

## Financial Deepening and Manufacturing Sector Productivity in Nigeria

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**Abstract:** Manufacturing firms' productivity has always been the panacea for sustainable economic growth and development. Nigerian economic growth has been very slow due to the abysmally low level of manufacturing sector productivity. In an attempt to promote the sub-sector for high level of productivity there have been several developmental plans and policies implemented by successive governments in Nigeria to deepen the financial system. Despite these efforts, it seems the manufacturing firms have not achieved the desired level of productivity. Based on the foregoing, this study investigated the effect of financial deepening on manufacturing firms' productivity in Nigeria. The data from 1986 to 2017, used for the study, were sourced from the publications of the Central Bank of Nigeria and National Bureau of Statistics. Autoregressive Distributed Lag model was employed to produce the parameter estimates. The validity of the results was examined using Breusch-Godfrey Serial Correlation and Breusch-Pagan-Godfrey heteroscedasticity tests. The findings reveal that financial deepening cointegrate, and has a significant negative effect on the index of manufacturing production in Nigeria. The major implication of this finding is that financial deepening has significant negative effect on manufacturing sector productivity in Nigeria. It is therefore recommended among others that government should rework and re-align the various financial deepening strategies to be properly adapted to the Nigerian financial peculiarities by promoting financial deepening strategies that relax capital market entry requirements to encourage small and medium scale manufacturing firms to be listed on the Nigerian Stock Exchange.

**Keywords:** Manufacturing firms, Productivity, Financial Deepening and Index of Manufacturing Production

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### I. Introduction

Nigeria is a country with the presence of huge human, natural and agricultural resources. In the midst of these, the country has always been referred to as technologically backward and underdeveloped, due to its lack of basic infrastructural facilities in all sectors of the economy, unemployment, high poverty and mortality rates, insecurity of lives and property, and abysmally low level of manufacturing sector productivity (Ojo, 2010; Uwaifo & Uddin, 2009).

Several policies targeted at boosting the productivity of this sector towards the growth of Nigerian economy have been implemented. The policies include the First Development Plan from 1962 to 1968 which focused on import-substituting industrialization, because most of the manufacturing firms depended solely on imported raw materials for their products. The inability of the firms to get vital raw materials locally affected their productivity negatively. During the second Developmental plan, which was from 1970 to 1975, concerted efforts were made to limit the import-substituting industrialization strategy, which characterized the first developmental plan. However, lack of technical know-how on the use of some machineries and relevant raw materials prevented the economy from achieving high level of manufacturing productivity (Ojo, 2010).

The third Developmental plan, from 1975 to 1980, shifted efforts towards establishment of heavy industries due to oil boom. During this period, the major problem that confronted the industrial sector was not funding but the shallow nature of technology in Nigeria. The fourth development plan, which was from 1980 to 1985 was in consonance with the third development plan and retained the strain on large industries. At this period, there was a global economic recession which ignited a sharp fall in the nation foreign exchange earnings. Hence, the manufacturing firms which were import-dependent became unprofitable as a result of dearth of earnings from crude oil export and most of the firms established at that period folded-up and the surviving few

were producing at a very low capacity (Chete, Adeoti, Adeyinka&Ogundele, 2012). Ajokuta Steel Company and Peugeot Nigeria Limited are examples of those firms affected and are yet to recover till date.

Therefore, it was obvious that all the developmental plans implemented to solve the problems of underdevelopment in the country through industrial development failed to achieve the set objectives. Various other policy measures adopted to ameliorate the situation, such as the stabilization measures of 1982, the restrictive monetary policy and stringent exchange rate control measures of 1984, proved ineffective in enhancing manufacturing sub-sector productivity. (Olorunfemi, Obamuyi&Adekunjo, 2013).

The structural weaknesses which retarded the nation manufacturing sub-sector development, made the economy extremely vulnerable to cyclical and random shocks, persisted and warranted the introduction of the Structural Adjustment Programme (SAP) in 1986. According to Ojo (2010), SAP was introduced to restructure and diversify the productive base of the Nigerian economy to promote manufacturing sector productivity and reduce dependence on the oil sector and imports. In order to achieve the main objectives of SAP, Financial reforms were introduced to deepen the Nigerian financial system (Ojo, 2010).

To address some of the bitter lessons learnt through the SAP programme, different Nigeria governments have been particularly diligent in deepening the financial system by reforming the stock markets, and the banking sectors have undergone considerable reforms to ensure their sustainability. Further, Nigerian leaders have been undertaking reforms needed to provide favourable investment climate more than any other developing country outside of Asia, without the expected increase in the manufacturing sector productivity (Ojo, 2010)

The major financial sector reform policies implemented were the deregulation of exchange rate and interest rate, free entry and exit into banking business. Also, the upward review of capital adequacy of banks from 2billion naira to 25 billion naira in 2004; which reduced the number of banks operating in Nigeria from 89 to 25 banks initially and later to 22 banks. The resuscitation of eight dying banks with injection of 620 billion naira in 2009; which resulted in the removal of the banks top executive directors by the Central Bank of Nigeria, following the global financial crisis. Other related policies implemented are; the establishment of the Nigerian Deposit Insurance Corporation (NDIC), strengthening the regulatory and supervisory institutions, introduction of indirect monetary policy instruments and capital market deregulation (Ojo, 2010; CBN, 2017).

The reforms were introduced to liberalize the financial sector in order to broaden and deepen the financial system to stimulate a diversified, strong and resilient banking industry and dependable capital market in the country, thereby increasing their ability to support the real sector to enable manufacturing firm access the required funds to finance production.

With the major financial sector reform policies implemented, the level of financial deepening has been greatly enhanced in Nigeria (Nzotta&Okereke, 2009). Therefore, it is thus expected that a deepened financial system would have a significant positive effect on the performance of the manufacturing firm. Several researchers have also provided proofs that development in the financial system plays a fundamental role in the economic growth of countries, (Ugbaje&Ugbaje, 2014; Garba, 2014; Emeka&Aham, 2013).

However, it is saddening that despite several financial deepening strategies implemented the country appears to have failed to achieve high level of manufacturing productivity. A review of the manufacturing sector in Nigeria indicated that the sector has been performing below capacity, leading to decline in index of manufacturing production. Hence, this study focused on the effect of financial deepening on the productivity of the manufacturing sub-sector in Nigeria from 1986 to 2017.

### **Objectives of the study**

The main objective of this study is to investigate the effect of financial deepening on manufacturing sub-sector productivity in Nigeria. The specific objectives are to;

- Examine the existence of long run relationship among broad money supply, private sector credit and market capitalization and index of manufacturing production in Nigeria.
- Evaluate the effects of broad money supply, private sector credit and market capitalization on the index of manufacturing production in Nigeria

## **II. Literature Review**

### **Empirical Evidences**

Ngongang (2015) examined the relationship between Financial Development and economic growth in Sub-Sahara Africa (SSA), using data obtained from 21 countries. He employed dynamic panel GMM technique and found that there exists a positive link between financial development and economic growth.

Gupta (2011) investigated the differential impact of increased financial development on industrial output, across states and industries in Indian. He used an unbalanced panel of 15 Indian states, 22 industries for 11-year period spanning 1992-2002. The study's most novel contribution was the testing for operating channels through which increased financial depth benefits output. It was found that financial depth facilitates increased

use of contract labour by industries, which in turn reduced the effects of industrial disputes and increases output. However, financial depth failed to directly benefit industries with the greatest need for external financing.

Al-Zubi, Al-Rjoub, and Abu-Mhareb (2006) investigated the relationship between financial development and economic growth, using panel data for eleven Arab countries during the period 1980-2001. They improved on the model developed by Levine (1997) by adding new four financial indicators in the second stage of the empirical test to investigate the effect of public credit ratios on economic growth. They applied Hausman's specification test to examine the fixed and random effects in the panel data. The results revealed that all financial indicators are insignificant and did not affect economic growth. Further, the result of the modified model revealed that only public credit to domestic credit indicator had a significant and positive effect on economic growth, indicating the dominance of the public sector in economic activities and that the financial sector is still underdeveloped and need more efforts to be able to perform its functions effectively in the Arab countries.

Odiambho (2004) studied the impact of financial development on economic growth in South Africa, using Johansen and Juselius co-integration approach and Vector error correction model analytical technique. The study employed three proxies of financial development; which are: the ratio of broad money supply ( $M_2$ ) to gross domestic product (GDP), the ratio of bank claims on the private sector to GDP and the ratio of currency to narrow money against economic growth proxy by real GDP per capital. The findings rejected the supply, leading hypothesis in favour of demand following hypothesis.

Okoye, Nwakoby and Okorie(2016) examined the effect of economic liberalization policy on the performance of the industrial sector in Nigeria. The study specifically investigated the extent to which changes in some key economic indicators like exchange rate, financial deepening, trade openness and lending rate account for the trend in output performance of Nigeria's industrial sector in the post reform period. The study used data from 1986 to 2014 using Vector Error Correction Model. The study found that rate of change in exchange rate, trade openness and lending rate exert significant negative impact on industrial output. Further, a significant positive impact of financial deepening on industrial output was found. The Granger causality result shows weak causal impact of financial deepening on industrial output as well as bi-directional causation between trade openness and industrial output. There is also an evidence of causal impact of industrial output on lending rate, implying that industrial development generates demand for financial resources.

Adeusi and Aluko (2015) investigated the relevance of financial sector development on real sector productivity in Nigeria. The study adapted the financial sector development indicators used in King and Levine (1993) model as predictors of industrial sector productivity. Employing the Ordinary Least Square (OLS) technique, the study found a strong linear relationship between financial sector and industrial sector productivity. The finding indicated that financial sector development is a veritable means to enhance real sector productivity. In a related study, Adeola (2005) examined the effect of financial development on real sector growth in Nigeria. Using the Ordinary Least Square (OLS) approach, the study revealed that financial sector development has remarkable impact on real sector growth in Nigeria. However, his findings further show that private sector credit exhibited a significant negative impact while liquid liabilities and the size of financial intermediaries exert significant positive influence on real sector growth

Ewetan and Ike (2014) investigated the long run and causal relationship between financial sector development and industrialization in Nigeria, using time series data from 1981 to 2011. Their findings provided evidence for a long run relationship between financial sector development and industrialization in Nigeria. Also, it was found that the two measures of financial deepening had contrasting effects on industrial output; while Ratio of private sector credit to GDP has a positive relationship with industrial output, the ratio of broad money supply to GDP has a negative relationship with industrial output. A long-run unidirectional causally, running from industrialization to financial development was also found, thereby supporting the demand following hypothesis.

Edeme and Karimo (2014) examined the impact of economic liberalization on industrial sector performance in Nigeria. The study found that economic liberalization has a significant impact on performance of the Nigerian manufacturing, mining and quarrying, and power subsectors, and on the aggregate industrial sector. From the findings, the interaction of the policy with financial deepening and trade openness dampened the performance of the manufacturing subsector, while its interaction with labour force is growth-enhancing. Also, the interaction of the policy with energy consumption was found to be negative but energy consumption and financial deepening have dampening effect on the performance of the mining and quarrying sub-sector. While it has enhancing impact on the aggregate industrial sector and non-significant on mining and quarrying and power subsectors, economic liberalization reduced the performance of the manufacturing subsector. It was also found that financial deepening has mix impact on the performance of the industrial sector; while it has increasing impact on the aggregate industrial sector, its impact on manufacturing sub-sector is negative.

Agbada and Osuji (2013) studied the trends in financial intermediation and output in Nigeria for the period of 30 years, using the endogenous components of financial intermediation, such as; Demand Deposits

(DD), Time/Savings deposits (T/Sav) and Credits (Loans and Overdraft) to predict the outcome of Gross Domestic Product. The finding shows that though there exist a positive growth relationship between financial intermediation and output in Nigeria, there also exist elements of negative short-run growth relationship for the periods that suffered financial shocks occasioned by the global financial crisis.

Elijah and Uchechi (2012) adopted autoregressive distributed lag (ARDL) co-integration method to analyze the impact of financial development on industrial production growth in Nigeria from 1970 to 2009, using time series data obtained from CBN statistical bulletin. The study found a strong co-integrating relationship between financial sector development and industrial production in Nigeria. Further, the study revealed that both long run and short run dynamic coefficients of financial sector development exhibited significant negative impact on industrial production. The study further posited that the inefficiency of the financial sector is responsible for its adverse effect on industrial sector production in Nigeria. Based on the findings, the study revealed that one of the most important task for Nigerian government is to ensure that further healthy financial sector reforms that will enhance the efficiency of the domestic financial sector are introduced.

Udoh and Ogbuagu (2012) examined financial sector development and industrial Production in Nigeria. Their findings show that both the long run and short run dynamic coefficients of financial sector development variables have statistically significant negative impact on industrial production. The study posited that the most important task for Nigeria government is to introduce further financial sector reforms to improve the efficiency of the domestic financial sector which is a pre-requisite for the achievement of industrial development.

Rasheed (2010) investigated financial development and productivity in the Nigerian manufacturing subsector, using Co-integration and error correction model analytical technique. The study indicates the presence of a long-run equilibrium relationship among index of manufacturing production, determinants of productivity, economic growth, interest rate spread, bank credit to the manufacturing subsector, inflation rates, exchange rate, foreign direct investment and quantity of graduate employment.

### **III. Model Specification**

For the purpose of this study, Auto-regressive Distributed Lag (ARDL) model is used. The idea behind the choice of this method lies in the fact that financial deepening has both short and long-run effect. The choice is buttressed by the fact that some of the variables in the model are stationary at level and the other became stationary at first difference. Nguena and Abimbola(2013) emphasized that lagged or initial variable of financial deepening contributes significantly to the explanation of the current financial deepening. This means that the effect of financial deepening will be felt beyond the year of its adoption, and therefore, the present performance/productivity of manufacturing firms can also influence the future performance.

ARDL model is a standard least squares regression that includes lags of both the dependent variable and explanatory variables as regressors (Brooks, 2008). This has gained popularity as a method of examining co-integrating relationship between variable through the work of Pesaran and Shin (1998) and Pesaran, Shin and Smith (2001). The approach has the additional advantage of producing consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are stationary at level 1 (0), or stationary after first differencing 1(1) (Pesaran & Shin, 1998). Therefore, the model is specified as;

$$Z_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^p \phi_i Z_{t-1} + \beta' x_t + \sum_{i=0}^{q-1} \beta_i' \Delta x_{t-1} + \mu_t \quad \dots\dots 1$$

Where,  $Z_t$  represent the regressive vector, containing observation on the index of manufacturing sector production (MFGI) and  $x_t$  represents the financial deepening proxies; Ratio of Broad Money Supply to GDP (FDMS); Ratio of Private Sector Credit to GDP (FDPC) and Ratio of market capitalization to GDP (RCAP), and controlled variables; Exchange Rate (EXCR), Inflation Rate (INFR), Growth in Government Expenditure (GEP), Interest Rate (INTR) and Ratio of Gross Capital Formation to GDP (RGCF); included to have a well specified model. Also,  $Z_{t-1}$  represents the lags of index of manufacturing sector production and  $x_{t-1}$  represents the lags of financial deepening and controlled variables;

### **IV. Results Analysis and Findings**

#### **Descriptive statistics**

The statistical properties of the variables were examined to know the normality condition, the extent of dispersion and volatility if present. The descriptive statistics is presented in table 1

**Table 1: Descriptive Statistics**

	EXCR	INFR	FDMS	GEP	INTR	MFGI	RFDI		RCAP	RGCF
								<b>FDPC</b>		
Mean	95.59903	19.37375	14.71700	23.57767	18.86438	127.0438	3.136874	0.088314	0.094808	0.128527
Median	115.2551	12.71000	13.09785	20.65715	18.13500	135.7500	2.749500	0.031204	0.026317	0.129655
Maximum	305.5112	72.73000	21.87510	106.0714	29.80000	182.7000	10.83250	0.342895	0.307105	0.192448
Minimum	2.020575	5.400000	9.151700	-26.02530	10.50000	78.20000	0.078060	0.001001	0.000446	0.070324
Std. Dev.	79.04839	17.32316	4.081379	27.26267	3.776921	26.78783	2.348648	0.109143	0.110126	0.028953
Skewness	0.556082	1.718557	0.517036	1.181045	0.889019	0.023364	1.535680	1.017303	0.734161	0.111158
Kurtosis	2.847539	4.896312	1.721932	5.050149	4.529777	2.246907	5.619486	2.520608	1.902476	2.585509
Jarque-Bera	1.680203	20.54634	3.603685	13.04343	7.335517	0.759110	21.72661	5.825923	4.480702	0.294970
Probability	0.431667	0.000035	0.164995	0.001471	0.025534	0.684166	0.000019	0.054315	0.106421	0.862875
Sum	3059.169	619.9600	470.9440	754.4855	603.6600	4065.400	100.3800	2.826044	3.033842	4.112853
Observations	32	32	32	32	32	32	32	32	32	32

Source: E-view 5.0 version output

From the result in table 1, we verified the normality condition of the variables using the Jarque-Berra statistics (JB). The JB statistics tests for the normality of the distribution with the null hypothesis of normal distribution against the alternative hypothesis of not normally distributed. If the probability value as presented in table 1 exceeds 5%, then the null hypothesis of normal distribution is accepted, otherwise it is rejected. Based on the result of the JB probability, we hereby conclude that Index of manufacturing production, (MFGI), exchange rate (EXCR) and financial deepening measured by the ratio of broad money supply to GDP (FDMS), are normally distributed as their respective probabilities are greater than 5% while the null hypothesis is rejected for Ratio of private sector credit to GDP, (FDPC), Ratio of market capitalization to GDP, (RCAP), Ratio of foreign direct investment to GDP (RFDI) and Ratio of Gross capital formation(RGCF), growth in government expenditure (GEP) and inflation rate (INFR) as their probabilities are less than 5%.

The result shows that on the average, the index of manufacturing production is erratic with a standard deviation of 26%, minimum and maximum values of 78.2 in 1986 and 182.7 in 1992 respectively. The result also suggests that the level of financial inclusion is relatively low and non-volatile; this is evidenced as only on average, the financial deepening ratio proxy by the ratio of broad money supply to GDP (FDMS) was 14.72% with a standard deviation of 4.08. Also, the result reveals that exchange rate is highly volatile as the minimum rate recorded for the period was 2.02 in 1986 while the maximum was 305.50 naira per dollar in 2017 and that the maximum amount of foreign direct investment inflow was about 10.8% of GDP in 1994. Further, the result shows that growth in government expenditure was erratic with minimum and maximum values of -26.03 and 106.07 in 2000 and 1993 respectively. This could be attributed to the various types of government dispensation over the period. Further, the results show that exchange rate, inflation rate, financial deepening measured by; the ratio of broad money supply to GDP; Ratio of private sector credit to GDP (FDPC) and Ratio of market capitalization to GDP (RCAP), Ratio of foreign direct investment to GDP (RFDI), Ratio of Gross capital formation (RGCF) and Index of manufacturing production (MFGI), Growth in government expenditure and Interest rate are positively skewed toward normality during the study period. The less than 3 Kurtosis statistics show that MFGI, FDMS, FDPC, RCAP, RGCF and EXCR are Platykurtic while INFR, RFDI, GEP and INTR, with Kurtosis values greater than 3 are leptokurtically distributed

**Unit Root Result**

The study applied Phillips-Perron (PP) test to examine the stationarity of the time series and test the null hypothesis of unit root. It is expected that the series is stationary to find long run relationship among the variables. The test was carried out using 5% Mackinnon Critical value. The levels of integration of the variables are reported in table 2.

**Table 2. Phillips-Perron (PP) Unit Root Result**

Variable	Method	At Level			At First Difference			Order of integration
		PP test statistics	5% critical value	Prob	PP test statistics	5% C.Value	Prob	
EXCR	PP	1.779038	-2.960411	0.9995	-3.151292	-2.963972	0.0333	I (1)
FDMS	PP	-0.558201	-2.960411	0.8659	-4.972826	-2.963972	0.0004	I (1)
GEP	PP	-6.911447	-2.960411	0.0000	-	-	-	I (0)
INFR	PP	-2.620309	-2.960411	0.0998	-5.049407	-2.963972	0.0003	I (1)
INTR	PP	-4.731632	-2.960411	0.0006	-	-	-	I (0)
MFGI	PP	-2.566180	-2.960411	0.1106	-6.025924	-2.963972	0.0000	I (1)
FDPC	PP	3.107799	-2.960411	1.0000	-3.463798	-2.963972	0.0163	I (1)
RCAP	PP	-0.263926	-2.960411	0.9194	-7.019509	-2.963972	0.0000	I (1)
RFDI	PP	-3.295890	-2.960411	0.0238	-	-	-	I (0)
RGCF	PP	-1.639021	-2.960411	0.4513	-6.536880	-2.963972	0.0000	I (1)

Source: E-view 5.0 version output

From tables 2, the PP unit root test reported Growth in government expenditure, Interest rate (INTR) and Ratio of foreign direct investment to GDP, (RFDI) as stationary at levels as their PP test statistics are significant at 5% levels. This implies that the variables are integrated of order zero at 5% significant level. The test reported Index of manufacturing production (MFGI), Ratio of private sector credit to GDP (FDPC), Ratio of market capitalization to GDP (RCAP), Exchange rate (EXCR), Ratio of broad money supply to GDP (FDMS) and Ratio of gross capital formation (RGCF) as stationary at first difference. The result implies that the variables are integrated of order one at 5% significant level. The findings indicate that while some of the series are stationary at levels, others contain unit root but became stationary after first differencing. Given this scenario, it is necessary to examine their long-run relationship, and to provide answer to the first objective. To achieve this, ARDL bound co-integration approach is adopted.

**ARDL Bounds Test for Co-Integration**

The result of the co-integration test is presented in table 3.

**Table 3: ARDL Bounds Result**

I(0)	I(1)
1.88	2.99
2.14	3.30
2.37	3.60
2.65	3.97
5.453927	
9	

Source: E-view 9.0 version output

Table 3 shows that the computed ARDL F-statistic, is greater than the 5% upper bound critical values, ie  $5.45 > 3.30$ . Hence, it is hereby concluded that the variables employed are I(1), and are co-integrated. Therefore, the null hypothesis of long run relationship among the variables of the model is hereby accepted. The implication of this is that the variables may deviate from their relationship in the short run, their association would return in the long run. Thus, it is concluded that there exist long run relationship among financial deepening variables; Ratio of Broad Money Supply to GDP (FDMS); Ratio of Private Sector Credit to GDP (FDPC) and Ratio of market capitalization to GDP (RCAP), and index of manufacturing sector production in Nigeria. As a result, financial deepening will be able to explain variations in the productivity of the manufacturing sector even in the long run.

**To establish the effect of broad money supply, private sector credit and market capitalization on the index of manufacturing production in Nigeria**

In order to examine this objective, an ARDL estimation technique is employed. This estimation technique is employed owing to the fact that the variables have dynamic relationship and some of the variables are stationary at levels, while the others are stationary at first difference.

**Table 4: ARDL Long and Short Run Result**  
**Dependent Variable: MFGI (Index of Manufacturing Production)**

Long Run Estimates				Short Run Estimates			
Variable	Coefficient	t-stat	Prob	Variable	Coefficient	t-stat	Prob
FDMS	-5.529123**	-3.714116	0.0026	$\Delta$ FDMS <sub>t</sub>	-3.093347	-1.749221	0.1038
FDPC	-92.207478	-1.147660	0.6826	$\Delta$ FDPC <sub>t</sub>	210.749192	2.012730	0.0653
RCAP	-102.005063*	-2.469800	0.0281	$\Delta$ RCAP <sub>t</sub>	-111.845204*	-2.175809	0.0486
RGCF	41.260763	0.318486	0.7552	$\Delta$ RFDI <sub>t</sub>	2.123573	1.477991	0.1632
RFDI	0.240085	0.140855	0.8901	$\Delta$ INFR <sub>t</sub>	0.038220	0.217340	0.8313
INFR	-0.208559	-1.074380	0.3022	$\Delta$ RGCF <sub>t</sub>	-331.15296*	-2.531522	0.0251
EXCR	-0.092449	-1.369646	0.1940	$\Delta$ EXCR <sub>t</sub>	0.103136	0.762571	0.4593
GEP	0.502236*	0.193032	0.0219	$\Delta$ GEP <sub>t</sub>	0.361483**	0.077069	0.0088
INTR	6.731719**	9.475952	0.0000	$\Delta$ INTR <sub>t</sub>	3.186527**	4.765530	0.0004
C	93.598239**	5.210304	0.0002	CoIntEq <sub>t-1</sub>	-0.696467**	-3.918504	0.0012

\* Implies significant at 5%                      \*\* Implies significant at 1%

Source: E-view 9.0 version output

**Table 5: Statistical Properties and Post Diagnostic Results**

Statistical Properties of Results		Post Diagnostic Tests Result	
R-squared	0.9612	BPG Heteroscedasticity (F-Stat)	0.3989
Adj R-squared	0.9104	BPG Heteroscedasticity Prob. F(17,13)	0.9611
F-statistic	18.9370	BPG Heteroscedasticity Obs* R-squared	10.6270
Prob(F-statistic)	0.000	Prob. Chi-Square (17)	0.8753
Durbin-Watson Stat	2.1503	Scaled explained SS	2.4222
Akaike Info Criterion:	7.2088	Prob. Chi-Square (28)	1.0000
Model Evaluated	512	B-G Serial Correlation LM (F-Stat)	3.2968
ARDL Best Model	(1,1,1,0,1,1,1,0,1,1)	B-G Serial Correlation LM Prob. F(2,11)	0.0755
		Obs* R-Squared	4.6181
		Prob. Chi-Square (2)	0.0630
		Ramsey RESET (F-Stat)	0.0774
		Ramsey RESET Prob. (F – Stat.)	0.7857
		Ramsey RESET (t – Stat.)	0.2781
		Ramsey RESET Prob. (t – Stat.)	0.7857
		Jarque-Bera Statistics for Normality	4.6730
		Jarque-Bera Prob.	0.0967

Source: E-view 9.0 version output

From Table 4, the result of the Autoregressive Distributed Lag Model (ARDL) reveals a negative effect of ratio of broad money supply to gross domestic product (FDMS) on index of manufacturing production. A unit increase in the ratio of broad money supply to gross domestic product will induce 5.53 units decrease in index of manufacturing production in the long-run, while a unit increase in the ratio of broad money supply to gross domestic product will induce 3.09 decrease in index of manufacturing production in the short-run. This result with probabilities of 0.003 and 0.104 for long-run and short-run respectively, shows an indirect and significant effect of ratio of broad money supply to gross domestic product on index of manufacturing production in the long-run and an indirect but insignificant effect on the index of manufacturing production in the short-run. This finding implies that available money in circulation did not arouse manufacturing production in Nigeria. With the negative effect, expansionary monetary policy will become ineffective and counter-productive on manufacturing production. The result is in line with the findings of Olanrewaju *et al.* (2015) that an indirect relationship exists between ratio of money supply to gross domestic product and the index of manufacturing production.

The ratio of credit to private sector to gross domestic product (FDPC), being an indicator of financial deepening in the banking sector, shows that in the long-run, a unit increase in the ratio of credit to private sector to gross domestic product will lead to 92.21 units decrease in index of manufacturing production while a unit increase in the ratio of credit to private sector to gross domestic product will lead to 211 units increase in index of manufacturing production in the short-run. The result with probabilities of 0.7 and 0.07 for long-run and short-run respectively, implies that in the long-run, ratio of credit to private sector to gross domestic product has indirect and insignificant effect on index of manufacturing production while there is direct and insignificant effect in the short-run. The implication of this findings is that with this negative relationship credit to private sector has not been significantly effective in improving manufacturing production especially in the long-run and hence, the result does not conform with the *a priori* expectation. The likely reason for this may be that a larger chunk of loans from banks to the manufacturing sub-sector are provided on short-term because of the banks reluctance to lend on long-term due to credit risk. As such, bank credits usually go to other sectors with a small portion going to the manufacturing sub-sector.

The ratio of market capitalization to gross domestic product (RCAP), being an indicator of financial deepening in the capital market is indirectly related to index of manufacturing production in the short-run and long-run. The result shows that a unit increase in market capitalization will stimulate 102.01 units decrease in index of manufacturing production in the long-run, while a unit increase in ratio of market capitalization to gross domestic product will stimulate 111.85 units decrease in index of manufacturing production in the short-run. The findings, with probabilities of 0.028 and 0.049, show an indirect and significant effect of market capitalization on the index of manufacturing production in the long-run and short-run respectively. The implication of the result is that the aggregate valuation on current share price and total number of outstanding stocks of listed manufacturing firms have not affected manufacturing sector productivity positively. This result contradicts the findings of Obamuyi, Edun and Kayode (2012). It could be due to the shallow nature of the Nigerian capital market and the stringent conditions for listing by manufacturing firms.

From the result, exchange rate produced direct and indirect effects on index of manufacturing production in the short-run and long-run respectively. A unit increase in exchange rate will lead to 0.1 unit increase in index of manufacturing production in the short-run. However, a unit increase in exchange rate will produce 0.09 unit decrease in index of manufacturing production in the long-run. With probabilities of 0.19 and 0.46 for long-run and short-run estimate, both are statistically non-significant. Although, non-significant, the short-run estimate of a direct relationship support the *a priori* expectation that devaluation will enhance manufacturing sector productivity. However, based on the result, devaluation would be detrimental to manufacturing sector productivity in the long-run.

In addition, the result shows a direct and indirect effect of inflation rate on index of manufacturing production in the short-run and long-run respectively. A unit increase in inflation rate will reduce index of manufacturing production by 0.21 units in the long-run. In the short-run, a unit increase in inflation rate will increase manufacturing production by 0.04 units. The probabilities of 0.3 and 0.8 for long-run and short-run respectively, reveal that both estimate are statistically non-significant. The implication of the finding is that an increase in inflation rate is needed to promote manufacturing sector performance in the short-run, but this will be detrimental to manufacturing production in the long-run. This finding of a negative effect of inflation on manufacturing production in the long-run is in line with the *a priori expectation*. However, the short-run direct effect negate it but corroborates the finding of Imoughele and Ismaila (2014), that positive relationship exist between inflation rate and manufacturing sector performance.

Furthermore, a unit increase in ratio of gross capital formation to gross domestic product will lead to 41.26 units increase in index of manufacturing production in the long-run and a unit increase in gross capital formation will lead to 331.15 units decrease in index of manufacturing production in the short-run. This implies that ratio of gross capital formation to gross domestic product has a direct effect on index of manufacturing production in the long-run and an indirect effect in the short-run. With probabilities of 0.76 and 0.03 for long-run and short-run respectively, the ratio of gross capital formation to gross domestic product proved statistically significant in the short-run and insignificant in the long-run.

The result also shows that both in the short-run and long-run, a unit increase in the ratio of foreign direct investment to gross domestic product will lead to 2.12 and 0.24 units increase in index of manufacturing production respectively. With probabilities of 0.89 and 0.16, ratio of foreign direct investment to GDP reveals a direct and statistically insignificant effect on index of manufacturing production in the long-run and short-run respectively. The implication of this is that an increase in foreign direct investment has not significantly enhanced the productivity of manufacturing sector.

Also, in the short-run and long-run, a unit increase in interest rate will induce 3.19 units increase and 6.73 units increase in index of manufacturing production, respectively. Thus, with zero (0) probability for both long-run and short-run estimates, interest rate has direct and significant effect on index of manufacturing production. The result does not conform with the *a priori* expectation of an indirect relationship. The implication of this finding is that the manufacturers believed that irrespective of the rate, they will break even and hence, they can acquire the loan even at increased rate of interest.

The ARDL result further shows that a unit increase in government expenditure will lead to 0.50 unit increase in index of manufacturing production in the long-run, while the short-run results show that a unit increase in government expenditure will lead to 0.36 unit increase in index of manufacturing production. The probabilities of 0.02 and 0.01 for long-run and short-run estimate respectively, shows that government expenditure has direct and significant effect on index of manufacturing production both in the short-run and long-run. The reason may be that the funds expended on infrastructures and funds released by the federal government on improving the sub-sector via subsidy and palliatives yielded positive results on the index of manufacturing production.

Furthermore, the intercept term (c) shows the mean or average effect of all the variables excluded from the model. Thus, on the average, a unit increase in the value of the excluded variables will lead to 93.6 units increase in the index of manufacturing sector production. In other words, given that all the included explanatory



variables are held constant, the index of manufacturing sector production would be 93.6 units. However, with a probability of 0.0002, the direct effect is statistically significant at 1% level. The implication of this finding is that apart from financial deepening and the controlled variables included, there are other significant explanatory variables causing variation in the index of manufacturing sector production in Nigeria.

It is also important to examine the statistical properties of the estimated result. From table 5, it is evident that the R-squared value of 0.961 indicates that about 96.1% variation in Index of Manufacturing Production is explained in the model by the explanatory variables. The F-statistics of 18.937 is statistically significant and this shows that there is a considerable harmony between Index of Manufacturing Production and the explanatory variables put together. This confirms that financial deepening and the controlled variables jointly have significant influence on index of manufacturing production in Nigeria.

Also, the Breusch-Pagan-Godfrey (BPG) test is applied to investigate the presence of heteroscedasticity in the regression result. The BPG tests the null hypothesis of no heteroscedasticity (ie. homoscedasticity) against the alternative hypothesis of heteroscedasticity. The result in table 5 presents three different types of tests for heteroscedasticity. The “F” test statistic is 0.3989 and chi-square ( $X^2$ ) test statistic is 10.6270, with probability values of 0.96 and 0.88 respectively. Both test statistics give the same conclusion that there is no evidence for the presence of heteroscedasticity, since the probability values are considerably in excess of 0.05.

The “scaled explained sum of square” (SESS), which is the third test is based on a normalized version of the explained sum of squares from the auxiliary regression. The SESS statistics of 2.4222, with a probability value of 1.000, which is greater than 0.05, suggests the absence of heteroscedasticity. Therefore, the “f” test, chi-square ( $X^2$ ) test and the “scaled explained sum of square (SESS) test produced the same result that the model is homoscedastic.

The B-G Serial Correlation Lagrange Multiplier (LM) test is used to test for higher order Autoregressive Moving Average (ARMA) errors and is applicable whether or not there is lagged dependent variable(s). The B-G tests the null hypothesis of no serial correlation against the alternative hypothesis of serial correlation. Table 5 presents “F” statistic as 3.30 and observed \*R square statistic as 4.62 for BG serial correlation LM test. The result of “F” statistic’s probability for the B-G Serial Correlation is 0.076 and the probability of chi-square is 0.063. Since the probabilities are greater than 5%, hence the null hypothesis of no auto-correlation cannot be rejected, implying that the model has no serial correlation. Also, the Durbin-Watson statistic of 2.258 indicates that there is no serial correlation associated with the regression result as this is in line with “two” as a benchmark. Therefore, this finding is in agreement with the result of Breusch-Godfrey test.

In the model, the error correction term  $CointEq_{t-1}$  is well specified and correctly signed. The coefficient of the lag of co-integrating equation ( $CointEq_{t-1}$ ) is approximately -0.69647, which implies that about 69.65 percent departure from long run equilibrium is corrected in the short run. The negative sign in the lag of co-integrating equation confirms the existence of long-run relationship. Hence, about 69.65% of the variations in the short run converge. The zero (0) probability shows that the estimate is statistically significant at 1% level.

The Ramsey RESET test is employed to examine whether the relationship between the dependent variable and the explanatory variables is linear or not. The results of this test as shown in table 5, is for one fitted term. Both “F” and “t” statistics versions of the test are presented. From the result, the “t” statistic is 0.2781 and “F” statistic is 0.0774. The probability of 0.79 for both “t” and “F” statistics which is higher than 0.05, shown that the estimates are not significant at 5% level. Hence, there is no apparent non-linearity in the regression equation and it is hereby concluded that the model specified for the relationship is appropriate. Also, the Jarque-Bera (JB) statistic for the normality distribution of the model is 4.673, with a probability of 0.096. Since the probability of obtaining the JB statistic under the normality assumption is greater than 0.05, the null hypothesis that the error terms are normally distributed cannot be rejected at 5% level.

Finally, based on the results of adequacy tests and the statistical characteristics of the specified model, it is hereby concluded that the inferences we made about the coefficients estimate are appropriate and valid, and that the model is well-fitted for forecasting purposes.

### **Implications of findings**

Various results have emanated from this study with varying policy implications. According to Brooks (2008), if both  $X_k$  and  $X_p$  are statistically significant, it means they both have incremental explanatory power. If  $X_k$  is statistically significant and  $X_p$  is not, then the latter has non explanatory power and the former is preferred. Therefore, table 6 is used to decide the aggregate effect of financial deepening on the productivity of manufacturing sub-sector in Nigeria.

**Table 6: the effect of financial deepening on the Index of manufacturing sector production**

Manufacturing sector productivity	Period	Broad Money Supply (FDMS)	Credit to the private sector (FDPC)	Market capitalization of manufacturing firm (RCAP)	Periodic decision	Overall decision
Index of manufacturing sector production (MFGI)	Short-run	Non-Sig. (-)	Non-Sig. (+)	Sig. (-)	Sig. (-)	Negative and Significant
	Long-run	Sig. (-)	Non-Sig.(-)	Sig. (-)	Sig. (-)	

Source: Author’s computation using result in Table 4.

From table 6, the summary of the results indicates a significant negative effect of financial deepening on the index of manufacturing sector production both in the short-run and long-run. Hence, the null hypothesis that financial deepening has no significant positive effect on the index of manufacturing sector production cannot be rejected. Therefore, the study hereby makes a submission that financial deepening has no significant positive effect on the index of manufacturing sector production in Nigeria. This implies that instead of promoting the index of manufacturing production, financial deepening strategies adopted have retarded the productivity index.

The plausible reason for the finding is market capitalization (financial deepening in the capital market) that is significantly detrimental in enhancing the index of manufacturing sector production in the short-run and long-run. One of the major reasons for the establishment of capital market in Nigeria is to provide avenue for long-term capital for development. The significant indirect short-run and long run effect recorded in this study could be due to the shock experienced in the Nigerian capital market caused by the assets price crash in 1998 to 2000, the global economic meltdown in 2007 and the financial crises that caused recession in the Nigerian capital market from 2016 to 2017. It could also be due to financial deepening policies misalignment in Nigeria. This finding is a deterrent for Nigeria, a developing country that requires long term funds to provide a big push for manufacturing sector productivity.

Also, with a significant long run negative effect of broad money supply, the finding suggests that the larger percentage of money supplied is applied for consumption through importation. This portends a dangerous signal for manufacturing sub-sector survival in Nigeria. The findings contradict the *a priori* and the finding of Okoye, Nwakoby and Okorie (2016) but in line with the findings of Edeme and Karimo (2014), Elijah and Uchechi (2012) and Udoh and Ogbuagu (2012).

### V. Conclusion and Recommendation

Financial deepening variables employed have long term relationship with index of manufacturing production. Also, a negative and significant effect of financial deepening on the index of manufacturing production in Nigeria is discovered. It is hereby concluded that financial deepening did not enhance manufacturing sector productivity in Nigeria. This finding could be due to financial deepening strategies misalignment and mal-adaptation in Nigeria. Thus, the Nigerian financial system’s institutional structure and arrangement, orientation and the modes of operation of its main actors are mainly transplanted, and not appropriately adapted and oriented to suit Nigerian economic peculiarities, as well as not being made to focus on the development of manufacturing sub-sector in the country.

This explains why the banks, capital market and other financial institutions perform their intermediation roles in an ineffective way as to render them unable or unwilling to make the expected contributions to manufacturing sector productivity in Nigeria. The limited savings mobilized are inefficiently allocated, mainly on short-term bases and usually to less productive activities. Therefore, measures taken by the Central Bank and other regulatory authorities to make the banks and other financial institutions change their non-productive financial practices, are usually not successful. Based on the findings, it is therefore recommended that;

- Government should rework and re-align the various financial deepening strategies to be properly adapted to the Nigerian financial peculiarities. Hence, government should relax capital market entry requirements to encourage small and medium scales manufacturing firms to be listed on the stock exchange productivity in the manufacturing sector.
- Government should also insure and encourage banks to provide long-term credit facilities for manufacturing firms in Nigeria.

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