AEFUNAI JOURNAL OF ECONOMICS, FINANCE AND DEVELOPMENT STUDIES (AEFUNAIJEFDS)
ISSN (Print): 2536-6793 | **ISSN (Electronic):** 2536-6742 *Volume 2 (2) September, 2025*

Impact of Bank Credit and Economic Recession on Manufacturing Sector Output

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DOI: 10.48028/iiprds/aefunaijefds.v2.i2.21
JEL Classifications: O14, C22, G21

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Abstract

This study investigates the combined and interactive effects of deposit money bank credit and economic recession on manufacturing sector output in Nigeria from 2010 to 2023. Preliminary tests done with the Augmented Dickey-Fuller and Phillips-Perron unit root tests indicated evidence of I(0) and I(1) stationarity of variables. The bound test showed evidence of cointegration in the model. The Autoregressive Distributed Lag (ARDL) model estimation results that bank credit significantly boosts manufacturing output in the short run but has an insignificant long-run impact. Real GDP growth rate, used as a proxy for economic recession, exerts mixed short-run effects and a negative long-run impact. This indicates the sector's exclusion from wider economic gains. However, the interaction between bank credit and GDP growth rate is positive and significant in the short run and in the long run. The implication is that bank credit plays a stabilizing role of credit during economic downturns. While broad money supply enhances long-run output, interest rate spreads show no significant effect. Based on the findings, the study suggest that strategic credit allocation, enhanced liquidity, and targeted industrial policies are essential to bolster manufacturing resilience and integrate it into the broader economy.

Keywords: *Impacts, Bank Credit, Economic Recession, Manufacturing Sector*

Background to the Study

The manufacturing sector is widely regarded as a fundamental pillar of economic progress and structural transformation, particularly in developing nations. It serves as a key engine for driving the development process, making it nearly impossible to achieve sustainable growth without a strong and functional manufacturing base (Nnamaka et al., 2022). It plays a pivotal role in enhancing GDP, generating employment, and raising per capita income. Moreover, manufacturing stimulates job creation, supports agricultural growth, promotes economic diversification, and enhances foreign exchange earnings. It also serves as a platform for skill development among the local workforce (Ume, et al., 2017). High interest rates not only elevate the cost of borrowing but also discourage manufacturers from seeking deposit money banks loans, thereby dampening investment, reducing aggregate demand, and weakening economic growth (Adigun, et al., 2022). In Nigeria, various policy efforts, including import substitution strategies and industrial development plans, have been implemented to stimulate manufacturing output (Adigun, et al.,2022).

Nonetheless, concerns persist over the sector's declining productivity, largely due to inadequate access to credit at favorable rates (Ogar, Nkamare, & Effiong, 2014). As Kaldor's first law suggests, manufacturing remains the engine of growth (McCausland, & Theodossiou, 2012). This idea makes it imperative to assess how deposit money banks credit affects the sector's performance in emerging economies like Nigeria. Despite the pivotal role the manufacturing sector plays in Nigeria's industrial and economic development, its performance continues to fluctuate in response to various macroeconomic shocks and financial dynamics. The motivation for this study could be traced to certain factors.

First, while numerous empirical studies have examined the relationship between bank credit and manufacturing output in Nigeria (e.g., Adeniyi, 2024; Bello et al., 2021; Asuquo et al., 2021), and a few others have analyzed the effect of economic recession on the manufacturing sector (e.g., Chude & Chude, 2023), no known study has explored the interrelationship among bank credit, economic recession, and manufacturing output in a single empirical model.

Second, the existing studies have largely treated economic recession as an isolated phenomenon or proxied it by inflation, as in the case of Chude and Chude (2023), which may not fully capture the macroeconomic reality of economic downturns. The use of GDP growth rate, a globally accepted proxy for recession, offers a more robust representation of the macroeconomic climate.

Third, no existing study has evaluated the interactive effect of bank credit and economic recession on manufacturing sector performance, despite the high vulnerability of industrial output to changes in both financial liquidity and cyclical economic fluctuations. This critical gap leaves policymakers with limited empirical guidance on how bank credit mechanisms might be leveraged to cushion the adverse effects of recessions on the manufacturing sector. This study, therefore, seeks to bridge these gaps by being the first to investigate the combined

and interactive effects of bank credit and economic recession, proxied by GDP growth, on the performance of the manufacturing sector in Nigeria over the period 2000 to 2023. This study is divided into five parts. The introduction forms that first part, followed by the literature review. Methodology is the third section. Results of data investigation are discussed in part four. Finally, conclusion and policy recommendations are done in the last section

Literature Review

The study is guided by the financial accelerator theory. The Financial Accelerator Theory, propounded by Bernanke, Gertler, and Gilchrist in 1996, is well-suited for studying the impact of banking sector credit on manufacturing output in Nigeria, especially during economic downturns. This theory posits that small economic shocks can be amplified through financial market imperfections, affecting borrowing costs and investment. Assumptions include imperfect information in credit markets, varying borrowing costs, and the procyclical nature of credit availability. It also assumes that borrowers' net worth influences their creditworthiness and that collateral values fluctuate with the economic cycle. Criticisms include the oversimplification of financial market dynamics and underestimation of non-financial factors. The theory may also neglect the role of government policies and external economic shocks. Despite these, the theory's relevance lies in its ability to explain how reduced credit access during downturns exacerbates declines in manufacturing output. It highlights the crucial role of banking sector credit in stabilizing the manufacturing sector, making it pertinent for analyzing Nigeria's economic fluctuations and credit policies. Many studies in the past have attempted to evaluate the impact of deposit money bank credit on manufacturing sector output in Nigeria.

Adeniyi (2024) conducted an ex-post facto study to examine the impact of bank lending on Nigeria's industrial sector performance between 1981 and 2017. Using a dynamic ordinary least squares (DOLS) approach, the study modeled manufacturing output as a function of bank credit, interest rates, and exchange rates. The results revealed that bank lending and interest rates had significant positive effects on manufacturing performance, while exchange rates exerted a significant negative influence on the sector.

Nwagu and Udeagbala (2024) examined the impact of bank credit to the private sector on Nigeria's manufacturing sector from 1981 to 2021. Using ARDL estimation and data from the CBN and NBS, the study found that credit to the private sector, interest rate, and exchange rate jointly explained 93.9% of the variation in manufacturing output. While exchange rate had a positive and significant effect, credit to the private sector and interest rate were statistically insignificant. The findings highlight the limited influence of bank credit and interest rates on manufacturing output during the study period.

Audu (2024) examined the impact of Deposit Money Banks' credit on the growth of Nigeria's manufacturing sector from 2005 to 2019. The study analyzed variables such as RGDP, M2, LIR, and EXR. Employing ADF, VECM, and multiple regression techniques, the findings revealed a significant positive relationship between bank credit and manufacturing sector growth in Nigeria.

Adebiyi, et al., (2022) examined the effect of credit on Nigeria's manufacturing output growth from 1995 to 2020 using secondary data and both descriptive and inferential methods. OLS estimates show expected but mostly insignificant signs. A negative link exists between lending rate and bank credit. Johansen tests confirm a stable long-run relationship between manufacturing output and key macroeconomic variables. Granger causality reveals that all variables jointly Granger-cause manufacturing growth, with a bidirectional causality between real GDP and bank credit.

Chude and Chude (2023) examined the impact of economic recession on Nigeria's manufacturing sector from 1981 to 2021, using manufacturing output, inflation, and government expenditure as variables. Data were sourced from the Central Bank of Nigeria and analyzed using the Ordinary Least Squares (OLS) method due to its BLUE properties. The study found that inflation negatively and significantly affected manufacturing output, while government expenditure had a positive but statistically insignificant impact on the sector. Afolabi, et al., (2022) investigated the impact of financial sector development on Nigeria's manufacturing industry using data from 1991 to 2020. Employing ARDL, they found that money supply positively affects manufacturing output, while private sector credit, manufacturing loans, and prime lending rate negatively impact it. Energy cost and exchange rate had minimal effects.

Bello, et al., (2021) examined the impact of bank credit on Nigeria's manufacturing sector output from 1986 to 2017. Using ADF, PP tests, ARDL, and Granger causality, they found that bank credit significantly boosts manufacturing output and has a long-run relationship with it. The study also found causality from manufacturing output to bank credit. Ademola and Afolabi (2023) examined the determinants of deposit money bank credit to the manufacturing sector in Nigeria from 1986 to 2021. Using ADF and ARDL techniques, they found that inflation and prime lending rates have positive but insignificant long-run effects on bank credit, while liquidity ratio has a negative effect. Loan-to-deposit ratio positively impacts credit in the short run.

Ibrahim, et al., (2021) studied the nexus between bank credit and manufacturing sector output in Nigeria from 1981 to 2019 using the NARDL model. They found long-run asymmetry in bank credit's impact on manufacturing output, with positive changes boosting output and negative changes reducing it. The study also found causality from output to bank credit and from lending rates to both credit and output.

Ebhotemhen and Hezekiah (2021) studied the effect of bank credits on Nigeria's manufacturing sector output from 1981 to 2019 using DOLS and ECM techniques. Their results showed that bank loans and government expenditure positively impact manufacturing output, while lending interest rates have an inverse effect. Asuquo, et al., (2021) explored the impact of deposit money bank credit on Nigeria's manufacturing sector performance from 1981 to 2019 using descriptive statistics, unit root tests, cointegration, and ECM. Their findings revealed a positive long-run relationship between bank credit and manufacturing output, with interest rates and inflation also significantly affecting sector performance.

Samson and Egbon (2023) analyzed the impact of financial sector development on Nigeria's manufacturing sector output from 1987 to 2021 using VECM. They found that financial sector development variables positively impact manufacturing output in both the long and short run, while deposit liability and private sector credit have negative effects. Ogbonna, Anaemena, Okechukwu, and Ibenyenwa (2023) examined the impact of bank credit on different industrial segments in Nigeria's economic development using ARDL. They found that bank credit to manufacturing significantly impacts the Human Development Index, while credit to agriculture and government segments showed a negative, insignificant relationship. Similarly,

Omimakinde and Otite (2022) investigated the distribution of banks' credit on sectoral output in Nigeria from 1979 to 2020 using ARDL and ECM. They found that bank credit to manufacturing and mining sectors significantly influences aggregate output growth, while credits to agriculture and real estate have lesser effects. Daniel, Oluwatobi, Taiwo, and Julius (2017) investigated the relationship between bank credits and manufacturing growth in Nigeria from 1978 to 2015. Using secondary data and cointegration analysis, they found that capital formation, capacity utilization, and deposit money banks loans positively and significantly impact manufacturing growth. Crude oil production also positively stimulates manufacturing growth in the long run.

Ume, Obasikene, Oleka, Nwadike, and Okoyeuzu (2017) investigated the impact of bank credit on Nigeria's manufacturing sector from 1986 to 2013 using ARDL and ECM. They found significant short-run relationships between bank credit and manufacturing output, with deposit money bank credit significantly impacting output in both the short and long run. in the same vein, Otubu (2019) examined the impact of bank credits on Nigeria's manufacturing sector from 1980 to 2015 using OLS, cointegration, ECM, and Granger causality. The study found that bank credits significantly boost manufacturing output, with government expenditure, capital formation, and tertiary enrollment also positively influencing output.

Similarly, Yua, Yua, and Ogbonna (2021) examined the role of deposit money bank credit on industrial output in Nigeria from 1981 to 2018 using ARDL and ECM. They found that bank credit and money supply significantly boost industrial output, while inflation and lending rates have minimal effects. Erhabor and Isedu (2021) analyzed the impact of bank credit on manufacturing output in Nigeria from 1981 to 2019 using ECM. They found that credit to the manufacturing sector significantly boosts output, while exchange rate and corruption negatively but insignificantly impact it. Interest rates and government expenditure had minimal effects.

Okere, et al., (2020) studied the effects of bank credits on the output of Nigeria's manufacturing sector from 1981 to 2018. They employed the Auto-Regressive Distributed Lag (ARDL) bound cointegration test approach and error correction. Findings revealed a positive and significant relationship between bank credits and the performance of the manufacturing sector in Nigeria.

Gbadebo, et al., (2017) investigated Banks credits and manufacturing growth in Nigeria from 1978 – 2015. Using, the Error correction model technique, findings show that bank lending to manufacturing sector is positively related and statistically significant at 5 per cent.

A review of extant literature reveals that numerous studies have examined the role of bank credit on manufacturing sector output in Nigeria (e.g., Adeniyi, 2024; Audu, 2024; Bello et al., 2021; Asuquo et al., 2021; Afolabi et al., 2022), with a consensus on the generally positive effect of bank lending on manufacturing sector growth. Similarly, recent efforts by Chude and Chude (2023) have analyzed the effect of economic recession on manufacturing performance using inflation as a proxy. However, no study to date has integrated the triadic relationship among bank credit, economic recession, and manufacturing output in a unified empirical framework.

Moreover, previous works have not explored the interactive effect of bank credit and economic recession on manufacturing output, an essential analysis considering that the availability of credit may either mitigate or exacerbate the impacts of economic downturns. Importantly, while inflation has often been used as a proxy for economic recession, this approach is limited in scope and may not fully capture recessionary periods. The present study advances the literature by employing GDP growth rate, a globally accepted and broader indicator of economic recession.

Methodology

This study employs a quantitative (*ex post facto*) research approach to empirically examine the impact of bank credit on manufacturing sector output in Nigeria. It seeks to establish the impact of bank credit and economic downturns on manufacturing sector output in Nigeria. This study utilized secondary data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin. The data spans from 2010 to 2023 (quarterly data) to provide the short and long run impact of bank credit on manufacturing sector output: the role of economic downturns, using the technique of Autoregressive distributed lagged model (ARDL)

Model Specification

Following the studies, by Okere, et al., (2020), Gbadebo, et. al., (2017), and Ume et. al., (2017), the relationship between manufacturing value added is specified as a function of bank credit from deposit money banks:

$$MVA = f(BCRM) \quad (1)$$

Considering the results and variables used by previous studies, we introduce the following variables: broad money supply (M_2), and interest rate (IRS). The model becomes

$$MVA = f(BCRM, M_2, IRS) \quad (2)$$

For the purpose of the present study, GDP growth rate (GDPGR) is used measures of economic downturns. The reason behind this is to estimating the role of economic downturns on the ability of deposit money bank credit to influence manufacturing value-added in Nigeria.

$$MVA = f(BCRM, GDPGR, M_2, IRS) \quad (3)$$

To evaluating the combined influence of economic downturns and bank credit, we have model 4:

$$MVA = f(BCRM, GDPGR, BCRM*GDPGR, M_2, IRS) \quad (4)$$

The econometric model is standardized using logarithmic transformation to ensure the robustness of the parameters during estimation.

$$LMVA = \beta_1 + \beta_2\, LBCRM_t + \beta_3 GDPGR_t + \beta_4 (LBCRM * GDPGR)_t + \beta_5\, LM2_t + \beta_7 IRS + \mu_t \quad (5)$$

Analytical Techniques

Unit Root test for Stationarity

The analytical technique begins with the estimation of the stationarity characteristics of the time series data using the Augmented Dickey-Fuller Unit Root test. we have a series y_t for testing unit root. Then, ADF model tests unit root as follows.

$$\Delta y_t = \mu + \delta y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-1} + \varepsilon_t \quad (6)$$

Bound test cointegration

The adoption of the ARDL (Autoregressive Distributed Lag) technique is used regardless of whether the underlying variables are I(0), I(1), or a combination of both, making it highly flexible and suitable for mixed-order integration. Moreover, ARDL provides unbiased long-run estimates and valid t-statistics even in the presence of small sample sizes (Pesaran, Shin, & Smith, 2001). The error correction version of the Autoregressive Distributed lagged model version of the above linear model is given as:

$$\Delta LMVA_t = \alpha_0 + \sum_{i=1}^{P} \gamma_1 \Delta LMVA_{t-i} + \sum_{i=1}^{P} \omega_2\, \Delta LBCRM_{t-i} + \sum_{i=1}^{P} \delta_3\, \Delta GDPGR_{t-i} + \sum_{i=1}^{P} \vartheta_4\, \Delta(LBCRM * GDPGR)_{t-i} + \sum_{i=1}^{P} \pi_5\, \Delta LM2_{t-i} + \sum_{l=1}^{P} \varphi_6 \Delta IRS_{t-i} + \beta_1 LMVA_{t-1} + LBCRM_{t-1} + \beta_5 GDPGR_{t-1} + \beta_5 (LBCRM * GDPGR)_{t-1} + \beta_6 LM2_{t-1} + \beta_7\, IRS_{t-1} + \mu_t \quad (3.7)$$

Where: LMVA is the log of manufacturing value-added (dependent variable). The explanatory variables are: log of bank credit to manufacturing (LBCRM); RGDPGR = GDP growth rate (Proxy for economic downturn); LM2 = log of broad money supply; IRS = interest rate spread; μ_t = error term

While the first part of the equation with $\gamma_1, \omega_2, \delta_3, \vartheta_4, \pi_5, and\ \varphi_6$ represents short run dynamics of the model, the second part with represents long run relationship parameters. The null hypothesis in the equation is $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_{6=} \beta_7 = 0$, which means non-existence of long run relationship. This is tested against the alternative: Hi: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_{6=} \beta_7 \neq 0$

Post Estimation Test

The model is checked for serial correlation of the residual to ensure that errors are not correlated across time (Wooldridge, 2012). The heteroscedasticity test assesses whether the variance of the errors is constant across observations (White, 1980). The normality test, often using the Jarque-Bera statistic, evaluates whether the residuals follow a normal distribution (Jarque & Bera, 1980). Performing these tests helped to ensure the reliability and validity of estimates of the econometric model.

Justification for the use of variables

Table 1: Description of Variables

Variable	Measurement	A priori Expectations
MVA	Manufacturing valued added to GDP in Nigeria (₦Billion) (Gbadebo, et. al 2017)	
BRCM	Deposit Bank credit to the manufacturing sector (₦Billion) (Erhabor, & Isedu, 2021)	Positive
GDPGR	Changes in growth rates of GDP (%) proxy for economic recession. (Reinhart, & Rogoff, 2009).	Negative
M2	Ratio of Broad money Supply to GDP (M2) ₦Billion (Afolabi, et. al., 2022)	Positive
IRS	Interest rate (%) (Ume et. al., 2017: Asuquo et. al. 2021)	Negative

Source: Authors' compilation

Results and Discussions

This section begins with the examination of the time series data for stationarity using the Augmented Dickey-Fuller and Philip-Peron's Unit root tests for stationarity. This is followed by the ARDL bound test cointegration. The regression result is presented and followed by the post estimation tests.

Table 2: Unit Root test of Stationarity

Variable	Augmented-Dickey Fuller				Phillip-Peron				
	Level		1st Diff.		Level		1st Diff.		
	Stat.	Critical Value (5%)	Stat.	Critical Value (5%)	Stat.	Critical Value (5%)	Stat.	Critical Value (5%)	Inference
MVA	-3.356	0.017	-	-	-2.313	0.171	-9.546	0.000	I(0); I(1)
BCRM	-1.506	0.523	-7.467	0.000	-1.614	0.469	-7.470	0.000	I(1)
GDPGR	-5.079	0.000	-	-	-10.04	0.000	-	-	I(0)
LM2	2.923	1.000	-6.319	0.000	3.310	1.000	-6.412	0.000	I(1)
IRS	-2.900	0.052	-	-	-2.863	0.056	-9.199	0.000	I(0); I(1)

Source: Authors' computation and compilation

Table 2 presents the results of the unit root test using both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) methods. The findings reveal that GDPGR is stationary at level [I(0)], while BCRM and LM2 are stationary at first difference [I(1)]. MVA and IRS show mixed results, being stationary at both level and first difference across the tests, suggesting I(0) and I(1) respectively. Overall, the series are a mixture of I(0) and I(1), justifying the application of the ARDL estimation technique.

Table 3: Bound test Result

Variable	K	F-stat. calculated	1%		5%		10%	
			L	U	L	U	L	U
Test Stat	4	4.710565	3.74	5.06	2.86	4.01	2.45	3.52

Source: Authors' computation and compilation
Note: U and L stand for upper and lower critical bounds, respectively.

The results in Table 3 indicate that the F-statistic exceeds all critical values at the 1%, 5%, and 10% levels. This implies that we reject the null hypothesis of no long-run relationship among the variables and accept the alternative hypothesis of cointegration among the variables. The calculated F-statistic (4.71) is higher than the critical upper bound F-statistic at the 1%, 5% and 10% significance levels, confirming a long-run relationship among the variables in the model.

Table 4: ARDL Regression result

ARDL Cointegrating And Long Run Form				
Dependent Variable: LMVA				
Selected Model: ARDL(1, 2, 4, 3, 4, 4)				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LBCRM)	0.042363	0.014965	2.830702	0.0085
D(LBCRM(-1))	0.057236	0.016846	3.397705	0.0021
D(RGDPGR)	-0.026796	0.010365	-2.585193	0.0152
D(RGDPGR(-1))	0.033556	0.008673	3.869150	0.0006
D(RGDPGR(-2))	0.028007	0.010725	2.611502	0.0143
D(RGDPGR(-3))	0.008716	0.002851	3.056822	0.0049
D(LBCRM * RGDPGR)	0.002982	0.000868	3.436646	0.0019
D(LBCRM(-1) * RGDPGR(-1))	-0.002538	0.000694	-3.654784	0.0011
D(LBCRM(-2) * RGDPGR(-2))	-0.002370	0.000844	-2.808759	0.0090
D(LM2)	-0.314034	0.233391	-1.345528	0.1893
D(LM2(-1))	0.163666	0.329775	0.496298	0.6236
D(LM2(-2))	0.643422	0.403549	1.594407	0.1221
D(LM2(-3))	-0.518267	0.306361	-1.691687	0.1018
D(IRS)	-0.000659	0.004772	-0.138006	0.8912
D(IRS(-1))	-0.008409	0.005187	-1.621147	0.1162
D(IRS(-2))	-0.000493	0.005077	-0.097034	0.9234
D(IRS(-3))	0.008989	0.005003	1.796845	0.0832
CointEq(-1)	-0.276186	0.074370	-3.713659	0.0009
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LBCRM	-0.011513	0.023529	-0.489304	0.6284
RGDPGR	-0.419333	0.152497	-2.749780	0.0103
LBCRM*RGDPGR	0.035090	0.012316	2.849251	0.0081
LM2	0.434262	0.134304	3.233422	0.0031
IRS	-0.034892	0.023711	-1.471531	0.1523
C	3.835290	1.305778	2.937169	0.0066

Source: Author's computation and compilation

Table 4 presents the results of the ARDL estimation for the short-run and long-run impact of bank credit-economic recession-manufacturing sector output nexus over the period under study. The ARDL (1, 2, 4, 3, 4, 4) model indicates that bank credit to the manufacturing sector (LBCRM), real GDP growth rate (RGDPGR), their interaction term, money supply (LM2), and interest rate spread (IRS) each exert both immediate and lagged effects, ranging from one to four periods, on the dependent variable.

In the short run, the coefficient of D(LBCRM) and its first lag are positive and statistically significant at 1% and 5% levels respectively ($p = 0.0085$; $p = 0.0021$). This is an indication that increases in bank credit positively influence manufacturing output. The suggestion being made in this outcome is that access to bank credit in the short term can stimulate production activities within the manufacturing sector, as was supported by Bello et al., 2021. However, in the long run, the coefficient of LBCRM is negative but statistically insignificant ($p = 0.6284$). The implication is that although bank credit may drive immediate gains, it may not sustain long run manufacturing growth. This outcome possibly reflects credit misallocation, high default risk, or ineffective loan utilization in the sector. The findings highlight the limited influence of bank credit and interest rates on manufacturing output (Nwagu & Udeagbala 2024).

With respect to changes in economic activities (RGDGR), in the short-run dynamics, the real GDP growth rate shows mixed effects across various lags: the contemporaneous change is negative and significant ($p = 0.0152$), while the subsequent lags (up to the third lag) are positively and significantly related to manufacturing output. This suggests a lagged positive transmission effect from overall economic growth (proxy for economic recession) to the manufacturing sector output. On the other hand, in the long run, RGDPGR exerts a significant negative influence on manufacturing output ($p = 0.0103$). This indicates that despite aggregate economic expansion, the manufacturing sector may be excluded from the growth process. This is possibly due to structural rigidities or dominance of non-manufacturing sectors, especially the rent-ridden activities (financial sector). This confirms earlier findings by Afolabi et al. (2022) that broader economic growth does not automatically translate to sectoral improvement without targeted policies.

The interaction between bank credit and GDP growth (used to proxy the effect of credit during economic downturns) is positive and statistically significant both in the short run ($p = 0.0019$) and in the long run ($p = 0.0081$). This suggests that during times of poor macroeconomic performance, bank credit can play a stabilizing role by cushioning the negative effects on the manufacturing sector. Over time, this credit-growth interaction becomes even more relevant in supporting output expansion. This long run resilience supports the idea that strategic credit policies can help mitigate recessionary impact.

In the short run, the coefficients of LM2 (broad money supply) and its lags are mixed and statistically insignificant at the 5% level (e.g., $p = 0.1893$). However, in the long run, LM2 exerts a significant and positive effect on manufacturing output ($p = 0.0031$). This means that liquidity expansion enhances productive investment and manufacturing activities over time. The result implies that while short-run fluctuations in money supply do not immediately impact the sector, consistent liquidity growth creates a conducive financial environment for manufacturing development. This outcome aligns with the findings of Yuah, et al., (2021) and Samson & Egbon, 2023), who highlighted the critical role of money supply in fostering industrial sectoral expansion.

The interest rate spread appears to be statistically insignificant both in the short run (p = 0.8912) and in the long run (p = 0.1523). This implies that the cost of borrowing, as measured by the spread, does not exert a meaningful effect on manufacturing output. This could be attributed to low credit access for manufacturers or the fact that interest rate dynamics are not the most binding constraint for the sector. Interestingly, this finding contrasts with that of Ume et al. (2017), who found significant effects using annual data. The discrepancy may be due to differences in data frequency (quarterly vs annual) or model specification.

The error correction coefficient is negative and statistically significant (CointEq(-1) = -0.2762, p = 0.0009), confirming that the model adjusts back to equilibrium after short-run shocks. The magnitude indicates that about 27.6% of deviations from long-run equilibrium are corrected every quarter. This validates the presence of a stable long-run relationship among the variables and reflects the reliability of the ARDL model in capturing both short- and long-run dynamics. The significance of the adjustment mechanism confirms the existence of a self-correcting mechanism in the Nigerian manufacturing sector.

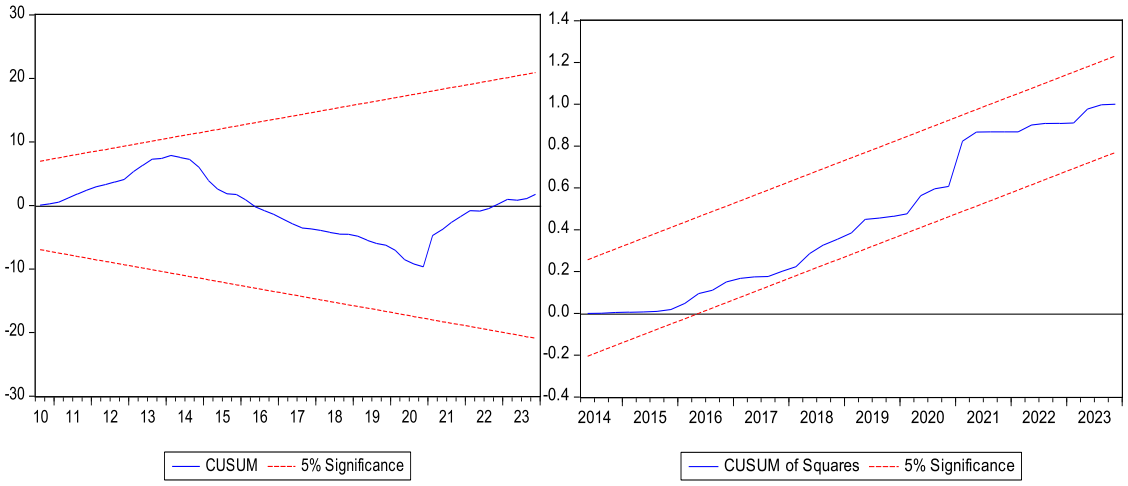
Check for Robustness

Table 6: Post estimation Results

Test	**Statistic**	**Pvalue**
Normality: Jarque-Bera	0. 790356	0.673560
Breusch-Godfrey Serial Correlation LM Test: F. Statistic	0.109954	0.8963
Heteroskedasticity Test: Breusch-Pagan-Godfrey: F-Stat.	0.815328	0.6932

Source: Author's computation and compilation

Table 6 presents the diagnostic tests. The diagnostic tests indicate that the residuals of the ARDL model are normally distributed (Jarque-Bera test, p = 0.673560), there is no evidence of serial correlation (Breusch-Godfrey test, p = 0.8963), and the model does not suffer from heteroscedasticity (Breusch-Pagan-Godfrey test, p = 0.6932). These results suggest that the model is well-specified and the estimations are reliable. To test for stability of the model, the result of the CUSUM and CUSUM of Squares tests shows that the blue lines are within the critical regions.



Conclusion and Policy Recommendations

Seldom has the impact of economic downturns on the industrial sector been examined in Nigerian literature. Using quarterly data observations, the study aimed to investigate the combined impact of economic recession and deposit money bank credit on Nigeria's manufacturing sector production from 2010 to 2023. Using an interactive modelling approach, the study employed the ARDL technique to determine the short run and long run impact of bank loan and economic recession on manufacturing sector production in Nigeria. The study comes to the conclusion that although bank lending has a major short-run impact on industrial output, its long run impact is negligible, pointing to problems like inadequate usage or credit misallocation. Real GDP growth has a lagging short-run positive effect but a long-run negative impact on the sector, indicating that manufacturing may be isolated from larger economic gains. Targeted credit policies can help the industry during economic downturns, according to the relationship between credit and GDP growth. Long run, a broad money supply boosts manufacturing production, but interest rate spreads have no discernible impact within any time frame.

In order to transform short run manufacturing gains into long run, sustainable growth, policymakers need make sure that bank credit is allocated efficiently and used productively. Targeted industrial policies and incentives are required to structurally integrate the manufacturing sector into the larger economy, as overall GDP growth does not always benefit it. Credit interventions should be selectively increased during economic downturns in order to stabilize manufacturing output and mitigate recessionary shocks. Furthermore, to improve financial liquidity, encourage investment, and promote long run sectoral growth, the broad money supply must continue to rise. Instead, than depending only on interest rate regulations, efforts should concentrate more on enhancing credit availability, reducing collateral requirements, and fortifying institutional frameworks because interest rate spreads are negligible.

References

Adebiyi, O. R., Folarin, E. M., & Olurinola, I. O. (2022). Impact of bank credit on the manufacturing sector in Nigeria. *Lapai International Journal of Administration (LIJAD), 5*(1), 121–142

Ademola, A. O., & Afolabi, D. O. (2023). Determinants of deposit money bank credit to manufacturing sector in Nigeria. *Nigerian Journal of Management Sciences*, 24(1a), 102-117

Adeniyi, L. T. (2024). *Bank credit and financial performance of listed manufacturing firms in Nigeria*. *International Journal of Economics and Financial Management (IJEFM), 9*(6), 35–45. https://www.iiardjournals.org

Adigun, A. O., Ologunwa, O. P., & Ayilara, M. A. (2022). Interest rate and manufacturing sector output in Nigeria (1998–2018). *International Journal of Management Studies and Social Science Research (IJMSSSR), 4*(3), 66–76.

Afolabi, B., Ayodele, A. E., Daramola, K. O., & Adewumi, P. A. (2022). Financial sector development and growth of the Nigerian manufacturing sector. *FUOYE Journal of Finance and Contemporary Issues*, 3(1), 113.

Asuquo, B., Onuchuku, O., & Nteegah, A. (2021). An analysis of the impact of sectoral allocation of deposit money bank's credit on manufacturing sector performance in Nigeria. *Asian Journal of Economics, Finance and Management, 3*(1), 354-362. Article no. AJEFM.468.

Audu, Y. P. (2024). Bank credit and growth of manufacturing sector in Nigeria. *International Journal of Business and Management Research, 5*(1), 231–255

Bello, A., Anfofum, A. A., & Farouk, B. K. (2021). Impact of bank credit on manufacturing sector output in Nigeria. *Journal of Economics and Allied Research, 6*(2), 85-97.

Bernanke, B. S., Gertler, M., & Gilchrist, S. (1996). The financial accelerator and the flight to quality. *The Review of Economics and Statistics, 78*(1), 1-15. http://links.jstor.org/sici?sici=0034-6535%28199602%2978%3A1%3C1%3ATFAATF%3E2.0.CO%3B2-U

Central Bank of Nigeria Statistical Bulletin (2023). www.cenbank.org

Chude, N. P., & Chude, D. I. (2023). Effect of economic recession on manufacturing sector in Nigeria. *International Journal of Innovative Research in Technology (IJIRT), 9*(8), 725–731. https://www.ijirt.org/visualize/index.php?paper_id=158028

Daniel, G. A., Oluwatobi, A. A., Taiwo, M., & Julius, F. F. (2017). Banks credits and manufacturing growth in Nigeria. *Nigerian Journal of Management Sciences, 6*(1), 277-284.

Ebhotemhen, W., & Hezekiah, O. (2021). Commercial bank credit and manufacturing sector output in Nigeria. *Lapai International Journal of Management and Social Sciences, 13*(1), 95-108. Faculty of Management & Social Sciences, IBB University, Lapai, Niger State-Nigeria.

Erhabor, O. J., & Isedu, M. (2021). Impact of bank deposit on manufacturing sector output: The case of Nigeria. *The International Journal of Business & Management, 9*(4), 272. https://doi.org/10.24940/theijbm/2021/v9/i4/BM2104-027.

Gbadebo, A. D., Adekunle, A. O., Muritala, T., & Fadeyi, F. J. (2017). Banks credits and manufacturing growth in Nigeria from 1978 to 2015. *Nigerian Journal of Management Sciences, 6*(1), 277-284.

Ibrahim, A., Abdulrahman, L., & Abubakar, A. B. (2021). Bank credit and manufacturing sector output in Nigeria: A nonlinear approach. *Lapai Journal of Economics, 5*(1), 32-46. Department of Economics, IBB University Lapai, Niger State, Nigeria. Print ISSN: 2659-028X. Online ISSN: 2659-0271.

Jarque, C. M., & Bera, A. K. (1980). Efficient Tests for Normality, Homoscedasticity and Serial Independence of Regression Residuals. *Economics Letters*, 6(3), 255-259.

McCausland, W. D., & Theodossiou, I. (2012). Is manufacturing still the engine of growth? *Journal of Post Keynesian Economics, 35*(1), 79-92. https://doi.org/10.2753/PKE0160-3477350105

Nnamaka, U. C., Odungweru, K., & Nwanyanwu, K. U. (2022). Interest rate and manufacturing sector performance: Further evidence from Nigeria. *Research Journal of Management Practice, 2*(1), 29–44. https://www.ijaar.org

Nwagu, K., & Udeagbala, J. C. (2024). Effect of bank credit to the private sector on the performance of manufacturing sector in Nigeria. *Saudi Journal of Economics and Finance, 8*(6), 174 – 184 https://doi.org/10.36348/sjef.2024.v08i06.003

Ogar, A., Nkamere, S.E., Effiong, C. (2014), Commercial bank credit and its contributions on manufacturing sector in Nigeria. *European Scientific Journal*, 8(3), 19-36.

Ogbonna, K. S., Anaemena, H. C., Okechukwu, P. A., & Ibenyenwa, E. K. (2023). Bank lending to industrial sector and economic development of Nigeria. *International Journal of Accounting Research, 8*(1), 1-6. ISSN: 2617-9954

Okere, P. A., Okere, C. O., & Nwaneto, U. (2020). Effects of bank credits on the manufacturing sector output in Nigeria (1981-2018). *International Journal of Science and Management Studies (IJSMS)*, 3(4), 74. E-ISSN: 2581-5946.

Omimakinde, J. A., & Otite, M. O. (2022). Impact of distribution of banks' credit on sectoral output in Nigeria. *Quest Journals: Journal of Research in Business and Management, 10*(6), 37-45. https://www.questjournals.org

Otubu, O. P. (2019). The impact of bank credits on the manufacturing sector in Nigeria (1980-2015). *International Journal of Science and Management Studies, 2*(4), 1. https://www.ijsmsjournal.org

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289-326. doi:10.1002/jae.616

Reinhart, C. M., & Rogoff, K. S. (2009). The aftermath of financial crises. *American Economic Review*, 99(2), 466-472.

Samson, U. E., & Egbon, P. C. (2023). Financial sector development and manufacturing sector performance in Nigeria. *EPRA International Journal of Economics, Business and Management Studies, 10*(8), 101 – 110. https://doi.org/10.36713/epra1013

Ume, K. E., Obasikene, A. C., Oleka, C. D., Nwadike, A. O., & Okoyeuzu, C. (2017). The relative impact of bank credit on manufacturing sector in Nigeria. *International Journal of Economics and Financial Issues, 7*(2), 196-201. Retrieved from http://www.econjournals.com

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4), 817-838.

Wooldridge, J. M. (2012). Introductory econometrics: a modern approach. Cengage Learning.

Yua, H., Yua, P. M., & Ogbonna, K. S. (2021). Deposit money bank's credit and industrial output in Nigeria. *International Journal of Economics, Business and Management Research, 5*(2), 147-161. Retrieved from http://www.ijebmr.com.