term ECM(-1) is well specified. The coefficient and t-statistic values of ECM(-1) are -0.000284 and -2.679245 respectively. The figures indicate a no feedback (00%) of the previous year's disequilibrium from the long-run equilibrium. The strong significance of the coefficient of ECM2(-1) further indicates that the dependent variable, (MINGDP), and the explanatory variables: (MINBC, INTR and EXR are indeed cointegrated. The ECM2(-1) had a correct sign and highly significant at 1 percent significance level as indicated by the p-value of 0.0098.

Table 5 show that adjusted R^2 obtained from the model estimation is 0.868205. This suggests that about 86.82 percent of the variation in the dependent variable (MINGDP) is explained by the combined effects of the explanatory variables. The result show F-statistic figure of 52.38282. It indicates that the overall regression is significant at 1 percent significance level, while the Durbin Watson statistic figure of 1.886918 indicates absence of serial correlations in the model.

Table 4: Showing results of Johanson cointegration test for mining and quarry sub- sector
Series: MINGDP, MINBC, INTR, EXR
Test assumption: No. deterministic trend in the data

EigenValue	Likelihood Ratio	5percent critical value	1percent critical value	Hypothesized no of CEs
0.627066	48.81878	39.89	45.58	None
0.180614	10.35094	24.31	29.75	At most 1
0.062026	2.582153	12.53	16.31	At most 2
0.002174	0.084868	3.84	6.51	At most 3

Normalized cointegrating coefficients, 1 cointegrating equation(s)

MANGDP	MANBC	INTR	EXR	C
1.000000	0.017001	-465.2473	-282.0757	2685.458
	(0.00609)	(123.289)	(60.6989)	

Log likelihood -1171.013

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.
L.R. test indicates 3 cointegrating equation(s) at 5% significance level.
Source: *Researcher's Computation*

Table 5: showing results of parsimonious error correction estimation for impacts of bank credits on mining and quarry sub-sector.
Dependent Variable: D(MINGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MINGDP(-1))	0.734148	0.068537	10.71172	0.0000
LOG(MINBC(-1))	0.126265	0.071033	1.777553	0.0844
INTR	-0.009810	0.006958	-1.409814	0.1677
EXR(-1)	-0.005988	0.003239	-1.848718	0.0609
ECM2(-1)	-0.000284	0.000106	-2.679245	0.0098
C	1.384184	0.367585	3.765621	0.0006
R-squared	0.885102	Adjusted R-squared	0.868205	
Durbin-Watson stat	1.886918	F-stat 52.38282		

Source: *Researcher's Computation.*

The results in table 5 show that the previous year Mining and Quarry output MINGDP (-1) was positive and very significant as indicated by its coefficient (0.7341), t-stat value (10.7112) and p-value of 0.000. Hence, the previous year MINGDP is a positive determinant of the current year MINGDP. The results also show that the coefficient and t-statistic values of bank credits to mining and quarry subsector (MINBC) are 0.126265 and 1.777553 with a probability value of 0.0844. Hence, at about 8.4% level of significance, a 100% in bank credit (MINBC) will leads to a 12.62% increase in MINGDP.
Interest rate (INTR) and exchange rate (EXR) had the right negative (-) sign. While INTR was insignificant, EXR was significant at 6% level of significance judging from its p-value of 0.0609.

4.4 Results of Impact of bank credits on Real estate construction sub- sector

Johansen cointegration test results in table 6 showed that there are three co integrating equation at 5 percent significance level. The normalized estimation of the unrestricted cointegrating equation(s) suggests that a unique long-run relationship exist between the dependent variable. The identified cointegration equation(s) was used as an error correction term ECM3(-1) in the error correction model estimation. This series formed the error correction variables.

Table 7 show results of parsimonious estimation of the impact of bank credits on Real estate and construction subsector. The results revealed that the error correction term ECM3(-1) is well specified. The coefficient and t-statistic values of ECM3(-1) are -0.000126 and -1.953104 respectively. The figures indicate a no feedback (00%) of the previous year's disequilibrium from the long-run equilibrium. The coefficient of ECM3(-1) was only significance at 6.4 % level of significance as indicated by the p-value of 0.064. This further indicates that the dependent variable, (RECGDP), and the explanatory variables: (RECBC, INTR and EXR are indeed cointegrated.

Table 6: Showing results of Johanson cointegration test for Real Estate and construction sub- sector in Nigeria

Series: RECGDP, RECBC, INTR, EXR
Test assumption: No. deterministic trend in the data

EigenValue	Likelihood Ratio	5percent critical value	1percent critical value	Hypothesized no of CEs
0.348216	28.52849	39.89	45.58	None
0.218093	11.83487	24.31	29.75	At most 1
0.050318	2.240121	12.53	16.31	At most 2
0.005794	0.226637	3.84	6.51	At most 3

Normalized cointegrating coefficients, 1 cointegrating equation(s)

RECGDP	RECBC	INTR	EXR	RECGDP
1.000000	-0.102427	6.364798	58.46376	1.000000
	(0.11527)	(246.514)	(122.575)	

Log likelihood -1096.170

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.
L.R. test indicates 1 cointegrating equation(s) at 5% significance level.

Source: *Researcher's Computation.*

The results in table 7 show that the previous year bank credits to real estate and construction (RECBC) is a positive determinant of the current year real estate and construction output (RECGDP). The coefficient and t-statistic values of bank credits to previous year real estate and construction subsector (RECBC) are 0.5408and 8.963 with a probability value of 0.000. Hence, at about 0% level of significance, a 100% increase in bank credit to estate and construction (RECBC) will leads to a 54.08% increase in RECGDP. Interest rate (INTR) and exchange rate (EXR) had the expected negative (-) sign. While INTR was insignificant, EXR was very significant at 0.04% level of significance judging from its p-value of 0.0004.

Table 7 also reveals that adjusted R^2 obtained from the model estimation is 0.832594. The figure suggests that about 83.25 percent of the variation in the dependent variable (RECGDP) is explained by the combined effects of the explanatory variables. The result show F-statistic figure of 32.08, It indicates that the overall regression is significant at 1 percent significance level, while the Durbin Watson statistic figure of 1.908 indicates absence of serial correlations in the model.

Table 7: showing results of parsimonious error correction estimation for impacts of bank credits on Real estate and construction sub-sector.

Dependent Variable: D(RECGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RECBC(-1))	0.540800	0.060513	8.936881	0.0000
INTR	-0.008812	0.007381	-1.193803	0.2459
EXR	-0.014389	0.003397	-4.235846	0.0004
ECM3(-1)	-0.000126	6.43E-05	-1.953104	0.0643
C	4.535709	0.363668	12.47212	0.0000

R-squared	0.859379	Adjusted R-squared	0.83259
Durbin-Watson stat	1.908752	F-stat 32.08432	

Source: *Researcher's Computation*

4.5 Results of Impact of bank credits on Aggregate industrial sector

Here, we present the results of the impacts of bank credits to Manufacturing; mining and quarry; and that of real estate and construction on the aggregate output of the entire industrial sector.

Table 8: showing results of parsimonious error correction estimation for impacts of bank credits on the entire industrial sector.

Dependent Variable: D(INDGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MANBC)	0.178855	0.211838	0.844305	0.4096
LOG(MINBC)	0.123640	0.212064	0.583034	0.5671
LOG(MINBC(-1))	0.252590	0.157053	1.608304	0.1252
LOG(RECBC)	0.591417	0.283254	2.087939	0.0513
INTR(-1)	0.005054	0.012754	0.396241	0.6966
EXR	-0.048233	0.008947	-5.391139	0.0000
ECM4(-1)	-7.17E-06	5.87E-06	-1.221404	0.2377
C	3.150152	0.478530	6.582969	0.0000
R-squared	0.946386	Adjusted	R-squared 0.9255	
Durbin-Watson stat	1.733384	F-stat 45.3903		

Source: *Researcher's Computation*

The results in table 8 shows that bank credits to manufacturing (MANBC) and bank credits to mining and quarry (MINBC) had the expected positive sign but, were insignificant. While bank credits to real estate and construction (RECBC) also came out with a positive sign and was significant at 5.1% as indicated by its p-value of 0.051. Hence, RECBC is an important determinant of the current year industrial output (INDGDP). Lag, interest rate INTR(-1) had a positive sign as against the expected negative sign and was insignificant. Exchange rate (EXR) had the expected negative (-) sign and was very significant at 0% level of significance judging from its p-value of 0.000.

Table 8 also reveals that adjusted R^2 obtained from the model estimation is 0.9255. The figure suggests that about 92.55 percent of the variation in the dependent variable (RECGDP) is explained by the combined effects of the explanatory variables. The result show F-statistic figure of 45.34, It indicates that the overall regression is significant at 1 percent significance level, while the Durbin Watson statistic figure of 1.733 indicates absence of serial correlations in the model.

5. Conclusion

The major findings of this study shows that Bank credits impacted positively and significantly on the manufacturing sub-sector in Nigeria, 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 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 lend supports to conclusion of many studies that increase bank credits to industrial sector are indispensible in stimulating industrial sector growth in Nigeria. Perhaps one way of redressing the dwindling nature of Nigeria industrial sector could be through adequate credit from commercial banks.

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