# International Credit Institutions and Real Sector Performance in Nigeria (1986-2018): Auto Regressive Distributed Lagged (ARDL) Technique

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***ABSTRACT***

*This study empirically examined international credit institutions and real sector performance in Nigeria within1986-2018. The specific objectives of the study examined the impact of African Development Bank (ADB), International Finance Corporation (IFC), and International Fund for Agricultural Development (IFAD) and International Development Association (IDA) credit financing on the output growth rate of manufacturing (MSO) and building and construction (BCO), sectors respectively. Time series data on each of the variables were collected from secondary sources, such as World Bank Financial Development Data Base, CBN Statistical Bulletin (various issues),Debt Management Office (DMO) annual reports. Quasi experimental design was adopted for the study with Johansen and Julius (1990) econometric model and ARDL as techniques for data analysis. ADF unit root test was conducted in determining stationarity of the variables. Results obtained showed that the series are mixed integrated and ranging from level 1(0) to and at first difference 1(1). The cointegration regression results showed that all the financing variables have positive significant impacts on output growth rate and fully integrated at the first difference 1(1) except IFC which integrated at level 1(0) ARDL regression results indicates that explanatory variables determine 73.3% of charges in AGO and the F statistic of 6.49 and P. value of 0.0003 revealed the model at good fit at 5% level of significance. Similar result of good fit and statistically significant applies to MSO where 78.5% of changes occurred and the F-statistic of 8.28 and P-value of 0.001 revealed that the model has a good fit at 5% level of significance and equally applied to BCO 84.4% changes, F-statistics 11.78 and P-value of 0.000.On the basis of the findings, it is recommended that international credit institutions particularly IFC, IDA should increase the funding of the real sector to sustain output growth rate increase export and enhance favorable external sector balance and economic sustainability of Nigeria economy.*

***KEYWORDS:*** *International Credit Institutions, Real Sector, Performance*

## INTRODUCTION

### 1.1 Background to the Study

The increasing integration of domestic economy to the global economy provides the opportunity for both developed and developing economies to seek increase flow of credits and capital from international credit institutions to expand output growth rate, attract investment and increase employment, facilitates trade and enhance favourable external sector balance (WTO, 2017).

Developing countries including Nigeria usually obtained credit support from international credit institutions to accelerate the pace of production, provision of infrastructural facilities, improve per-capita income and contribution to international trade. According to CBN statistical bulletin (2017) indicated that international credit institutions such as International Finance Corporation (IFC), International Development Association (IDA), International Fund for Agricultural Development (IFAD), Africa Development Bank (ADB), Organization of Economic Corporation and Development (OECD), International Monetary Fund (IMF) has significantly contributed to economic development of growing economies through credit and technical support including economic diversification programme. Also, Bacho and Taylor (1990) identified the third gap; stressed the importance of foreign aids in helping growing economies overcome their saving gap. These gap models are of the view that international capital flows alongside foreign aids provided opportunity for raising the level of long term investment, increase production and human capital development in less developed economies characterized by saving and investment gap.

Furthermore, ease of doing business policy is essential to attract international credit financing and Multilateral Development Banks (MDBs) capital inflow into the real sector of the economy and other economic sectors. The provision of infrastructures by the government and creating of enabling environment for business to thrive including tax reforms attract flows of capital into recipient economy. Strong financial sector provides adequate credit and support to businesses including considerable interest rate on money borrowed and liberalization of exchange rate control, enhances investment in the real sector economy and creates employment, income, increase savings and raise investment level. Thus, liberalization/restructuring of economic institutions, effective planning and networking, good economic relations with developed and medium income countries would attract foreign investors, capitals and credit flow from international credit institutions and increase output growth rate, capital accumulation and new level of investment and enhance economic growth. Capital gape merges from imbalance between exports and imports, between debt payments and resource inflows. Also, domestic savings and investment gap affects production and mismanagement of basic economic resources further weakens foreign investments in the real sectors and output growth rate. According to Levine and Zervous (1998), a viable capital market attracted increase inflows of capital funds and savings into the economy from international credit institution and meeting their preferences and liquidity needs. Better savings mobilization may increase the saving rate and investment funds necessary to drive economic activities of various sectors and reduce dependence on foreign borrowing.

In this regard, growing companies are able to raise capital at lower cost. In addition, business sector in countries with developed stock markets are less dependent on bank financing, which can reduce the risk of credit crunch with complementary support of international credit institutions. Stock markets therefore are able to positively influence economic growth through savings amongst

corporate entities, business organizations, financial institutions individuals and providing avenues for business and production financing.

According to Soludo (2006) Nigeria economy could follow the path of China or Singapore economic success with an organize capital market that attract increase foreign portfolio investment and capital flows to stimulate domestic production and drive economic of scale in the real sector i.e. in the agricultural and manufacturing sub-sectors lift the economy from the present import dependency to export orient economy that competitively drive foreign exchange earnings economic growth and sustainability and reduce dependency on foreign borrowing.

The contribution of agricultural and manufacturing sectors are affected by problem inadequate funding and capital mobilization, cost of funds, foreign exchange shortages, high cost of imported inputs, unstable power supply and harsh economic environment in LDCs economies. This problem imposes a drag on the real sectors output performance, export and external sector balance. Considering the diminishing contribution of the real sector to the overall GDP and export over the years, this study examined the international credit institutions financing and output growth rate to fill the gap in previous studies.

## Methodology

### 3.1 Research Design

. In this study, the descriptive and quasi-experimental designs were adopted based on panel data obtained from secondary sources. This indicates that research design provides an insight into data sources and analytical approach as well as the likely outcomes. The choice of this approach depends on its suitability in assessing the impact of multivariate explanatory variables on dependent variables.

### 3.2 Data Collection Methods and Sources

The data required for this study were time series data and sourced from selected international credit institutions such as Africa Development Bank, International Financial Cooperation, and International Fund for Agricultural Development and International Development Association. Furthermore, data was also be obtained from World Bank Financial Data Base (WBFDB)CBN Statistical Bulletin (various issues), Debt Management office Publications (DMO) and National Bureau of Statistics annual report within the period 1986-2018.

### 3.3 Data Analysis and Estimation procedure

the study adopted the autoregressive distributed lag (ARDL) modeling in order to explain the functional relationships between the variables employed in this study. The ARDL technique is useful as a result of its reliability in correcting spurious regressions and determining short and long run relationships between identified variables. It is argued that ARDL models are especially advantageous in their ability to handle co-integration with inherent robustness to misspecification of integration orders of relevant variables (Giles, 2017). This approach shall be adopted because it can be used without considering the order of integration of variables i.e, it can be used with a mixture of variables integrated at levels, 1(0), variables integrated at first difference 1(1) or variables that are fractionally integrated.

### 3.3.1 Unit Root Test

This study shall adopt the Augmented Dickey Fuller (ADF) test for unit root determination. The model for unit is specified including a drift and deterministic trend as follows:

$$\Delta Y_t = \theta_0 + \theta_1 Y_{t-1} + \sum \frac{k}{i} = {}_1b_1 \Delta Y_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots \quad \ldots\ldots\ldots\ldots \quad (1)$$

Where $Y_t$ = vector of all variables in the model, $\theta_0$=Intercept ,$\theta_1$ and $b_1$=parameters to be estimated , $k$ = Lag length , $\Delta$ =First difference notation and $\mu_t$= while noise

### 3.3.2 Johansen Co-Integration Test

This test was used to find-out if the variables included in the model have long-run relationship. The Johansen system of co-integration was applied in carrying out this test. The Max-Eigen statistic and Trace statistic form basis for rejecting the null hypothesis of no co-integration among the underlying variables. A lack of co-integration suggests that such variable have no long-run relationship: i.e they wander arbitrarily far away from each other (Dickey et al, 1991). We employ the maximum likelihood test procedure established by Johansen and Juselius (1990). Specifically, if Yt is a vector of n stochastic variables, then there exist a P-lag vector auto-regression with Gaussian errors. The general model for the co-integration is the form:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} In(1 - \lambda_i) \quad (3.2)$$

$$\lambda_{trace}(r,r+1) = -T\, In(1 - \lambda r + 1) \quad (3.3)$$

Where $\tilde{\lambda}$ denotes the estimated values of the characteristic roots and T denotes the number of observations. Basically, the trace statistic tests the null that the number of distinct co-integrating vectors is equal to or less than r. The further estimated characteristic roots are from zero, the greater the value of computed trace statistic. On the other hand, the Max-Eigen statistic tests the null hypothesis that the number of co-integrating vectors is r, against the alternative of r+1. In this case, the critical values for both trace and Max-Eigen statistic have been calculated by Johansen and Juselius (1990). Evidence of at least one co-integrating vector at 5 percent level of significance indicates that the underlying economic time series have long-run relationship.

### 3.3.3Auto Regressive Distributed Lags (ARDL) Regression Test

According to Giles (2013) regression models of this type provided a reliable technique for testing for the presence of long-run relationships between economic time-series. In its basic form, an ARDL regression model shown below:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \ldots + \beta p y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \ldots + \alpha_q x_{t-q} + \varepsilon_t$$

Where $\varepsilon_t$ is a random "disturbance" term. The model is "autoregressive", in the sense that $y_t$ is "explained (in part) by lagged values of itself. It also has a "distributed lag" component, in the

form of successive lags of the "x" explanatory variable. Sometimes, the current value of $x_t$ itself is excluded from the distributed lag part of the model's structure.

### 3.3.3.1 Statistical Criteria (First Order Test)

The following Statistical Criteria (First Order Test) was carried out in the study and they include; T-test, Test for Goodness of Fit and F-Test

### 3.3.4 Second Order Tests

i.) **Normality Test**:

. The skewness and Kurtosis are measures in the Jarque-Bera test procedure using the formula below:

$$JB = n\left[\frac{S^2}{6} + \frac{(k-3)^2}{24}\right] \quad (3.4)$$

Where n = number of observation , S = Skewness and K = Kurtosis. Other form of Second Order Tests include; Serial Correlation Test, and Heteroscedasticity Test

### 3.4 Model Specification

This study adopted three multivariate dynamic regression models anchored on the theory of financial intermediation which hinged on the efficacy of credit as an important aspect of financial intermediation that provided needy funds that stimulate output growth rate in the real sector. Manufacturing Sector Output (MSO), Building and Construction (BCO) proxied RGDP as the dependent variables while credit from International Finance Corporation (IFC), International Fund for Agricultural Development (IFAD), African Development Bank (ADB), International Development Association (IDA) as the explanatory variables. The specifications of the models in their functional forms were as follow:

MSO = f (ADB, IFC, IFAD, IDA) ……..... (3.5)

BCO = f(ADB, IFC,IFAD, IDA) …….....(3.6)

The models are expressed mathematically as follows:

$$MSO_t = \propto_0 + \propto_1 ADBt + \propto_2 IFC_t + \propto_3 IFAD_t + \propto_4 IDA_t + U_t \text{……..(3.8)}$$

$$BCO_t = \propto_0 + \propto_1 ADBt + \propto_2 IFC_t + \propto_3 IFAD_t + \propto_4 IDA_t + U_t \text{…….. (3.9)}$$

Where: $\propto_0$ =Constant terms , $\propto_1 + \propto_4$ = Coefficients of the regression and $U_t$ =Measure of unexplained variations. In accordance with the theoretical framework, the apriori expectations are: $\propto_1 > 0$, $\propto_2 > 0$, $\propto_3 > 0$, $x_1 > 0$, $x_2 > 0$, $x_3 > 0$, $x_4 > 0$

### 3.5. Variable Description and Measurement

The dependent variables include; Manufacturing Sector Output (MSO)and Building and Construction (BCO) while Independent Variables include;International Finance Corporation (IFC),International Fund for Agricultural Development (IFAD),African Development Bank (ADB)and International Development Association (ADA)

## RESULTS

This chapter examined the presentation and analysis of the data collected in this study, using selected econometric tools.

### 4.1.1 Time Plot of Data

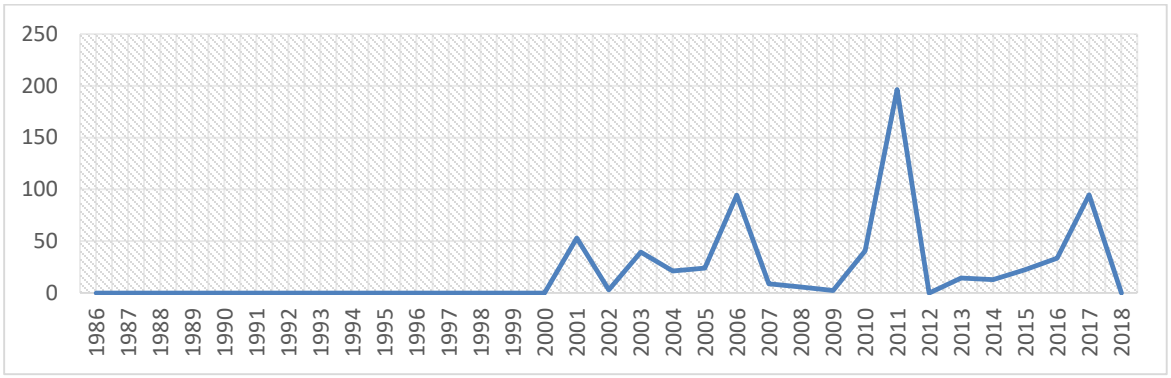


**Figure 4.2 Time Plot of IFC Loans (1986-2018)**
**Source: World Bank Database**

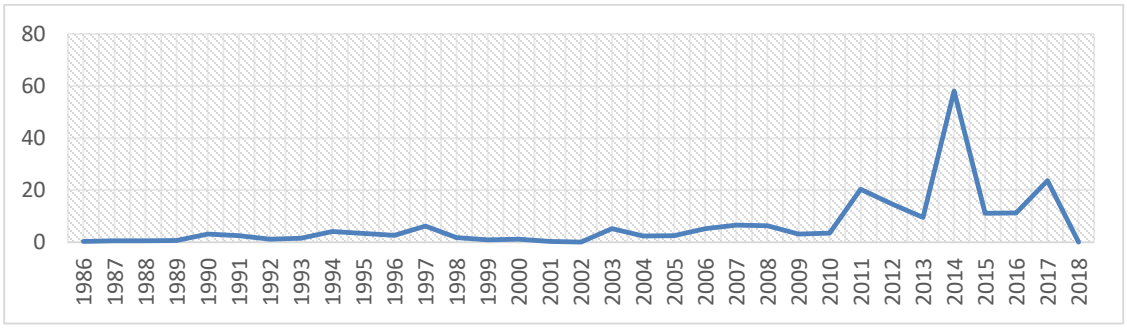


**Figure 4.3 Time Plot of IFAD Loans (1986-2018)**
**Source: Debt Management Office Annual Report, World Bank Database**

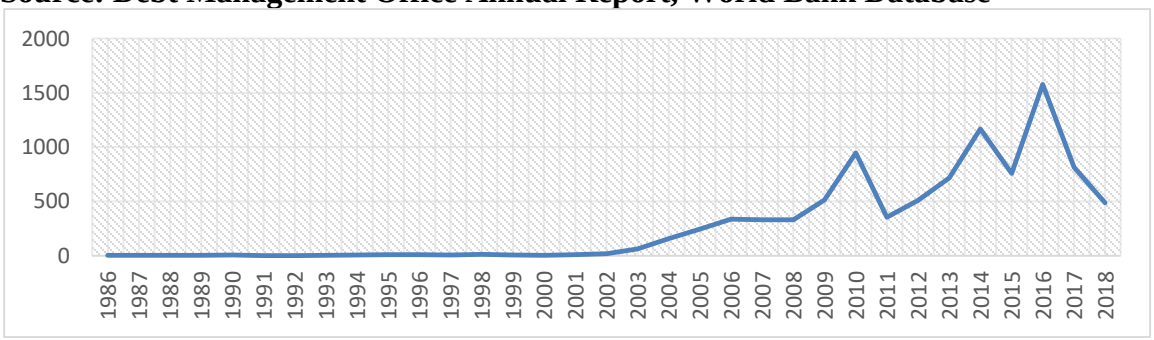


**Figure 4.4 Time Plot of IDA Loans**
**Source: Debt Management Office Annual Report, World Bank Database**

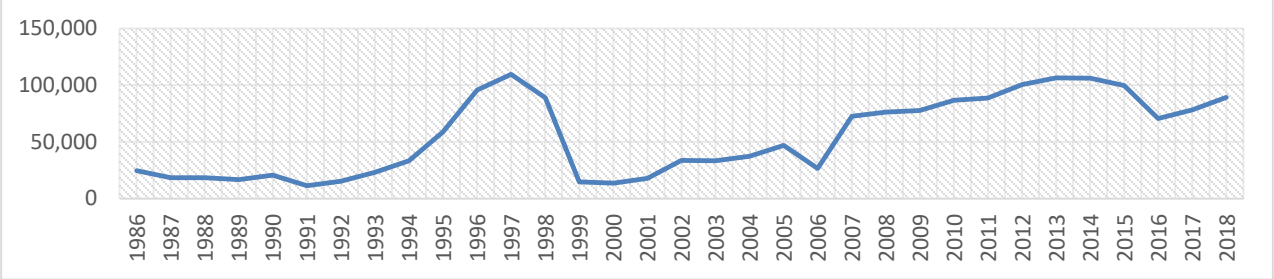


**Figure 4.5 Time Plot of Agricultural Subsector Output**
**Source: Computed from CBN Statistical Bulletin (2018) using Official Exchange Rate**

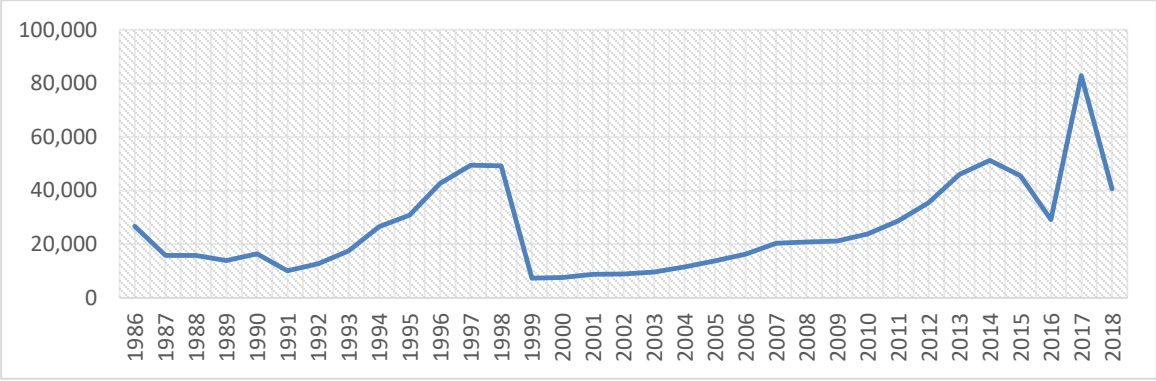


**Figure 4.6 Time Plot of Manufacturing Subsector Output**
**Source: Computed from CBN Statistical Bulletin (2018) using Official Exchange Rate**

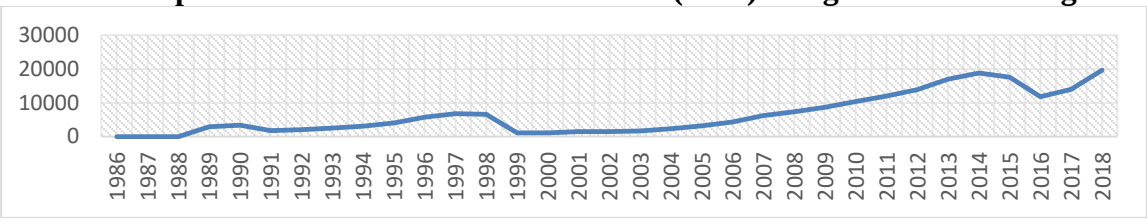


**Figure 4.7 Time Plot of Building and Construction Subsector Output**
**Source: Computed from CBN Statistical Bulletin (2018) using Official Exchange Rate**

## 4.2 Descriptive Statistics

**Table 4.2 Descriptive Statistics**

| | IFC | IFAD | IDA | AGO | MSO | BCO |
|---|---|---|---|---|---|---|
| Mean | 20.86406 | 6.685625 | 279.3589 | 53792.16 | 25483.34 | 6042.973 |
| Median | 1.167176 | 3.120000 | 16.10490 | 41955.50 | 20593.50 | 3720.000 |
| Maximum | 196.5224 | 58.09000 | 1578.500 | 109436.0 | 82825.00 | 18798.00 |
| Minimum | 0.000000 | 0.000000 | 2.159400 | 11214.00 | 7269.000 | 2.430700 |
| Std. Dev. | 40.88199 | 10.99099 | 404.6658 | 34704.28 | 17214.25 | 5567.130 |
| Skewness | 2.930946 | 3.487167 | 1.585982 | 0.250801 | 1.377274 | 0.936652 |
| Kurtosis | 12.11314 | 16.25177 | 4.895518 | 1.457524 | 4.914328 | 2.679575 |
| Jarque-Bera | 156.5482 | 299.0009 | 18.20580 | 3.507783 | 15.00292 | 4.815917 |
| Probability | 0.000000 | 0.000000 | 0.000111 | 0.173099 | 0.000552 | 0.089999 |

Source: Computed by Researcher Using E-views 9.5

### 4.3 Correlation Statistics

This examined the degree of association among the variables employed in the study, which is shown in table 4.3.

**Table 4.3Correlation Statistics**

| | IFC | IFAD | IDA | AGO | MSO | BCO |
|---|---|---|---|---|---|---|
| IFC | 1.000000 | 0.314105 | 0.282463 | 0.182479 | 0.186997 | 0.306523 |
| IFAD | | 1.000000 | 0.633775 | 0.536624 | 0.570650 | 0.730124 |
| IDA | | | 1.000000 | 0.591193 | 0.473262 | 0.813124 |
| AGO | | | | 1.000000 | 0.754533 | 0.851799 |
| MSO | | | | | 1.000000 | 0.728380 |
| BCO | | | | | | 1.000000 |

Source: Computed by Researcher Using E-views 9.5

### 4.4 Unit Root Testing

The unit root test was carried out to determine whether the variables in the time series have a unit root, and thus stationary; or otherwise. The Augmented Dickey Fuller (ADF) unit root test was employed in determining the stationarity of the variables.

**Table 4.4 Augmented Dickey Fuller (ADF) Unit Root Test**

| Variables | | t-statistic | Critical value (0.05) | Prob. | Order of Int. |
|---|---|---|---|---|---|
| IFC | Level | -4.580593 | -2.960411 | 0.0010 | *I*(0) |
| IFAD | Level | -1.064986 | -2.967767 | 0.7157 | *I*(1) |
| | 1$^{st}$Dif | -8.665305 | -2.967767 | 0.0000 | |
| IDA | Level | -1.236702 | -2.960411 | 0.6456 | *I*(1) |
| | 1$^{st}$Dif | -4.364015 | -2.976263 | 0.0020 | |
| AGO | Level | -1.622729 | -2.957110 | 0.4597 | *I*(1) |
| | 1$^{st}$Dif | -4.492550 | 2.960411 | 0.0012 | |
| MSO | Level | -2.660184 | -2.957110 | 0.0920 | *I*(1) |
| | 1$^{st}$Dif | -7.767255 | 2.960411 | 0.0000 | |
| BCO | Level | -0.005820 | -2.957110 | 0.9512 | *I*(1) |
| | 1$^{st}$ Diff | -4.647309 | -2.963972 | 0.0008 | |

Source: Computed by Researcher Using E-views 9.5

### 4.5 Co-integration Test

**Table 4.6 Johansen Co-integration Test(Model 2)**

Sample (adjusted): 1988 2017
Included observations: 21 after adjustments
Trend assumption: Linear deterministic trend
Series: MSO ADB IFC IFAD IDA
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

| Hypothesized | | Trace | 0.05 | |
|---|---|---|---|---|
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.956285 | 138.2870 | 69.81889 | 0.0000 |
| At most 1 * | 0.911013 | 72.55547 | 47.85613 | 0.0001 |
| At most 2 | 0.597349 | 21.75087 | 29.79707 | 0.3126 |
| At most 3 | 0.091304 | 2.647510 | 15.49471 | 0.9805 |
| At most 4 | 0.029872 | 0.636883 | 3.841466 | 0.4248 |

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized | | Max-Eigen | 0.05 | |
|---|---|---|---|---|
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.956285 | 65.73155 | 33.87687 | 0.0000 |
| At most 1 * | 0.911013 | 50.80460 | 27.58434 | 0.0000 |
| At most 2 | 0.597349 | 19.10336 | 21.13162 | 0.0939 |
| At most 3 | 0.091304 | 2.010627 | 14.26460 | 0.9905 |
| At most 4 | 0.029872 | 0.636883 | 3.841466 | 0.4248 |

Source: Computed by Researcher Using E-views 9.5

**Table 4.7: Johansen Co-integration Test (Model 3)**

Sample (adjusted): 1988 2017
Included observations: 21 after adjustments
Trend assumption: Linear deterministic trend
Series: BCO ADB IFC IFAD IDA
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized | | Trace | 0.05 | |
|---|---|---|---|---|
| No`. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.964249 | 150.4631 | 69.81889 | 0.0000 |
| At most 1 * | 0.894093 | 80.50850 | 47.85613 | 0.0000 |
| At most 2 * | 0.750427 | 33.35951 | 29.79707 | 0.0186 |
| At most 3 | 0.125463 | 4.211470 | 15.49471 | 0.8857 |
| At most 4 | 0.064324 | 1.396197 | 3.841466 | 0.2374 |

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.964249 | 69.95465 | 33.87687 | 0.0000 |
| At most 1 * | 0.894093 | 47.14898 | 27.58434 | 0.0001 |
| At most 2 * | 0.750427 | 29.14804 | 21.13162 | 0.0030 |
| At most 3 | 0.125463 | 2.815274 | 14.26460 | 0.9583 |
| At most 4 | 0.064324 | 1.396197 | 3.841466 | 0.2374 |

Source: Computed by Researcher Using E-views 9.5

### 4.6 Regression Test

This was performed using the ARDL method, so as to capture the long and short run dynamics of the model as well resolve the issue of serial auto correlation. The result obtained in indicated in tables 4.8-4.10

**Table 4.9 ARDL Regression Test (Model 2)**

Dependent Variable: MSO
Method: ARDL
Sample (adjusted): 1988 2017
Included observations: 21 after adjustments
Dynamic regressors (2 lags, automatic): ADB IFC IFAD IDA
Number of models evaluated: 81
Selected Model: ARDL(1, 2, 2, 1, 0)

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| MSO(-1) | 0.536768 | 0.219014 | 2.450838 | 0.0342 |
| ADB | 417.7886 | 233.5434 | 1.788912 | 0.1039 |
| ADB(-1) | 1882.679 | 957.7814 | 1.965667 | 0.0777 |
| ADB(-2) | -1802.941 | 947.7212 | -1.902396 | 0.0863 |
| IFC | 23.98849 | 147.9473 | 0.162142 | 0.8744 |
| IFC(-1) | -204.8844 | 155.2169 | -1.319988 | 0.2163 |
| IFC(-2) | -976.4908 | 487.5941 | -2.002671 | 0.0731 |
| IFAD | 3722.637 | 1411.302 | 2.637733 | 0.0248 |
| IFAD(-1) | 1882.129 | 1868.274 | 1.007416 | 0.3375 |
| IDA | 122.0769 | 87.27153 | 1.398817 | 0.1921 |
| C | -10155.44 | 8980.127 | -1.130879 | 0.2845 |

| | | | |
|---|---|---|---|
| R-squared | 0.892256 | Mean dependent var | 22440.24 |
| Adjusted R-squared | 0.784511 | S.D. dependent var | 19031.09 |

| | | | |
|---|---|---|---|
| S.E. of regression | 8834.375 | Akaike info criterion | 21.31637 |
| Sum squared resid | 7.80E+08 | Schwarz criterion | 21.86350 |
| Log likelihood | -212.8219 | Hannan-Quinn criter. | 21.43511 |
| F-statistic | 8.281230 | Durbin-Watson stat | 2.210223 |
| Prob(F-statistic) | 0.001258 | | |

Source: Computed by Researcher Using E-views 9.5

**Table 4.10ARDL Regression Test (Model 3)**

Dependent Variable: BCO
Method: ARDL
Sample (adjusted): 1988 2017
Included observations: 21 after adjustments
Dynamic regressors (2 lags, automatic): ADB IFC IFAD IDA
Number of models evaluated: 81
Selected Model: ARDL(1, 2, 2, 1, 0)

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| BCO(-1) | 0.467253 | 0.216613 | 2.157084 | 0.0564 |
| ADB | 66.62288 | 32.39625 | 2.056499 | 0.0668 |
| ADB(-1) | 291.4126 | 131.1427 | 2.222103 | 0.0505 |
| ADB(-2) | -309.9805 | 132.3958 | -2.341317 | 0.0412 |
| IFC | 3.057508 | 20.12412 | 0.151932 | 0.8823 |
| IFC(-1) | -26.68689 | 21.29050 | -1.253465 | 0.2385 |

| | | | | |
|---|---|---|---|---|
| IFC(-2) | -152.3701 | 66.76801 | -2.282082 | 0.0456 |
| IFAD | 538.6522 | 199.9406 | 2.694061 | 0.0225 |
| IFAD(-1) | 265.9377 | 259.0831 | 1.026457 | 0.3289 |
| IDA | 24.85036 | 11.98881 | 2.072797 | 0.0650 |
| C | -1062.134 | 1133.211 | -0.937278 | 0.3707 |

| | | | |
|---|---|---|---|
| R-squared | 0.921776 | Mean dependent var | 3604.068 |
| Adjusted R-squared | 0.843552 | S.D. dependent var | 3053.045 |
| S.E. of regression | 1207.586 | Akaike info criterion | 17.33632 |
| Sum squared resid | 14582642 | Schwarz criterion | 17.88345 |
| Log likelihood | -171.0313 | Hannan-Quinn criter. | 17.45506 |
| F-statistic | 11.78380 | Durbin-Watson stat | 2.210223 |
| Prob(F-statistic) | 0.000282 | | |

Source: Computed by Researcher Using E-views 9.5

### 4.7 Serial Correlation Test

The post-estimation tests are used to check the reliability of the regression results in order ensure that such results are not misleading. The tests include serial correlation, normality and heteroskedasticity tests.

#### 4.7.1 Serial Correlation Test

The serial correlation test was carried out to determine if the variables in the model were serially correlated or not. The results for models 1-3 are presented in tables 4.1 1

**Table 4.12: Serial Correlation Test (Model 2)**

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 0.087030 | Prob. F(2,8) | 0.9175 |
| Obs*R-squared | 0.447179 | Prob. Chi-Square(2) | 0.7996 |

Source: Computed by Researcher Using E-views 9.5

**Table 4.13: Serial Correlation Test (Model 3)**

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 0.957399 | Prob. F(2,8) | 0.4239 |
| Obs*R-squared | 4.055629 | Prob. Chi-Square(2) | 0.1316 |

Source: Computed by Researcher Using E-views 9.5

#### 4.7.2 Normality Test

The normality test was carried out to ascertain whether the variables in the model are normally distributed or not, which is one of the conditions for most econometric analysis. The normality test was carried out using the Histogram Normality Test, as shown in figures 4.8 to 4.10.

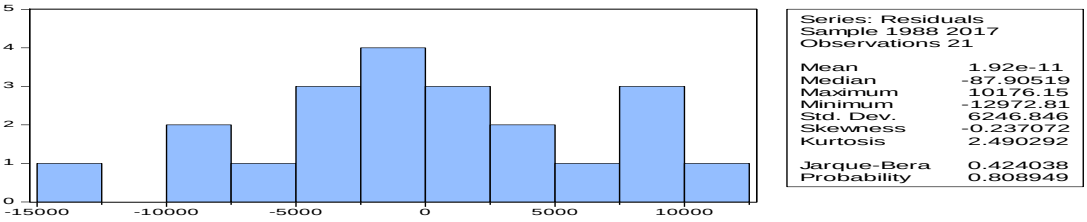


**Figure 4.9Histogram Normality Test (Model 1)**

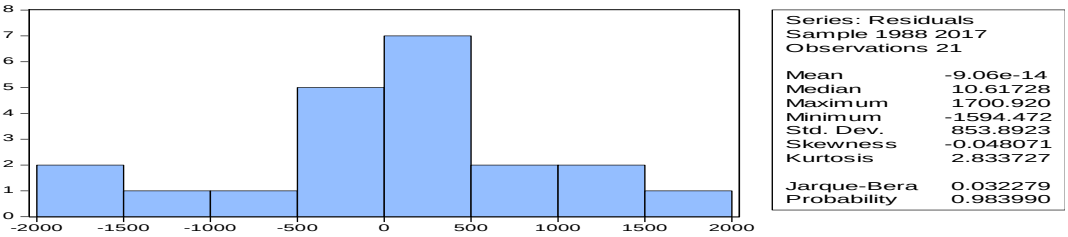


**Figure 4.10Histogram Normality Test (Model 2)**

### 4.7.3 Heteroskedasticity Test

The problem of heteroskedasticity takes place when the variance of the error terms varies across observations. The test was carried out using the Breusch-Pagan-Godfrey Heteroskedasticity Test, as shown in tables 4.13 to 4.15

**Table 4.14: Heteroskedasticity Test (Model 1)**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

| | | | |
|---|---|---|---|
| F-statistic | 1.312028 | Prob. F(10,10) | 0.3379 |
| Obs*R-squared | 11.91707 | Prob. Chi-Square(10) | 0.2906 |
| Scaled explained SS | 2.013595 | Prob. Chi-Square(10) | 0.9962 |

Source: Computed by Researcher Using E-views 9.5

**Table 4.15: Heteroskedasticity Test (Model 2)**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

| | | | |
|---|---|---|---|
| F-statistic | 0.549005 | Prob. F(10,10) | 0.8207 |
| Obs*R-squared | 7.442912 | Prob. Chi-Square(10) | 0.6831 |
| Scaled explained SS | 1.547422 | Prob. Chi-Square(10) | 0.9988 |

Source: Computed by Researcher Using E-views 9.5

## DISCUSSION

### 5.1 Trend Analysis of the Data

In figure 4.2, there was no disbursement of funds between 1986 and 2000. However, from 2001, so much inconsistency in loan disbursement from IFC was observed, with significant increases in 2006, 2011 and 2017. The trend analysis in figure 4.3 revealed that loans from IFAD was relatively stable from 1986 to 1989 before showing a steady rise up to 1997. But IFAD loans fell from 1997 to 2002. However, from 2003 to 2011, there was a rise in the loans disbursed by IFAD before rising sharply in 2014. In figure 4.4, it is revealed that IDA provided consistent financing from1986 to 2001. Afterwards, a steady upward trend was observed from 2002 to 2006 while it became stable between 2006 and 2008. Steady rises in IDA loans were also seen from 2008 to 2010, 2011 to 2014. However, IDA loans fell drastically from 2016 to 2018. On the other hand, a similar trend in AGO and MSO is observed in figures 4.5 and 4.6. In both figures, a steady drop in agricultural sector output is seen from 1986 to 1989, after which it rose slightly in 1990 before dropping again in 1991. But from 1992 to 1997 a steady and drastic rise in loans to both sectors were observed. More so, from 1998 to about 2000, it fell sharply to its lowest ebb. Again, from 2001 and up to 2014, it maintained a steady upward trend, except for a fall in AGO in 2006. The same trend of declining output was also seen from 2015 to 2016.However, between 2017 and 2018, the trend of output took an opposite course for AGO and MSO. While AGO rose in 2017 and 2018, MSO rose in 2017 but fell sharply in 2018. In figure 4.7, the course of BCO was slightly different from those of the agricultural and manufacturing subsectors. First, BCO was steady between 1986 and1998 but rose sharply in 1989. Although it fell in 1991, a steady upward trend in BCO was seen from 1992 to 1997 before dropping sharply again in 1999. More so, from 2001 to 2014, a steady upward trend was a gain observed. However, BCO slumped downwards again in 2015 and 2016 before its remarkable rise in 20017 and 2018. The result of the descriptive statistics in table 4.2 indicates mean outputs were $53.8b, $25.5b and $6b for the agricultural, manufacturing and building and construction subsectors. Thus, the agricultural subsector has been the most productive, with almost two times as much output as manufacturing and building and construction. The table also revealed that all the data were positively skewed. However, the Jarque-Bera statistics and associated probabilities suggested that only AGO and BCO were normally distributed.

The correlation test was to examine the degree of association among the variables employed in the study, which is shown in table 4.3. The result revealed that all the variables in the model have positive associations with each other. Strong correlations are observed between IDA and AGO as well as B/CO, which is followed by that of IFAD. However, the least correlation is seen between IFC and all three dependent variables. It must also be noted that the correlation between the independent variables are quite low except for a 63.4% between IFAD and IDA. This is an indication that multi-collinearity is nonexistent between the variables in the model. The result of the Augmented Dickey Fuller (ADF) used in determining the presence of unit root is summarized in table 4.4; This indicated that all the variables are stationary and fully integrated at their first differences, $I(1)$, except IFC, which is integrated at level, $I(0)$. Thus, IFC is trend stationary while

all others are difference stationary. This implies absence of unit root in all the variables employed in the three models.

### 5.5 Johansen Test for Cointegration

In table 4.5, the Trace test indicated the presence of 2 co-integrating equations while the Maximum Eigen value Test indicated the presence of 3 co-integrating equations. Both tests confirmed the rejection of the null hypothesis of no co-integration among the variables in the model. However, Johansen and Juselius (1990) recommends the use of the trace statistics when there is a conflict between the trace statistics and maximum eigenvalue statistics. This is because the trace statistics takes into account all of the smallest eigenvalues, thereby possessing more power than the maximum eigenvalue statistic (Serletis and King, 1997; and Kasa, 1990). Thus, it is concluded that there are 2 co-integrating equations in the model. This implies that financing from international credit institutions have a long-run relationship with agricultural sector output. This result is similar to that of Akinwale, Adekunle and Busayo (2018), who found co-integration between foreign credit financing and agricultural output growth rate in Nigeria.

Also in table 4.6, both the Trace and Maximum Eigenvalue Tests indicated the presence of 2 cointegrating equations. Both tests confirmed the rejection of the null hypothesis of no cointegration among the variables in the model. Thus, it is concluded that there are 2 cointegrating equations in the model. This implies that financing from international credit institutions have a unique long-run relationship with manufacturing sector output in Nigeria.

Furthermore, in table 4.7, both the Trace and Maximum Eigenvalue Tests also indicate the presence of 3 co-integrating equations in the model. Both tests confirmed the rejection of the null hypothesis of no co-integration among the variables in the model. This implies that financing from international credit institutions have a unique long-run relationship with manufacturing sector output in Nigeria.

### 5.6 ARDL Regression Results

In the model presented in table 4.9,the independent variables determined 78.5% of changes in MSO. More so, the F-statistic of 8.28 and p-value of 0.001 revealed that the model has a good fit at.5% level of significance. Furthermore, the t-statistics and their associated p-values revealed that all the variables have positive relationships with manufacturing sector output growth in the long run but only IFAD is significant at 5%. However, none of the variables were found to have significant impact on MSO in the short run. The Durbin Watson statistic of 2.21 also suggests the unlikelihood of serial correlation in the model. Furthermore, in the third model reported in table 4.10, the independent variables determined 84.4% of changes in BCO. More so, the F-statistic of 11.78 and p-value of 0.000also revealed that the model has a good fit at.5% level of significance. Furthermore, the t-statistics and their associated p-values revealed that all the variables have positive relationships with building and construction subsector outputs in the long run but only IFAD is significant at 5%. However, the second lagged values of ADB and IFC were found to have significant impact on BCO in the short run. The Durbin Watson statistic of 2.27 also suggests the unlikelihood of serial correlation in the model. The histogram-normality test results in figures 4.8 to 4.10, revealed Jarque-Bera statistics and p-values of 0.424 (0.809) and 0.032 (0.984) for

models 1 and 2, respectively. Since the p-values are greater than 0.05, the null hypothesis of normality is accepted. Thus, the variables in all three models are normally distributed. Finally, the heteroskedasticity test conducted using the Breusch-Pagan-Godfrey test also showed that the p-values of the F-statistic, observed R-squares and explained SS for all the three models are greater than 0.05. Thus, the errors of the models are homoscedastic.

### 6.1 Conclusion

The real sector of the economy plays significant role in stimulating economic growth and external sector balance. A flourishing real sector creates demand for product and stimulates output growth rate leading to income earning, employment, savings, and foreign investment. This therefore, creates the need to resort to external funding and support to expand production and achieve macroeconomic stability through international credit institutions funding. Specifically, the study examined the funding performance of the African Development Bank (ADB), International Finance Corporation (IFC), International Fund for Agriculture Development (IFAD) and the International Development Association (IDA) and impact on the output growth rate of the agricultural, manufacturing and building and construction subsectors. Using the Johansen co-integration technique and the Auto Regressive Distributed Lags (ARDL) model, the study established that international credit institutions' credit financing and support programme have long-run relationships with the output growth rate of all three subsectors of the real sector. More so, IFAD funding had the most significant long-run impact on the aggregate real sector – agriculture, manufacturing as well as building and construction. The ADB has also contributed positively to all subsectors but only significantly on the agricultural subsector, whereas the IFC and the IDA credit funding have fairly significant effect on output growth rate of the subsectors. The findings above justified Agu, C. (2009) and Nyong (1997) empirical works which showed that international credit financing and capital inflows has a direct and positive effects on real sector output growth rate and economic growth in Nigeria. In conclusion and from the findings, it is obvious that international credit institutions' funding has significant impacts on real sector performance, employment, export, income earnings, contribution to economic growth and diversification within the period of study.

### 6.2 Recommendations

In consideration of the findings and conclusions made in this study, the following policy recommendations can aid in the stimulation of aggregate real sector development in Nigeria.

1) The government should improve existing infrastructures that would enhance output growth rate, capacity utilizations, employment and export in the real sector of the economy.

2) The Federal Government and CBN should implement research findings and recommendation on economic studies conducted to attract foreign investment and credit inflow into the real sector of the economy.

4) There is need for increased provision of infrastructures to stimulate production, create employment, enhance export and economic diversifications.

8) Government should integrate the informal sector of the economy through provision of medium and long term credit financing, extension and managerial services to improve their productive capacity and contribute effectively to raise GDP, employment, income earnings and export drive.

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