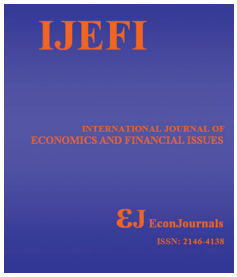

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# The Relative Impact of Bank Credit on Manufacturing Sector in Nigeria

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**ABSTARCT**

This study examined the relative impact of Bank credit on the manufacturing sector in Nigeria' 1986-2013. The major objective was to investigate the extent of impact of bank credit on the output of the manufacturing sector in Nigeria. The study adopted the autoregressive distributed lag (ARDL) bound cointegration test approach and error correction representations. Focusing on the short run relationship, we found every explanatory variable and their following lags as significant functions of volume of output of the manufacturing sector at 5% except exchange rate and its lags. In the bound test following the ARDL, we found evidence in favor of cointegration among the variables regardless of whether they are stationary or not given that the observed test statistic exceeds the upper critical band. Our results imply the presence of co integrating vectors of long run equilibrium relationships among the variables of interest. This result is corroborated by the Dynamic ordinary least squares results as well as the long run estimates of the ARDL. Overwhelmingly, we found evidence of a certain return to the long-run equilibrium in the model. The error correction term is negative and statistically significant. The negative value shows that there exists an adjustment speed from short-run disequilibrium towards the long-run equilibrium. By this, there is an indication that it takes about 3 years to restore the long-run equilibrium state on the Output of the manufacturing should there be any shock from the explanatory variables. By way of policy recommendation or positioning, the Central Bank and other monetary authorities alike should make policy that will lead to increase in VBC to the manufacturing sector. As this will play a catalytic role for growth in the sector in particular and the economy in general.

**Keywords:** Manufacturing Sector, Volume of Bank Credit, Nigeria, Autoregressive Distributed Lag Model, Bound Test
**JEL Classifications:** E51, L6

## 1. INTRODUCTION

Manufacturing as a process involves conversion of raw materials into finished consumer goods or intermediates/semi-finished goods. Like other industrial activities, manufacturing creates employment, boost agriculture and diversifies the economy while helping the nation to increase its foreign exchange earnings. Additionally, it enables local labour to acquire skills. The history of manufacturing in Nigeria can be traced to pre-colonial times. In village - based societies of Hausa, Benin and the Ibo's among others, small scale manufacturers of goods for trade and other social purposes abound (Charles-Anyaogu, 2012).

Nigeria as a country has suffered from a grave neglect of the manufacturing sector owing to overdependence on oil. This has eventually made the country monolithic unlike the historical experiences of Britain, US, Germany, Japan, Russia and of late, emerging economies from Asia, notably China, India, Singapore, Taiwan, Thailand South Korea, Malaysia Brazil and even of recent, Ghana (Obidigbo, 2012).

In Nigeria like most developing countries, poor access to production funds has been blamed for the near-absence of growth of the manufacturing sector (Adelegan, 2011). Opined that managers of firms complain that inadequate finance and high interest rates are

major constraints to doing business in Nigeria. Supporting the same frame of thought, a study by the Federal Republic of Nigeria (2011) held that the flow and quality of bank funding to the private sector went down increasingly as the risk aversion of banks increased in the aftermath of the financial meltdown. Funding has made it difficult for firms to invest in modern machines, information and communication technology and human resources development which are essential factors in trimming down costs, raising productivity and improving competitive strength.

Even when credit is available, high lending rate which is sometimes go over 30%, make such credits unattractive, given the fact that returns on investments in the sub-sector have been below ten percent (10%) on the average (Nwasilike, 2006).

The place of the manufacturing sector in the development of any nation's economy cannot be over-emphasized. The catalytic role of manufacturing with emphasis on the overall economic growth and development of any nation has been largely studied and documented in economic and finance literature.

Regrettably, Nigeria regardless its enormous natural endowments, has been a pathetic case as the manufacturing sector still accounts for a very low percentage of the gross domestic product (GDP). This is a cause for worry even as the nation's quest to becoming a leading world economy by 2020 increases (Omankhanlen and Owonibi, 2012).

Chronicling the performance of the manufacturing sector Ade-Agoye (2011) submitted that manufacturing sector's contribution to GDP dropped from 15% in the 1970's to 4.21% in 2010. The poor performance led to the closure of over 1000 manufacturing companies nationwide. He also adds that capacity utilization also dropped from 70% in the 1980's to 45% in 2010. Besides, Central Bank of Nigeria (2005) complained that growth in the manufacturing output was unimpressive. Omankhanlen and Owonibi (2012) observed that this sector is riddled with multifarious challenges. Outside infrastructure, there are other challenges such as the suffocating high interest rate and banks' unwillingness to lend to the sector even though the monetary authorities classify it as a priority sector. The manufacturing sector's contribution to GDP, following the negative state of the economic indicators, stood at 4.23% in 2013.

In view of the above situations this study is to situate the relative impact of Bank Credit on the manufacturing sector in Nigeria for the sample period 1986-2013. Hence, the main objective of this research is to investigate the relative impact of bank credit on the output of the manufacturing sector (OMS) in Nigeria. The specific objective is to determine whether volume of bank credit (VBC) have significant impact on OMS in Nigeria. The remaining part of the paper will be divided into review of literature for part two, methodology for part three, four is empirical results and interpretation and five is summary as well as conclusions.

## 2. REVIEW OF EMPIRICAL LITERATURE

Essentially, several empirical literature abound on the study of bank Credit and the manufacturing sector. These literatures differ in terms of time, space, setting and methodology. Arne and Mans (2003) did a panel study of whether firms in Africa's manufacturing sector are credit constrained. Using direct evidence on whether firms have a demand for credit and the degree to which this demand was satisfied by the formal credit market, the study found out that while banks allocate credit on the basis of expected profits, micro or small firms are much less likely to get loans than large firms. It found out in effect that debt is positively related to obtaining further lending.

Still along the line of micro studies and internationally documented evidence, Alexander and Luis (2003) examined the finances and the effect of credit limitations on the behavior and performance of firms in Costa Rica. Using panel data of firms in Costa Rica, the study found out that while banks are the main sources of credit for larger firms, non-banking credit (trade plus informal credit) remains the leading source of funds for smaller firms. Moreover, own funds and informal credit is a leading form of credit for newly created firms. It is also found that the probability of having banking credit and the fraction of banking credit/total debt is mostly affected by (if anything) characteristics of the firm and not by those of their owners. Indeed, the firm's value and age, and whether it keeps formal accounting procedures appear as the most relevant determinants of access to banking credit.

Nuno (2012) in examining the link between bank lending and economic growth for European Union countries (EU-27) for the period 1990-2010, used dynamic panel data generalized method of moments, system estimator. The study showed that savings promotes growth of bank credit while bank credit showed a negative impact on economic growth.

Empirical evidence also abounds in this line of study with the Nigerian research space. Doing a macro analyses of the effect of credit on manufacturing, Tawose (2012) investigated the effect of bank loans and advances on industrial performance in Nigeria between 1975 and 2009. Long run relationship and adjustment to shocks and dynamics were checked using Co-integration and error correction technique. The results showed that industrial performance co-integrated with all the identified explanatory variables. Industrial sector as dependent variable was proxied by real GDP, while Commercial Banks' loan and advances to industrial sector (BLM), aggregate saving (SAV), interest rate (INT), inflation rate (INF) were used as the independent variables. The study evidently showed that the behavior of real GDP contributed by industrial sector in Nigeria was significantly explained by the commercial banks' loan and advances to industrial sector, aggregate saving, interest rate and inflation rate within the period under study.

Similarly, Onuorah and Anyachukwu (2013) explored the necessity of bank credit and economic growth of Nigeria, by examining the relationship between bank credit and economic growth in Nigeria over the period 1980 to 2011. Using various statistical technique such as co-integration VAR model and Causality test the study showed that bank credit measures such as Total Production Bank Credits, Total General Commerce Bank Credits, Total Services Bank Credit, and Other Banks Credit

did not granger cause GDP instead GDP exerted influence on them. More so, short run relationship was found to have existed between bank credit measures and GDP within the studied period. The study alluded that the problems associated with bank credit facility revolved around the constraint and regulations imposed by the monetary authorities with emphasis on credit to entrepreneurs. Significantly, the studied used a lagged model in measuring the bank credit/manufacturing sector productivity nexus.

Following a similar line, Aliero et al. (2013) focusing on private sector credit used autoregressive distributed lag (ARDL) model to analyze the relationship between private sector credit (credit to the manufacturing sector inclusive) and economic growth in Nigeria. Using time series data for the period of 37 years (1974-2010), the results indicated that a long run equilibrium relationship exists between private sector credit and economic growth, when private sector credit was used as dependent variable. However, in agreement with Onuorah and Anyachukwu (2013), the causality tests indicate that there is no causal relationship between private sector and economic growth in Nigeria.

Ogar et al. (2014) examined how commercial bank credit can influence manufacturing sector in Nigeria using a time series data for a sample period of 1992-2011. The study utilized ordinary least squares multiple regression analysis and discovered that commercial bank credit had a significant relationship on manufacturing sector in Nigeria.

Ebere and Iorember (2016) examined the effect of commercial bank credit on the manufacturing sector output in Nigeria from 1980 to 2015 using Cochrane-Orcutt method. The study discovered that inflation rate and interest rate have negative effect on manufacturing sector output while loans and advances and broad money supply have positive effect with manufacturing sector output in Nigeria.

Adolphus and Deborah (2014) analyzed the role of banks in financing the agriculture and manufacturing sectors in Nigeria from 1981 to 2010. The study employed descriptive statistics combined with multiple regression analysis. The findings revealed that there exists a significantly weak correlation between commercial bank lending and the contribution of agriculture to GDP and a significantly positive correlation between merchant bank lending and agricultural contribution to GDP.

Olanrewaju et al. (2015) empirically investigated the effect of banking sector reforms on the output of manufacturing sector in the Nigerian economy between 1970 and 2011 with a view to examining the extent of the impact of banking sector reforms on the manufacturing sector. The study utilized annual time series data from 1970 to 2011, adopting the Cointegration analysis and error correction mechanism (ECM). The result revealed that Bank assets, Lending rate, Exchange rate (EXR) and real interest rate have low and positively significant effect on manufacturing output while financial deepening and interest rate have negative and significant impact on the output growth of manufacturing sector in Nigeria.

Ogunsakin (2014) empirically investigated the impact of financial sector reforms on the performance of manufacturing sector in Nigeria using annual time series data for the period of 1980-2009. The study adopted the multivariate co-integration method by Johansen (1988) and Jeselius (1990) and found out that financial sector reforms in Nigeria does not have significant impact on the growth of manufacturing output in Nigeria.

Yakubu and Affoi (2014) analyzed Commercial Banks' Credit on Economic Growth in Nigeria from 1992 to 2012 employed the ordinary least square and found that the commercial bank credit has significant effect on the economic growth in Nigerian. On the study of bank Credit and the manufacturing sector, Imoughele et al. (2013) examined commercial bank credit accessibility and sectoral output performance in a deregulated financial market economy: Empirical evidence from Nigeria using a time series data for a sample period of 1986-2010. The study utilized ordinary least squares techniques and discovered that various commercial bank credit supply and other included variables has a long run relationship with sectoral output performance i.e., agricultural, manufacturing and services sector output and the main demand for credit facility in Nigeria is the manufacturing sector. The work also revealed that commercial bank credit has direct and insignificant impact on sectoral output performance but cumulative supply and demand for credit in the previous period has direct and significant impact on the growth of agriculture, manufacturing and the services sectors output. Human capital investment and interest rate has direct and insignificant impact on the sector output performance while inflationary rate has inverse and insignificant impact on the various sector performances.

From recent local and international studies as shown above, it is evidently gathered that there is inconclusive evidence on the effect of credit (be it general or bank) on the manufacturing sector. Taking a stand in this argument, this study would ensure currency of data and adequacy of analytical technique in studying the relative impact of bank credit on the productivity of the manufacturing sector within the Nigerian economic/financial environment.

## 3. METHODOLOGY

This study will follow the ARDL Model as developed and popularized by Pesaran et al. (2001). The bound test (cointegration) and error correction method will be used to model both the short run and long run relationship amongst the variables. The technique has several advantages over other cointegration methods for which cause it is chosen for this work. Firstly, it is efficient in small samples and not restricted in terms of stationarity properties of the variables under study. The approach can allow for a combination of I(0) and I(1) variables.

In the first stage, we will estimate following the ordinary least squares the following equation:

$$\begin{aligned} \ln OMS_t = {} & \beta_0 + \beta_1 \ln VBC_{t-1} + \beta_2 INTR_{t-1} + \beta_3 \ln CPSGDP_{t-I} \\ & + \beta_0 EXR_{t-1} + \sum ai \Delta \ln OMS_{t-i} + \sum bi \Delta INTR_{t-j} \\ & + \sum ck \Delta CPSGDP_{t-k} + \sum dr \Delta EXR_{t-r} + u_t \end{aligned}$$

Where:
VBC: Volume of bank credit
OMS: Output of the manufacturing sector

INTR: Interest rate
CPSGDP: Ratio of credit to the private sector to GDP
EXR: Exchange rate

$\beta_1$-$\beta_4$ are the long run multipliers, $\beta_0$ the drift and $u_t$ are white noise errors.

The choice of the lag length will be done following the Schwartz information criterion with the optimal lag length being the lag with the least information criterion.

Cointegrating relationship amongst the variables is established following the Bound Test Approach. We use two critical values for the test for cointegration which are the lower and the upper band. The decisions shall be made as follows:

Test statistics > upper band = cointegration
Test statistics < lower band = no cointegration
Test statistics within upper and lower band = inconclusive.

In the third stage cointegration is established, we obtain the short run dynamic parameters by estimating an error correction model associated with the long run estimates:

$$\ln OMS_t = \beta_0 + \beta_1 \ln VBC_{t-1} + \beta_2 INTR_{t-1} + \beta_3 \ln CPSGDP_{t-I} + \beta_0 EXR_{t-1} + \psi ecm_{t-1}$$

Where, β1-β4 are short run dynamic multipliers, $\beta_0$ the drift and $\psi ec_{t-1}$ is the speed of convergence or adjustment to equilibrium which must be negative and statistically significant for us to say that it is rightly signed.

The estimates are subjected to diagnostic tests to confirm validity and reliability of the estimates.

The data for the estimation is drawn from the Central Bank of Nigeria Statistical Bulletin and it covers the period 1986-2013.

### 3.1. Unit Root Test

Following the apparent failure of the traditional unit root tests such as Augmented Dickey Fuller Test, to account for structural breaks, the variables under study shall firstly be tested for structural break before testing them for unit root. This will be done by running each variable as an endogenous factor of its constant and subjecting the regression result to multiple breakpoint tests. If a structural break is detected, the unit root tests will be done following a combination of the Zivot and Andrews (1992) and Perron (1994) unit root tests that have provisions for structural breaks.

## 4. ANALYSES AND PRESENTATION OF DATA

The results of the breakpoint test following the form described above, clearly indicates that the variables under study have breakpoints at different dates and intervals. The results of the multiple breakpoint tests are presented Table 1.

From the test results, it is clearly shown that all the variables face the problems of structural break with the exception of interest rate. The report is presented in two parts, while the section headed sequential lists the breaks in order of intensity, the section headed Repartition shows the breaks in chronological order. Essentially, the results, evidence that the traditional unit root tests would lose its power when used in these circumstances. This justifies the use of the Zivot and Andrews (1992) and Perron (1994) structural break consistent tests.

The Unit root test results in Table 2 show that the variables are integrated of different orders which justifies the use of the ARDL. While CPSGDP, OMS and VBC are order one variable following the ZAU test, CPSGDP, INTR, OMS and VBC are also order one following the PP test. All the other variables are stationary at levels and this combination essentially validates the choice of ARDL.

### 4.1. Diagnostic Tests Results

R2 = 99%, DW Stat = 2.4; Ramsey (RESET) F-stat = 0.0003 (0.986)

BG LM Test F-stat = 0.727 (0.498); Het (White) F-stat = 0.573 (0.768)

Focusing on the short run relationship, we found every explanatory variable and their following lags as significant functions of VBC at 5% except EXR and its lags.

The bound test is an F-test of joint significance of the lagged variables. In this context, we conclude in favor of cointegration among the variables regardless of whether they are stationary

**Table 1: Breakpoint tests results**

| Exchange rate | | |
|---|---|---|
| **Break dates** | **Sequential** | **Repartition** |
| 1 | 1999 | 1992 |
| 2 | 2009 | 1999 |
| 3 | 2003 | 2003 |
| 4 | 1992 | 2009 |

**Bai-Perron (Econometric Journal, 2003) critical values

| Interest rate | | | |
|---|---|---|---|
| Sequential F-statistic determined breaks | | | |
| **Break test** | **F-statistic** | **Scaled F-statistic** | **Critical value**** |
| 0 versus 1 | 3.718833 | 3.718833 | 8.58 |

*Significant at the 0.05 level, **Bai-Perron (Econometric Journal, 2003) critical values

| OMS | | |
|---|---|---|
| **Break dates** | **Sequential** | **Repartition** |
| 1 | 1996 | 1992 |
| 2 | 2008 | 1996 |
| 3 | 1992 | 2008 |
| **Volume of bank credit** | | |
| **Break dates** | **Sequential** | **Repartition** |
| 1 | 2008 | 2001 |
| 2 | 2001 | 2008 |
| **Credit to the private sector** | | |
| **Break dates** | **Sequential** | **Repartition** |
| 1 | 2007 | 2007 |

**Bai-Perron (Econometric Journal, 2003) critical values, Source: Authors' Extract from the multiple breakpoint tests of the variables under study, OMS: Output of manufacturing sector, ARDL: Autoregressive distributed lag

**Table 2: Unit root tests results with structural breaks**

| Zivot Andrews structural breaks consistent unit root results | | | | Philip Perron structural breaks consistent unit root test results | | | |
|---|---|---|---|---|---|---|---|
| Variable | Zau Test stat @ 5% | C.V @ 5% | Remarks | Variable | PP Test stat @ 5% | C.V @ 5% | Remarks |
| CPSGDP | −5.88 | −4.42 (.008) | I (1) | CPSGDP | −5.15 | −4.83 | I (1) |
| INTR | −5.22 | −4.93 (0.02) | I (0) | INTR | −10.07 | −5.23 | I (I) |
| EXR | −9.32 | −4.93 (0.008) | I (0) | EXR | −9.43 | −5.23 | I (0) |
| OMS | −4.39 | −4.93 (.03) | I (1) | OMS | −5.64 | −5.23 | I (1) |
| VBC | −10.04 | −5.08 (0.000) | I (1) | VBC | −18.10 | −5.23 | I (1) |

Source: Authors' computation of stationarity properties of the variables

or not if the observed test statistic exceeds the upper critical band. According to the data in Table 4, the null hypothesis is rejected since the test statistic is greater than the lower and upper critical bands, the results suggests that there is evidence of a long run relationship between the variables at the 5% level. Our results imply the presence of co integrating vectors of long run equilibrium relationships among the variables of interest.

### 4.2. Long-Run Elasticites

We now investigate the short run and long run dynamics of the ECM following the ARDL approach. Conclusions are drawn based on the dynamic adjustment of short run deviations of the variables from their long run state. This is as reported in Tables 5 and 6.

From Table 6, we can conclude that VBC, ratio of CPSGDP and EXR all exert long-run positive and significant effect on the OMS at 5% level of significance while interest rate (INTR) in consistency with theoretical expectation share negative but significant relationship with VBC the endogenous variable also at 5% significance level.

It can be observed that the long run elasticities reported in Table 6 are corroborated by the results of the dynamic ordinary least squares (OLS) as shown in Table 7.

Sequel to the detected cointegrating relationships, the results reported in Table 7 show evidence of a certain return to the long-run equilibrium in the model. The error correction term is negative and statistically significant. The negative value shows that there exists an adjustment speed from short-run disequilibrium towards the long-run equilibrium. In this situation, the error correction term coefficient is equal to (−0.34), which implies that a deviation from the equilibrium level in the current year will be corrected by 34% in years following. By this, there is an indication that it takes about 3 years to restore the long-run equilibrium state.

## 5. CONCLUSION

The focus of this research is on the relative impact of bank credit on the output of manufacturing sector in Nigeria. Focusing on the short run relationship, we found every explanatory variable and their following lags as significant functions of OMS at 5% except EXR and its lags. In the bound test following the ARDL, we found evidence in favor of cointegration among the variables regardless of whether they are stationary or not given that the observed test statistic exceeds the upper critical band. Our results imply the presence of co integrating vectors of long run equilibrium relationships among the variables of interest. This result is corroborated by the Dynamic OLS results as well as the long run estimates of the ARDL. Overwhelmingly, we found evidence of

**Table 3: ARDL short term estimates**

| Dependent variable: LOGOMS | | | | |
|---|---|---|---|---|
| Method: ARDL (2,0,0,1,2) | | | | |
| Variable | Coefficient | Standard error | t-statistic | P* |
| LOGVBC (−1) | 0.659889 | 0.070112 | 9.411926 | 0.0000 |
| LOGOMS (−1) | 0.231098 | 0.065263 | 3.541048 | 0.0022 |
| LOGINTR | −0.272622 | 0.096640 | −2.821024 | 0.0109 |
| LOGCPSGDP | 0.184885 | 0.076994 | 2.401301 | 0.0267 |
| LOGEXR | 0.027974 | 0.091153 | 0.306886 | 0.7623 |
| LOGEXR (−1) | 0.030331 | 0.107982 | 0.280888 | 0.7818 |
| LOGEXR (−2) | 0.162287 | 0.085917 | 1.888883 | 0.0743 |

Source: Author's computation, ARDL: Autoregressive distributed lag, *0.05

**Table 4: Cointegration tests results**

| ARDL bounds test | | |
|---|---|---|
| Null hypothesis: No long-run relationships exist | | |
| Test statistic | Value | K |
| F-statistic | 4.887711 | 3 |
| Critical value bounds | | |
| Significance | I0 bound | I1 bound |
| 10% | 2.01 | 3.1 |
| 5% | 2.45 | 3.63 |
| 2.5% | 2.87 | 4.16 |
| 1% | 3.42 | 4.84 |

Source: Authors' result for cointegration following the bound test, ARDL: Autoregressive distributed lag

**Table 5: Long run coefficients showing long-run elasticities**

| Variable | Coefficient | Standard error | t-statistic | P |
|---|---|---|---|---|
| LOGVBC | 0.679478 | 0.165250 | 4.111815 | 0.0006 |
| LOGINTR | −0.801570 | 0.205924 | −3.892548 | 0.0010 |
| LOGCPSGDP | 0.543603 | 0.193188 | 2.813856 | 0.0111 |
| LOGEXR | 0.648588 | 0.139671 | 4.643670 | 0.0002 |

Source: Authors' computation

**Table 6: Long-run from DOLS**

| Indices | LOGVBC | LOGINTR | LOGEXR | LOGCPSGDP |
|---|---|---|---|---|
| Coefficient | 0.897 | −1.10 | −0.428 | 1.07 |
| Standard error | 0.12 | 0.32 | 0.09 | 0.10 |
| T-stat | 7.45 | −3.39 | 4.56 | 10.41 |
| P-value | 0.0001<0.05 | 0.0095<0.05 | 0.0018<0.05 | 0.0000<0.05 |

Source: Authors' computation from dynamic OLS of cointegrating regression, OLS: Ordinary least squares

**Table 7: Error correction representation**

| Indices | ECM (−1) | D (LOGVBC) | D (LOGINTR) | D (LOGCPSGDP) | D (LOGEXR) |
|---|---|---|---|---|---|
| Coefficient | −0.34 | 0.23 | −0.27 | 0.18 | 0.02 |
| Standard error | 0.07 | 0.06 | 0.09 | 0.07 | 0.09 |
| T-stat | −4.85 | 3.54 | −2.82 | 2.40 | 0.31 |
| P value of T | 0.001<0.05 | 0.002<0.05 | 0.009<0.05 | 0.028<0.05 | 0.76>0.05 |

Source: Authors' computation, GDP: Gross domestic product, ECM: Error correction mechanism

a certain return to the long-run equilibrium in the model. The error correction term is negative and statistically significant. The negative value shows that there exists an adjustment speed from short-run disequilibrium towards the long-run equilibrium. In this situation, the error correction term coefficient is equal to (−0.34), which implies that a deviation from the equilibrium level in the current year will be corrected by 34% in years following. By this, there is an indication that it takes about 3 years to restore the long-run equilibrium state on the Output of the manufacturing should there be any shock from the explanatory variables.

Having found 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 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.

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