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Effects of Interest Rates on Performance of Manufacturing Sector in Nigeria

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Abstract

The study evaluates the effect of interest rates on performance of manufacturing firms in Nigeria between 1981 to 2018. The objective of the study is to assess the relationship between interest rates and performance of manufacturing firms in Nigeria for 38 years. Three indicators such as manufacturing sector output, manufacturing capacity utilization and manufacturing value added where employed as proxies of manufacturing firm's performance. The data were analyzed using ordinary least square regression (OLS) on manufacturing output and auto regressive distributed lag (ARDL) on manufacturing capacity utilization and manufacturing value added. A pre-diagnostic tests such as unit root test and cointegration test were carried out on the variables. The cointegration test showed a relationship between manufacturing sector output and interest rates and no cointegration of interest rates with manufacturing capacity utilization and value added. The data analyzed indicated interest rates has no effect on manufacturing sector output, result also showed that interest rates has no significant effect on capacity utilization and interest rates has significant impact on manufacturing value added in Nigeria. It is recommended that interest rates be benchmarked to single digits by the authority; manufacturing firms should be encouraged to operate on full capacity scale so to absorb the high interest rates. The authority will need to step up responsibility to ensure funds are made available at lower interest rates to manufacturing sector.

Background to the Study

The contributions of the Manufacturing sector in any economy cannot be overemphasized. It contributes to creation of wealth, reduce unemployment, increase productivity related to import replacement and export expansion, creating foreign exchange earnings capacity and raising employment and per capita income which cause unique consumption patterns (Imoughele and Ismail 2014). Manufacturing sector creates investment capital more than other sectors of the economy which promotes broader and more effective linkages among different sectors (Ogwuma 1995).

Over the years, interest rates as remained a subject for assessment with diverse implications for savings and mobilization and investment promotions. In Nigeria, the minimum monetary policy rate is the official interest rates of the Central Bank of Nigeria (CBN), which anchors all other interest in the economy (Ogunbiyi and Ihejirika, 2014). Generally, interest rates are the rentals payments for the use of credit by borrowers and return for parting with liquidity by lenders (CBN, 1997).

Despite all attempts in developing the manufacturing sector it is still not performing or growing as expected. Statistics have shown that the share of manufacturing in the aggregate GDP declined from 5.3% in 1981 to 4.1% in 1993, 3.4% in 2005, and 4.1% in 1993, 3.4% in 2005 and 2.1% in 2016 (CBN, 2016).

The study therefore is focused on determining the extent to which interest rate of deposit money banks have impacted on the performance of the manufacturing firms in Nigeria. Based on the above, the study thus seeks to achieve the following objectives:

i. To examine the impact of interest rates on manufacturing sector output in Nigeria.
ii. To analyze the impact interest rates has influenced manufacturing capacity utilization in Nigeria.
iii. To determine the extend which interest rates has influence manufacturing value added in Nigeria.
iv. In-line with the stated research questions, the following hypotheses were tested:

H01: Interest rate has no significant effect on manufacturing sector output in Nigeria.
H02: Interest rate has no significant effect on manufacturing capacity utilization in Nigeria.
H03: Interest rate has no significant effect on manufacturing value added in Nigeria.

Concept of Interest Rate

Interest rate is one of the economic price variables (like exchange rate, wage rate, etc.) which determines the flow of economic activity. Just like the wage rate refers to the price of labor used in production, lending rate relates to the price paid for capital or money used in the production of goods and services. As a concept, interest has been defined in a variety of ways even among economists. Jhingan (2001), documents the views of some renowned economists on the concept.

For instance, Mill conceives interest as the remuneration for mere abstinence. According to Mill, since abstinence from consumption is often painful and disagreeable, fund owners should be compensated in the form of interest. Fisher defines interest as the premium for time preference. He considers interest as an inducement to postpone present enjoyment of goods to the future. Keynes on the other hand defines interest as payment for the use of money or the reward for parting with liquidity.

Interest rates can be explained as a financial benefit which the fund user (borrower) gives to the fund owner (lender) for using the fund. It is often expressed as a rate per cent per year. Interest rates can also be explained as the reward or compensation to an entrepreneur for risk-taking. Therefore, for a rational entrepreneur, the higher the risk of an economic activity, the higher the expected reward or return associated with it. Two major polices of Interest rate management are interest rate regulation and interest rate reform. Interest rate regulation often embodies the practice of interest rate repression and entails the use of quantitative or administrative controls by the monetary authorities to influence the magnitude as well as direction of credit. A characteristic feature of the regulated regime is maintenance of interest rate at levels lower than the rate of inflation (interest rate repression). Repression of interest rate targets maintenance of low and negative real interest rates to support manufacturing industry growth through provision of cheap finance (credit) to industry operators. On the other hand, interest rate reform refers to liberalization of the framework for interest rate determination. Movement of interest rate during a liberalized or reformed policy regime is directed by the market forces of demand and supply. Interest rate levels under the regime reflect the inflationary trend in the economy and are therefore often perceived to be high, particularly in the developing economies that are characterized by high inflation rates. Liberalization policy aims at promotion of effective deposit mobilization and efficient allocation of funds to achieve output growth.

An intriguing aspect of the concept is that the different policies impact differently on different economic agents. For instance, while savers are reluctant to make deposits during a repressed regime, borrowers have an incentive to borrow at the cheap rates to fund their operations. The reverse position however occurs during a period of interest rate reform thereby presenting an obvious challenge to the monetary authorities with respect to formulation of a functional policy that will simultaneously stimulate savings as well as promote entrepreneurship since both are necessary conditions for manufacturing industry growth.

Concept of Manufacturing

Manufacturing is the period of social and economic change that transforms a human group from an agrarian society into an industrial one, involving the extensive re-organization of an economy for the purpose of manufacturing (Bilkisu, 2017). All too often we associate manufacturing with the growth of factory industry. When we talk of industrial production, we refer to factory production. Anyanwu et al (1997) describes manufacturing as the process of building up a nation's capacity to convert raw materials and other inputs to finished goods and to manufacture goods for other production or for final consumption. Manufacturing is about the introduction and expansion of industries in a particular place, region or country (Obioma and Ozughalu, 2015). It is a situation where many industries are established in different parts of the country. As many industries are established in a country many different types of products are produced. Industrialization therefore, is a process of building up a country's capacity to produce many varieties of products – extraction of raw materials and manufacturing of semi-finished and finished goods (Udo, 2014)

Literature Review

Idisi, Ugwu and safugha (2019), examined the impact of interest rates on manufacturing sector performance for 2000 to 2017, the ordinary least square regression was used to analyses the models the results shows a positive relation between the variables. The results show apart from the interest rates there are other factor that government should look into, for example infrastructure and rail transportation. There was no unit root test on the variables which was not proper on time series data

Babatunde (2017), examines the impact of interest rates on performance of manufacturing sector in Nigeria 1970-2008 the purpose of research was to examine the impact of interest rates on loans on the performance of manufacturing sector using a least square multiple regression as a statistical technique to analyze the data. The results show a weak and negative relationship between the explanatory variables (interest rates, and inflationary rates). This shows that bank rate and inflation rate is statistically insignificant factor influencing the manufacturing capacity utilization. Unit root test was not carried on the variables to determine the use of proper technique.

Odhiambo (2009), examined the effect of interest rate on manufacturing industry growth in Nigeria. Regression results show evidence of a strong support for positive impact of interest rate on manufacturing depth. He also finds that financial deepening granger-causes manufacturing industry capacity utilization and growth. Other findings of the study are (i) lagged financial depth leads to further financial depth (ii) bi-lateral causation exist between savings and growth (iii) financial development has long-run causation on savings. The use of OLS regression technique appears too low for scope of the study.

Joseph, Ochinyabo and Sule (2014), examines the role of interest rates on manufacturing sector performance 1986 -2012 employing the OLS multiple regression model to analyses a secondary data from CBN and federal bureau of statistics. It was determining that interest rates have no effect on manufacturing sector performance. Unit root test was not carried out on the variable to prevent a spurious regression

Obamuyi (2009), investigated the relationship between interest rate and manufacturing industry growth in Nigeria using data over the period 1970-2006. Employing error correction analysis, he finds that lending rate exerts a significant negative impact on manufacturing industry growth while deposit rate shows a significant positive effect on growth. The result also shows a significant negative impact of interest on growth. No theoretical framework was provided by the author and it is a missing link in this study.

Okoye (2016), examined the effect of interest rate on productive activities in Nigeria using data on selected manufacturing industries using ANOVA. The study shows evidence of positive effect of interest rate on savings but a negative effect on manufacturing value added. The use of ANOVA may not really show how impactful the study would be. The author would have considered the use of regression to determine the relationships amongst variables.

Udoka and Anyinyang (2012), examined the effect of interest rate changes on manufacturing industry growth in Nigeria using annual data over the period 1970-2010. Employing the technique of the ordinary least squares (OLS) analytical technique, they find an insignificant negative effect of interest rate on manufacturing growth. They also find evidence of a significant difference between the growth of the economy in pre and post reform periods.

Adofu, Abula, and Audu (2010), examined the effect of interest rate deregulation on manufacturing industry performance in Nigeria. Annual data over the period 1986-2005 were analyzed using the technique of the ordinary least squares (OLS). They find a significant positive effect of interest rate on manufacturing industry performance during the period.

Musa (2011), while looking at the relationship between Interest Rates and Performance of manufacturing industry in Kenya using regression analysis established that long term interest rates have a significant influence on the financial performance of manufacturing firms in Kenya. The researcher found that interest rates have diverse impact on the manufacturing industry performance. High interest rates are likely to curb business investments and innovation. Rising interest rates could also increase loan defaults in the banking system and bank business financing and affect business revenues and profits negatively. When interest rate is raised, the general effect is to lessen the amount of money in circulation, which works to keep inflation low. On the other hand, lower interest rates give companies an opportunity to borrow money at lower rates, which allows them to expand their operations and also their cash flows. When interest rates are declining, the economy is expanding in the long run. Appropriate interest rates should therefore be set to maintain inflation at desired levels while encouraging economic development.

Igbinedion, and Ogbeide, (2016), investigated the nexus between interest rate policy and manufacturing capacity utilization in Nigeria for the 1980-2014 periods, using an error-correction modeling approach. Their findings showed that current and past values of lending rate adversely affect manufacturing performance, but manufacturing responds positively to the current period's banking credit, confirming that policy to enhance access to funds can stimulate investment in manufacturing sub-sector in Nigeria.

Gap(s) in Literature

From the empirical literature reviewed in this study, a lot of studies have investigated the effects of interest rates on performance of manufacturing firms in Nigeria. For instance, Idisi, Ugwu and safugha (2019), examined impact of interest rates on manufacturing sector performance for 2000 to 2017. Babatunde and Adesana (2017), looked at interest rates on performance of manufacturing sector in Nigeria 1970-2008. Here, manufacturing capacity utilization was used as the dependent variable. Joseph, Ochinyabo and Sule (2014), examines the role of interest rates on manufacturing sector performance 1986 - 2012. The manufacturing sector performance was adopted as the dependent variable. Odhiambo (2009) also examined effect of interest rate on manufacturing industry growth in Nigeria.by using capacity utilization as dependent variable. Obamuyi (2009) investigated the relationship between interest rate and manufacturing industry growth in Nigeria using data over the period 1970-2006. Other studies include Okoye (2016), Udoka and Anyinyang (2012), Adofu, Abula, and Audu (2010), Musa (2011), and Igbinedion, and Ogbeide, (2016). All of these studies have used manufacturing sector output, manufacturing capacity utilization and manufacturing value added individually, to examine the effect of interest rate on them. Among all, none these studies have used all three variables together as the dependent variables. This is why this present study seeks to examine the effect of interest rate on the performance of manufacturing firms in Nigeria by applying the three variable (manufacturing sector output, manufacturing capacity utilization and manufacturing value added), hence, the gap to this study.

Theory of Interest Rate

Theory of interest was first propounded by the Swedish economist Wicksell (1986) and later developed and supported by several leading American and Swedish economists including Professor Robertson, Bertil Ohlin, Lindhal and Myrdal (1991). However, the theory in its present form is associated with Professor Robertson. According to this theory the rate of interest is determined by the demand and supply of loanable funds. In the market, there are those who supply loanable funds and those who borrow them. The rate of interest will be such as shall bring about equilibrium between the demand and supply of loanable funds.

The loanable funds theory is a distinct improvement on the old classical theory of interest because the term "supply of loanable funds" is wider in scope and includes not only savings out of current income but also bank credit, dis-hoarding and dis-investment. Actually, bank loans represent important funds, which are available on payment of interest by the borrower. Likewise, loaned wealth can also become available for purpose of investment. Dis- invested wealth is another source of funds available to the borrowers. Since loanable funds theory is more comprehensive, it is often referred to as real as well as monetary theory of interest. This theory is just the of the two general approaches that have been followed in developing the modern monetary theory of the rate of interest.

Research methodology

Research Design: *Expost-factor* research design is employed in the study. An *expost-facto* research design is very appropriate for this study because it describes the statistical association between two or more variables. The use of this design allows for the testing of expected relationship between and amongst this variable and the making of predictions regarding these relationship (Kothari, 2004)

Method of Data Collection: The data were sourced from the Central Bank of Nigeria (CBN) statistical bulleting of 2018. For Manufacturing Sector Output, Manufacturing Capacity Utilization, Manufacturing Value Added and interest rate annual data were used to run the econometric model to measure the relationship between interest rate and manufacturing sector performance in Nigeria.

Methods of Data Analysis

The study employed Auto Regressive Distributed Lag (ARDL) Model to analyse the variables. The ARDL is very efficient when the variables under study were integrated at order, I(0), I(1) or combination of both. Nkoro and Uko (2016), ARDL cointegration technique is preferable when dealing with variables that are integrated of different order, I(0), I (1) or combination of both. Similarly, Aliha, et al (2017), said that ARDL has become popular because: It is able to estimate the long and short-run parameters of a model simultaneously, it avoids the problems posed by non-stationary data, there is no need to determine the order of the integration amongst the variables in advance, and it is statistically much more significant approach for the determination of the cointegration relationship in small samples, while allowing different optimal lags of variables.

$$\Delta y_t = -\sum_{i=1}^{p-1} \gamma_i^* \Delta y_{t-1} + \sum_{j=1}^{k} \sum_{i=0}^{q_j-1} \Delta X'_{j,t-i} \beta_{j,i}^* - \rho y_{t-1} - \alpha - \sum_{j=1}^{k} X'_{j,t-1} \delta_j + \epsilon_t \qquad \ldots 1$$

To avoid misleading characteristics of time series macroeconomic variables which in most cases are non-stationary, the study examined the time series properties of all the variables under investigation using the Augmented Dickey-Fuller (ADF) Test to confirm the stationarity level of each of the variables.

$$\Delta y_t = \beta_1 + \beta_2 t + \theta y_{t-1} + \sum_{i-1}^{n} \varphi \Delta y_{t-1} + \epsilon_t$$

Where y_t represents the relevant variables under investigation and ϵ_t is a random term

The study also employed Bounds co-integration test technique to ascertain whether the variables are co-integrated that is, if there is long run equilibrium relationship among the variables.

Model Specification

Autoregressive Distributed Lag (ARDL) Model was utilised to examine the relationship between the dependent variable and the independent variables. Thus, the models are specified as:

$$MSO = \beta_0 + \beta_1 INR + \mu_t ------(1)$$

$$MCU = \beta_0 + \beta_1 INR + \mu_t -----(2)$$

$$MVA = \beta_0 + \beta_1 INR + \mu_t ------(3)$$

β_0 = The autonomous parameter estimates (Intercept or constant)

β_1 = Parameter coefficients of lending rates

MSO = Manufacturing Sector Output

MCU = Manufacturing Capacity Utilization
MVA =Manufacturing Value Added
INR = Interest Rate
μ_1 = error term

Result and Discussion

Descriptive Statistics

Table 1: Manufacturing sector output variables and interest rate Statistical Summary

	INR	*MVAD*	*MCU*	*MSO*
Mean	17.57662	35.42515	47.38763	5.089944
Standard Deviation	4.628232	9.305454	10.9035	15.12898
Minimum	7.75	17.90564	29.29	0.030876
Maximum	29.8	52.99716	73.3	93.45127
Sum	667.9115	1346.156	1800.73	193.4179
Count	38	38	38	38

Source: Author's Computation from the original Data 2020, using Excel 13.0

The summary descriptive statistics shows that the mean interest rate of 17.56% influences the mean Manufacturing Value Added of manufacturing sector by N35.45 billion, Manufacturing Capacity Utilization by N47.38 billion and Manufacturing Sector Output by N5.089 billion.

Unit Root Test

With to view to have an accurate estimate and prediction, to avoid the problem of spurious regression, and to select an appropriate model; Augmented Dicker Fuller (ADF) Test was conducted to confirm the stationarity of the variables. The Variables were transformed to stationarity at different stages as shown in Table 2.

Table 2: Unit Root Test Output Table

Test	**ADF**			
Test/Variables	**Level**	**1st Diff.**	**2nd Diff**	**Remark/Decision**
MSO	I(0)			Stationary at Level
MCU		I(1)		Stationary at First Difference
MVA		I(1)		Stationary at First Difference
INT	I(0)			Stationary at Level

Source: Authors computation 2020 using e-views 10.

Cointegration Test

Table 3: Bound Cointegration Test

Variables	Co-integration Value	Critical value (5%)		Remark
		I(0)	I(1)	
MSO & INT	16.54	3.62	4.16	Co-integrated
MCU & INT	1.476	3.62	4.16	Not Co-integrated
MVA & INT	3.222	3.62	4.16	Not Co-integrated

Source: Authors computation 2020 using e-views 10.

Table 3 shows result of the cointegration for the variables. The result revealed that the relationship between MSO and INT is cointegrating while the relationship between MCU and INT and MVA and INT are not cointegrating. Hence, the first relationship requires and ARDL estimation while the last two relationships (MCU & INT and MVA & INT) require short-run OLS.

Table 4: ARDL and OLS Result

Variables	***Long Run***		***Short Run***	
	Coefficient	P-value	Coefficient	P-value
MSO				
INT	*-1.416*	*0.0087***	*-0.699*	*0.3212*
Constant	*30.255*	*0.0025***	*35.75*	*0.0049***
MCU				
INT	-		*0.4208*	*0.1929*
Constant	-		*-8.003*	*0.1610*
MVA				
INT			*0.4003*	*0.0418***
Constant			*-7.738*	*0.0222***

Source: Authors computation 2020 using e-views 10

The coefficients of the variable, INR which is interest rate in the relationship between MSO and INR in the long-run is -1.416, which indicates a negative relationship between Manufacturing Sector Output and interest rate. An increase by 1% of INR, will decrease by 1.416 % in the Manufacturing Sector Output. The P-value of the coefficient is 0.0087, which less than 0.05, this indicate a statistical significant relationship between the manufacturing sector output and interest rate, i.e. interest is statistically significant enough to influence the variation of the MSO in the long-run.

The coefficients of the variable interest rate (INR) is -0.699, which indicates a negative relationship between MSO and INR in the short-run. If INR increased by 1%, then MSO will decrease by 69.9%. The P-value of the coefficient is 0.3212, which is more than 0.05, this indicate a statistical not significant relationship between MSO and INR; interest rate is lacking statistically significant strength to influence or explain the variation of the MSO in the short run.

The coefficients of the variable interest rate (INR) is 0.4208, which indicates a positive relationship between the Manufacturing Capacity Utilization (MCU) and INR. If INR increased by 1%, then MCU will increase by 42.08%. The P-value of the coefficient is 0.1929, which is greater than 0.05, this indicate a statistical insignificant relationship between the MCU and INR; INR is statistically insignificant enough to explain the variation of MCU in the short run.

The coefficients of interest rate (INR) is 0.4003, which indicates a positive relationship between the Manufacturing Value Added (MVA) and interest rate (INR). If INR increased by 1%, then MVA will increase by 40.03%. The P-value of the coefficient is 0.0418, which is less than 0.05, this indicate a statistical significant relationship between the MVA and INR; the variable is statistically significant enough to explain the variation of the MVA in the short run.

Post Estimation Test

Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test was employed to confirm the existence or otherwise of Serial Correlation. The Durbin-Watson (DW) values for the three models are 2.355, 1.272 and 2.12 indicated that two models DW values are approximately 2, and one is not. There is an indication of absence of serial correlation for approximation of 2 and presence of serial correlation for less than 2. This was corrected through the application of Heteroscedasticity-Autocorrelation Consistent (HAC). This study therefore accepts that the variables are not serially correlated and this is desirable.

Test of Hypotheses

Hypothesis One:

H_{01}: Interest rate has no significant effect on manufacturing sector output in Nigeria.

Decision rule

If the p value is greater than the level of significance of 0.05, the null hypothesis is rejected while the alternate hypothesis is accepted. If the p value is greater than the significance level of 0.05, the null hypothesis is accepted and the alternate hypothesis is rejected. Given that the p-value for interest rate (INR) in table 4 in the short-run is greater than 0.05 level of significance (0.3212 > 0.05), which suggest that, we fail to reject null hypothesis while the alternate hypothesis is rejected hence, Interest rate has no significant effect on manufacturing sector output in Nigeria.

Hypothesis Two:

H_{02}: Interest rate has no significant effect on manufacturing capacity utilization in Nigeria.

Decision rule

If the p value is greater than the level of significance of 0.05, the null hypothesis is rejected while the alternate hypothesis is accepted. If the p value is greater than the significance level of 0.05, the null hypothesis is accepted and the alternate hypothesis is rejected. Since that the p-value for interest rate (INR) in table 4 in the short-run is greater than 0.05 level of significance (0.1929 > 0.05), which suggest that, we fail to reject null hypothesis while the alternate hypothesis is rejected hence, Interest rate has no significant effect on manufacturing capacity utilization in Nigeria.

Hypothesis Three:

H_{03}: Interest rate has no significant effect on manufacturing value added in Nigeria.

Decision rule

If the p value is greater than the level of significance of 0.05, the null hypothesis is rejected while the alternate hypothesis is accepted. If the p value is greater than the significance level of 0.05, the null hypothesis is accepted and the alternate hypothesis is rejected. Since that the p-value for interest rate (INR) in table 4 in the short-run is less than 0.05 level of significance (0.0418 < 0.05), which suggest that, we reject null hypothesis while the alternate hypothesis is accepted hence, Interest rate has significant effect on manufacturing value added in Nigeria.

Discussion of Findings

Findings from the study revealed that interest rate has an insignificant effect on manufacturing sector output in Nigeria between 1981 and 2018. This is expected because increase in interest rates would translate into reduced factor inputs of manufacturers such as input manufacturing plants, and equipment leasing centres which would invariably reduce manufacturing labour productivity. This is not in agreement with Udoka and Anyinyang (2012), whose study a significant negative effect of interest rate on manufacturing growth.

However, the study showed that interest rate has a significant effect on manufacturing capacity utilization in Nigeria. The implication of this significant and positive effect is that the manufacturers expect the cost of borrowing to be covered by their profit margins via high capacity utilization and optimization of their operations. This finding agrees with the study of Odhiambo (2009) whose study showed that a strong support for positive impact of interest rate on manufacturing depth. He also finds that financial deepening granger-causes manufacturing industry capacity utilization and growth.

The study further showed that interest rate has a negative and insignificant effect on manufacturing value added in Nigeria. This was due to lack of credit facilities and the neglect of the sector by the government who had found solace in borrowings through bonds and treasury bills; and as a result, crowds out manufacturing value added through increased interest rate charges. This is not in-line with Okoye (2016) whose study showed that interest rate has negative effect on manufacturing value added. Udoka and Anyinyang (2012), also found an insignificant negative effect of interest rate on manufacturing growth.

Conclusion and Recommendations

The performance of the manufacturing sector of the Nigerian economy was analyzed. It was discovered that interest rate has a direct and significant relationship with manufacturing sector capacity utilization. However, interest rates were found to have not adequately improved manufacturing outputs and value added within the period under study.

Therefore, having found prime lending rates of banks as veritable financier of manufacturing, there should be policies that attach importance to the manufacturing sectors in Nigeria and other developing economies. This will exploit and explore funding options in area of granting of credits that catalyses firm growth. This cause should be championed by the Central Bank and other monetary authorities alike and should be pursued by the strengthening of the banking sector. This can be piloted through enhanced supervision of these banks to ensure that they meaningfully contribute to the economy by operating the right lending policies that would enable the manufacturing sector operate optimally.

Based on the findings, the following recommendations were raised:

i. The monetary authority should ensure that restrictive policies are implemented to guarantee that the lending interest rate to the manufacturing sector is within a single digit, accessible, affordable and sustainable. This is to ensure a greater productivity in the sector since it accounted for the biggest variance in the manufacturing contribution to gross domestic product relative to other monetary variables.

ii. It is very pertinent that monetary authorities should adopt policy measures to maintain a favorably low commercial bank lending rate (that will lower cost of capital); this will serve as an incentive to manufacturing investors and it will accelerate high business investment in small, medium and even large-scale businesses and subsequently in the long-run contribute significantly to manufacturing sector growth.

iii. As regards to enhancing manufacturing value added, the policy that established Asset Management Corporation should be strengthened in other to free the deposit money banks from a high incidence of non-performing loans, and thereby, enhance their ability to extend more credit at lower interest rates to the manufacturing sector.

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APPENDICE
DATA

YEAR	INT	MVAD	MCU	MSO
1981	7.75	39.96296908	73.3	0.0308757
1982	10.25	35.45212717	63.6	93.451274
1983	10.00	30.87443558	49.7	0.035744
1984	12.50	28.33066628	43	0.0311498
1985	9.25	29.85999554	38.3	0.0426499
1986	10.50	27.15992017	38.8	0.0443858
1987	17.50	35.30465439	40.4	0.0496292
1988	16.50	31.78959962	42.4	0.072945
1989	26.80	43.59741552	43.8	0.0837141
1990	25.50	45.27008579	40.3	0.0967756
1991	20.01	45.75690188	42	0.1270119
1992	29.80	52.99715832	38.1	0.1762418
1993	18.32	42.68732857	37.19	0.2540592
1994	21.00	32.85864453	30.4	0.4072946
1995	20.18	46.01588429	29.29	0.4755802
1996	19.74	48.51684755	32.46	0.5488731
1997	13.54	44.13767405	30.4	0.6278422
1998	18.29	33.55937602	32.4	0.7122389
1999	21.32	37.85793978	34.6	0.8197496
2000	17.98	52.2053917	36.1	0.948604
2001	18.29	40.87178731	42.7	1.1358946
2002	24.85	30.51808697	54.9	1.2945021
2003	20.71	36.75029474	56.5	1.4975894
2004	19.18	42.09064639	55.7	1.7410213
2005	17.95	43.5078294	54.8	2.0426859
2006	17.26	41.91683487	53.3	2.3915231
2007	16.94	40.65207185	53.38	2.7575194
2008	15.14	41.48267065	53.84	3.1713518
2009	18.99	34.2051642	58.92	3.6413586
2010	17.59	25.31745224	55.82	4.1096964
2011	16.02	28.34709652	56.49	5.199298
2012	16.79	27.31368916	58.92	6.4181782
2013	16.72	26.03718054	58.2	8.3067157
2014	16.55	24.94620824	60	9.9743096
2015	16.85	20.38194776	58.8	10.305442
2016	16.87	18.45515344	48.46	10.224437
2017	17.58	21.261103	48.46	10.168063
2018	16.91	17.9056448	55	10.001647

Unit Root Test

Null Hypothesis: INT has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.522847	0.0128
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(INT) has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.558895	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: MCU has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.471321	0.1304
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(MCU) has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.730458	0.0077
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: MSO has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.121610	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(MSO) has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.77813	0.0001
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: MVAD has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.842381	0.3549
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(MVAD) has a unit root
Exogenous: Constant
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.282000	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.
Dependent Variable: MSO
ARDL Long Run Form and Bounds Test
Dependent Variable: D(MSO)
Selected Model: ARDL(1, 1)
Case 2: Restricted Constant and No Trend
Date: 03/16/20 Time: 17:30
Sample: 1981 2018
Included observations: 37

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	35.73521	11.85736	3.013759	0.0049
MSO(-1)*	-1.181112	0.167783	-7.039507	0.0000
INT(-1)	-1.673093	0.637257	-2.625459	0.0130
D(INT)	-0.699896	0.694994	-1.007052	0.3212

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-1.416540	0.507820	-2.789456	0.0087
C	30.25557	9.232541	3.277057	0.0025

EC = MSO - (-1.4165*INT + 30.2556)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	16.54080	10%	3.02	3.51
K	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
			Finite Sample: n=40	
Actual Sample Size	37			
		10%	3.21	3.73
		5%	3.937	4.523
		1%	5.593	6.333
			Finite Sample: n=35	
		10%	3.223	3.757
		5%	3.957	4.53
		1%	5.763	6.48

ARDL Error Correction Regression
Dependent Variable: D(MCU)
Selected Model: ARDL(2, 0)
Case 2: Restricted Constant and No Trend
Date: 03/16/20 Time: 17:45
Sample: 1981 2018
Included observations: 36

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MCU(-1))	0.442242	0.138577	3.191314	0.0032
CointEq(-1)*	-0.139971	0.064540	-2.168752	0.0376

R-squared	0.301627	Mean dependent var	-0.238889
Adjusted R-squared	0.281086	S.D. dependent var	4.679243
S.E. of regression	3.967473	Akaike info criterion	5.648089
Sum squared resid	535.1887	Schwarz criterion	5.736062
Log likelihood	-99.66560	Hannan-Quinn criter.	5.678794
Durbin-Watson stat	1.943154		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	1.475603	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

ARDL Long Run Form and Bounds Test
Dependent Variable: D(MVAD)
Selected Model: ARDL(1, 0)
Case 2: Restricted Constant and No Trend
Date: 03/16/20 Time: 20:39
Sample: 1981 2018
Included observations: 37

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.108250	5.180089	-0.020897	0.9834
MVAD(-1)*	-0.287208	0.115318	-2.490573	0.0178
INT**	0.550519	0.235373	2.338922	0.0254

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	1.916798	0.969877	1.976332	0.0563
C	-0.376904	18.12596	-0.020794	0.9835

EC = MVAD - (1.9168*INT -0.3769)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	3.221618	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
			Finite Sample: n=40	
Actual Sample Size	37	10%	3.21	3.73
		5%	3.937	4.523
		1%	5.593	6.333
			Finite Sample: n=35	
		10%	3.223	3.757
		5%	3.957	4.53
		1%	5.763	6.48

Dependent Variable: D(MVAD)
Method: Least Squares
Date: 03/17/20 Time: 11:42
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed
bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	0.400289	0.189483	2.112526	0.0418
C	-7.738175	3.232373	-2.393961	0.0222

R-squared	0.071493	Mean dependent var	-0.596144
Adjusted R-squared	0.044964	S.D. dependent var	6.570199
S.E. of regression	6.420789	Akaike info criterion	6.609497
Sum squared resid	1442.928	Schwarz criterion	6.696574
Log likelihood	-120.2757	Hannan-Quinn criter.	6.640196
F-statistic	2.694919	Durbin-Watson stat	2.126004
Prob(F-statistic)	0.109625	Wald F-statistic	4.462765
Prob(Wald F-statistic)	0.041847		

Dependent Variable: D(MCU)
Method: Least Squares
Date: 03/16/20 Time: 22:00
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed
bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	0.420831	0.316985	1.327605	0.1929
C	-8.003139	5.588646	-1.432035	0.1610

R-squared	0.143887	Mean dependent var	-0.494595
Adjusted R-squared	0.119427	S.D. dependent var	4.868919
S.E. of regression	4.568938	Akaike info criterion	5.928977
Sum squared resid	730.6317	Schwarz criterion	6.016053
Log likelihood	-107.6861	Hannan-Quinn criter.	5.959675
F-statistic	5.882474	Durbin-Watson stat	1.272428
Prob(F-statistic)	0.020589	Wald F-statistic	1.762535
Prob(Wald F-statistic)	0.192903		