Review Article

The Impact of Deposit Money Banks' Credit and Government Expenditure on Industrial Productivity in Nigeria: An Empirical Analysis (1981–2020)

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ABSTRACT

This study investigates the impact of Deposit Money Banks' (DMBs) credit and government expenditure on industrial sector productivity in Nigeria using time-series data from 1981 to 2020. Industrial productivity is measured as total industrial sector output, defined as the aggregate value-added (in constant 2010 Nigerian Naira, billions) from the manufacturing, mining and quarrying, and construction sub-sectors, sourced from the Central Bank of Nigeria Statistical Bulletin. An error correction model (ECM) was employed following stationarity tests (Augmented Dickey-Fuller) and cointegration analysis (Engle-Granger), with estimation via Ordinary Least Squares. Empirical results reveal a negative and significant short-run effect of DMB credit on industrial output (coefficient: -0.590963, p=0.0147), rejecting the null hypothesis of no significant relationship. A positive but insignificant lagged effect was observed (coefficient: 0.340145, p=0.1928). Government expenditure showed an insignificant effect (coefficient: -0.884716, p=0.5625), failing to reject the null hypothesis. The error correction term was negative and significant (coefficient: -0.132579, p=0.0429), indicating adjustment to long-run equilibrium, with an R-squared of 0.284340 suggesting modest explanatory power. Based on these findings, recommendations include implementing targeted SME lending quotas and credit guarantee schemes by the Central Bank of Nigeria to improve credit allocation, capping prime lending rates at 15% for industrial loans to reduce borrowing costs, and enhancing fiscal transparency through digital tracking to minimize inefficiencies in government spending.

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1. INTRODUCTION

Deposit money banks (DMBs) are also involved in developing the economy of Nigeria by its provision in contributing to government expenditure as well as increasing productivity of the industries. The large financial intermediaries (DMBs), collect the savings of the population and invest in productive activities that shape the fiscal policies and development of the industry. Diversification of the non-oil economy, manufacturing industry, agriculture, and infrastructure has assumed a first priority in a country that has been relying traditionally on oil earnings. DMBs capacity to offer credit, treasury services and funding of government bonds that was facilitated by the banking sector consolidation that the Central Bank of Nigeria conducted at the beginning of the 2000s also allowed investing in infrastructure and social programmes that can aid in industrial development (Fatai & Alenoghena, 2024). Along with financing government projects, DMBs affect the investment trends by assessing the financial soundness of credit based on the soundness of the macroeconomic system and the policy provisions. DMB credit should enhance the production and efficiency in the industry as this will then motivate companies to invest in the technology and operation to make the banks profitable with the interests imposed (Akpansung & Babalola, 2018). To the extent that it covers gaps in funds, such credit can be utilised as a support to production. Similarly, the state spending particularly on capital projects like infrastructure creates an enabling environment to facilitate industrial development. The stimulation of production can be achieved by prioritising allocation to key sectors that are capable of producing sustainable economic effects (Njoku et al., 2014).

But several experiments indicate the lack of success of DMBs in justifying government spending and industry production. Nigeria has large non-performing loans (NPL) ratios, and this leads to tight lending conditions that restrict access to credit by small and medium enterprises (SMEs) that contribute about 48 percent of the GDP and 70 percent of the jobs in Nigeria (El-Yaqub & Ismail, 2025; NBS, 2023). This limit SMEs investment in technology, innovation and growth that impairs industrial output. Examples of macroeconomic instability that can deter lending and restrict government borrowing in infrastructure projects include inflation and exchange rate volatility (Mohammed, 2024). Moreover, the strict regulations, impossibility to lend being one of them, will redirect finances toward lending and limit the ability of DMBs to stimulate industrial growth (Habila et al., 2024). The above issues have underscored the need to align the DMB activities with economic policies so as to enhance access to financial resources and effectiveness of governmental expenditure.

The aim of the current paper is to deliberate on the relationship among the DMB credit, government spending, and the productivity of the industry sector in Nigeria with respect to their interactions with the economic policy, investment patterns, and fund accessibility. Specifically, the proposed study is focused on determining the impact of the DMB credit and government expenditure on the total industry output (aggregated manufacturing, mining and quarrying, and construction sub-sectors). To accomplish this and answer the research questions, the null hypotheses below are also tested: (i) DMB credit does not significantly relate to the productivity of the industrial sector in Nigeria; and (ii) government expenditure does not significantly relate to the productivity of the industrial sector in Nigeria. The rest of the paper is arranged in the following way: the conceptual review is devoted to the discussion of such concepts as; the theoretical framework is devoted to the description of theories used; the empirical review is devoted to the summary of previous works and identification of gaps; the methodology section is devoted to the description of data sources used, model specification, and methods of analysis; the results and discussion part is devoted to the analysis of findings and their interpretation; the conclusion is devoted to the summary of findings, implications, and recommendations.

2. LITERATURE REVIEW

These are basic financial intermediation processes and government investment linkages between Deposit Money Banks (DMBs), government spending and industrial output in Nigeria. DMBs play a significant role as sources of mobilization of savings and the transfer of these savings to productive sectors, in particular, small and medium enterprises (SMEs) that are the pillars of the industrial environment in Nigeria and deliver about 48 percent of GDP and 70 percent of employment (Akinola et al., 2020; NBS, 2023). Accessibility and affordability of cheap credit offered by DMBs also enables firms to invest in technology, scale operations and innovate to enhance the industrial productivity and efficiency (Akpansung & Babalola, 2018; Adeleke, 2022). Other drivers such as high interest rate, high collateral requirement and low financial literacy typically limit this to the SMEs and it diminishes the productivity in turn (El-Yaqub & Ismail, 2025; Ochieka, 2025). In accordance with these, there is the creation of an enabling environment by the government expenditure on infrastructural developments such as transport, power and communication infrastructure; thus reducing the cost of operation and increasing competitiveness (Ozuzu & Isukul, 2021; Jacobs & Oladipo, It is the logistical and manufacturing cost of the country of example that it is the integration of the road system and power outages and the projected loss of systems that are estimated at least 29 billion dollars per year that cause an increase in the level of economic development because of the non-oil dependence of the economy, the high rate of employment, and the increase of the potential of exports (Adesola & Ewa, 2020; Yusuf & Sulaiman, 2022). When balanced accordingly, it will result in an increase in the level of economic development.

There are several conceptual bases that lie on this theoretical foundation that explain the role of financial and public intervention on industry and economic performance. It would carry with it the implication of the Financial Intermediation theory that, the greater the sharing of information between the financial institutions of the DMBs, the less asymmetric and costly would be the transactions that the banks would be engaging in and by consequence would lead to an efficient allocation of capital to productive investment or high efficiency in industrial production (Levine, 1997). One can imagine the theory to describe why DMBs are able to close funding gaps left by SMEs in Nigeria and the process is disrupted by the inefficiency in the form of high non-performing loans (Akinola

et al., 2020; Adeleke, 2022). And the theory of the Infrastructure-Led Growth would also lead to the fact of the existence of the value that would be created by the physical infrastructural investment due to the reduction of the externalities and the cost of production of the same and the rise of the access to the market that would directly increase the productivity of the industries (Aschauer, 1989; Jacobs & Oladipo, 2021). The Keynesian Economic Theory according to which the solution to the multiplier effect of demand and actions in the market of private relations is state expenditure is also its antithesis (Keynes, 1936; Akanbi & Kadsar, 2020). This kind of human capital which can be accumulated by some investments made by government in learning and research is definitely compatible with capital accumulation, labour and technological advancements as the principal pillars of long-run production in Solow-Swan Growth Model (Solow, 1956). What these theories suggest is that, the unitary argument that sustainable industrialization needs to be financed by financial intermediation and fiscal policy is in fact true in the Nigerian context (Ezenwobi & Anisiobi, 2021; Romer, 1986).

The studies that support the theoretical propositions and provide the local complexities of Nigeria do not always support these dynamics. To illustrate, the productivity of banks and consequently funding of government expenditure and economic activities correlates positively with the deposit growth in DMBs, Fatai and Alenoghena (2024) determined through regression analysis of 2015-22 DMBs data. Similarly, Musa and Magaji (2024) found that the association between commercial bank credit and manufacturing output is significantly positive over the period 2010 to 2022 and that an increase in financing results in an increase in technology and capacity. Since the existing literature, e.g. by Izuochukwu *et al.* (2024), discovered that DMB credit to the private sector positively correlates with GDP growth due to industrial activity, to confirm this fact, ADRL modelling based on the 20102022 data was performed. In the fiscal dimension, Abdullahi (2024) presented on the basis of a Vector Error Correction Model (VECM) that government capital spending on infrastructure enhanced manufacturing productivity (2005 to 2020), and Bizue and Eme (2025) empirically correlated strategic DMB asset investments to better financial performance and industrial support (20132022). However, all is not good, Mohammed (2024) also highlighted the effects of high public debt that is often financed by DMBs on the expenditure that cannot be used to develop industries (2010 to 2022). Moreover, James and Eloho (2020) authored that the policy of cashless banking enhances efficiency in DMB without always and invariably being transformed to industrial gains (2012 to 2019) is true. All these studies show that despite the potential productivity boosting effects of DMB credit and government spending, other variables like debt burdens and regulation constraints usually dampen their effects.

Irrespective of these revelations, there still exist major gaps in the literature that this study seeks to fill. Though articles like Adeleke (2022) and Musa and Magaji (2024) also mention the positive effects of DMB credit on the industrial output, they pay little attention to the processes that have occurred in the sector, such as the specific contributions made by manufacturing, mining, quarrying and construction sub-sector to the overall productivity. Empirical reviews, such as Ozuzu and Isukul (2021) and Jacobs and Oladipo (2021), address the issue of infrastructure deficits but do not analyse, in detail, the ways in which inefficiencies in government expenditure, like corruption or misallocation, and DMB lending practises have been interacting to limit growth (Akanbi & Kadsar, 2020; Ezenwobi & Anisiobi, 2021). On top of this, although Mohammed (2024) briefly explains how lending is affected by macroeconomic volatility, the paper has not yet established empirical research on how the issues safeguard the credit-productivity nexus in the long run. Other models, including those prepared by Ogar *et al.* (2014), are based on DMB credit and industrial output but again are calculated over a shorter time span and they fail to take into account long-term trends after CBN consolidation policies. This paper helps address these gaps by estimating the overall effects of DMB credit and government spending on the overall industrial production through taking into consideration an error correction model with data covering the period between 1981 and 2020 and summing up sub-sector effects and long-run effects, thus making it easier to explain what is meant by the policy implications of diversifying the Nigerian industrial sector.

3. METHODOLOGY
This section outlines the sources and methods of data collection, model specification, and estimation procedures used in the analysis.

3.1. Sources and mode of data collection
The study relies on secondary time-series data spanning 1981 to 2020, sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and World Bank Indicators. These sources provide reliable, publicly available macroeconomic data on banking credit, government expenditure, and industrial output.

3.2. Model specification
This study adapts the model from Ogar, Nkamare, and Effiong (2014) but extends the analysis to a longer period (1981–2020) to capture long-term trends, including post-CBN banking consolidation effects. The dependent variable is total industrial sector productivity, modeled as a function of Deposit Money Banks' (DMBs) credit and government expenditure. The functional form is:

$$Totlindoutpt = F(Dmbcrtind, Gvtexpind) \quad ....(1)$$

The explicit econometric form is:

$$Totlindoutpt = B_0 + B_1 \, Dmbcrtind + B_2 \, Gvtexpind + M \quad ....(2)$$

Where,

Totlindoutpt = Total Industrial Sector Output, measured as the aggregate value-added (in constant 2010 Nigerian Naira, billions) from the manufacturing, mining and quarrying, and construction sub-sectors, sourced from Central Bank of Nigeria (CBN) Statistical Bulletin. This measure reflects real economic contributions adjusted for inflation, providing a proxy for industrial productivity.

Dmbcrtind = Deposit Money Banks' Credit to the total industrial sector, measured as the total outstanding loans and advances (in billions of Naira) extended by DMBs to industrial firms, sourced from the CBN Statistical Bulletin.

Gvtexpind = Government Expenditure on industry-related capital projects, measured as total public spending (in billions of Naira) on infrastructure and development initiatives supporting the industrial sector (e.g., roads, energy, and manufacturing support), sourced from the CBN Statistical Bulletin.

β_0 = Regression constant.

β_1, β_2 = Coefficients representing the marginal effects of the independent variables.

μ = Stochastic error term.

A priori expectations are $\beta_1 > 0$ and $\beta_2 > 0$, implying that increases in DMB credit and government expenditure should positively influence industrial output, consistent with prior studies (Ebi & Emmanuel, 2014; Obamuyi, 2007).

3.3. Method of data analysis

The analysis employs the Ordinary Least Squares (OLS) technique to estimate the relationships, selected for its ability to minimize the sum of squared residuals and provide unbiased estimates under standard assumptions. To ensure robustness: Stationarity is tested using the Augmented Dickey-Fuller (ADF) unit root test to avoid spurious regressions. Cointegration is assessed via the Engle-Granger test to confirm long-run relationships.

An Error Correction Model (ECM) is used for estimation, incorporating short-run dynamics and long-run equilibrium adjustments.

Diagnostic tests (e.g., for autocorrelation via Durbin-Watson statistic) are conducted to validate the model.

These methods align with time-series econometric practices for analyzing macroeconomic relationships in developing economies.

4. RESULTS AND DISCUSSION

This section presents the empirical results from the analysis of Deposit Money Banks' (DMBs) credit and government expenditure on industrial productivity in Nigeria, followed by a discussion of the findings.

The variables Total Industrial Sector Output (TOTLINDOUTPT), Deposit Money Banks' Credit to Industry (DMBCRTIND), and Government Expenditure (GVTEXPIND) were tested for stationarity to prevent spurious results. The Augmented Dickey-Fuller (ADF) unit root test indicated that all variables are stationary at first difference, integrated of order one, I(1). The results are summarized in Table 1 as follows:

Table 1. Augmented dickey-fuller unit root test

	Lag	ADF Test Statistic	Critical Values		
Variables	**SCI**	**1st difference**	**1%**	**5%**	**Remarks**
GVTEXPIND	3	-5.199543	-3.615588	-2.941145	Stationary
TOTLINDOUTPT	1	-5.294092	-3.615588	-2.941145	Stationary
DMBSCTIND	1	-4.428531	-3.615588	-2.941145	Stationary
GVTEXPIND	1	-5.294092	-3.615588	-3.615588	Stationary
LOGGVTEXPIND	3	-6.463005	-3.615588	-2.941145	Stationary

Source: Author's computation

From table 1, the ADF statistic of all the series are more negative than their 5 percent critical values at first difference implying that they are integrated of order one. If the error term of the integrated series is a linear combination that are integrated of order zero, I(0), they are said to be cointegrated. Thus, the researcher used the Engel and Granger test of cointegration and found that all the models are cointegrated.

Table 2. Error correction model for the entire industry's output-DMB credit and government expenditure model.

Dependent Variable: D(TOTLINDOUTPT)
Method: Least Squares
Date: 11/23/22   Time: 07:20
Sample (adjusted): 1984 2020
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOTLINDOUTPT(-2))	0.262876	0.166065	1.582967	0.1236
D(DMBCRTIND)	-0.590963	0.228805	-2.582821	0.0147
D(DMBCRTIND(-2))	0.340145	0.255518	1.331196	0.1928
D(GVTEXPIND)	-0.884716	1.511231	-0.585427	0.5625
ECT(-1)	-0.132579	0.090487	-1.465174	0.0429
C	258.6642	121.7567	2.124435	0.0417

R-squared	0.284340	Mean dependent var	181.0259
Adjusted R-squared	0.168911	S.D. dependent var	644.4190
S.E. of regression	587.4787	Akaike info criterion	15.73695
Sum squared resid	10699069	Schwarz criterion	15.99818
Log likelihood	-285.1336	Hannan-Quinn criter.	15.82905
F-statistic	2.463331	Durbin-Watson stat	1.947135
Prob(F-statistic)	0.054439		

Source: Author's computation

The results of the ECM show that the level of DMB credit currently has a negative and noticeable impact on the total industrial output (coefficient: -0.590963, p=0.0147), which does not reject the null hypothesis of no significant relationship. The effect of DMB credit is positive but not significant at lag 2 (coefficient: 0.340145, p=0.1928). The effect of government expenditure is not significant (coefficient = -0.884716, p=0.5625), which rejects the null hypothesis. The error correction term (ECT(-1)) is negative and large (coefficient: -0.132579, p=0.0429) and it indicates that the adjustment is made by the error correction toward long-run equilibrium. The autocorrelation may not be there because the Durbin-Watson statistic (1.947135) is not indicative of autocorrelation.

The R-squared of the model of 0.284340 suggests that the variables included in the model account for the variation in total industrial output at a relatively low level of 28%. This means that this model is just a small portion of the dynamics, which can be justified by the reality that this model did not pay much attention to such a great number of other factors (i.e., the macroeconomic factors (e.g., inflation, exchange rates) or external shocks (e.g., oil price volatility)) that are known to impact the industrial sector in Nigeria (Mohammed, 2024). The number of predictors is reflected in the adjusted R-squared (0.168911), which also indicates weak explanatory power. Although the overall significance (2.463331, p=0.054439) is marginal, the low R-squared suggests that future studies may enhance model fit by adding more controls, or by using alternative specifications, e.g. panel data by sub-sector.

4.1. Discussion of findings

The results show that DMB credit, government spending, and industrial productivity in Nigeria have a complex and counterintuitive relationship that refutes a priori expectations of positive effects. The adverse and robust short-run impact of DMB credit on aggregate industrial production (the rejection of the first null hypothesis) is consistent with more general issues regarding credit allocation and utilisation inefficiencies, as noted by El-Yaqub and Ismail (2025). Plausible economic explanations of such an outcome should be explored, especially in relation to the industrial sector of the Nigerian economy, which is marked by intensive reliance on oil, the prevalence of SMEs, and macroeconomic instability.

The second is an inefficient supply of credit to low productivity and high collateral asymmetric information adverse selection by firms theory (Stiglitz & Weiss, 1981). In Nigeria, DMBs tend to focus on lending to established companies with large operations in the extractive sector (e.g., mining and oil-related activities) with solid collateral, as opposed to innovative SMEs in manufacturing or construction that generate a lot of employment (approximately 70%), but have no assets to secure the loan (NBS, 2023; Akinola *et al.*, 2020). This is consistent with Financial Intermediation Theory (Levine, 1997), which argues that banks should effectively allocate funds to high-productivity uses, but in reality, risk-averse lending behaviour with high levels of non-performing loans (NPLs) (typically over 5% in Nigeria) will result in credit rationing to safe but low-growth borrowers (El-Yaqub & Ismail, 2025). As a result, capital might be directed to companies that lack the ability to upgrade or even expand their technology in the short-term, which leads to low aggregate industrial output.

The other reasonable reason is the suffocating influence of high interest rates on investment, which discourages borrowing and productive capital formation. This is because both inflationary pressure tendencies and the tightening of the monetary policy of the Central Bank of Nigeria to deal with the impacts of the exchange rate instability are historically the two reasons why lending rates in Nigeria have always been greater than 20 percent (Mohammed, 2024). In the above scenario, there is Keynesian Economic Theory (Keynes, 1936) where the high cost of borrowing kills the multiplier effect on credit by dampening personal investment, particularly in capital-intensive sub-sectors like manufacturing and construction. In Nigeria, with its other setbacks like power outages and absence of infrastructure (costing $29 billion per year; Omojeni & Oloko, 2023), those high rates exacerbate the liquidity challenges to SMEs, result in underinvestment and adverse productivity shocks. Similarities are seen in empirical terms, as in Adeleke (2022) which notes that in optimal circumstances credit will stimulate output by 0.5 per cent as a one percentage point increase, but at high levels the result is counterproductive. On the other hand, the positive, albeit insignificant lagged effect of the DMB credit reflects any potential delayed payoff, which was also noted by Musa and Magaji (2024) who found that, the long-term financing enhances the manufacturing capacity in the long-term as a result of a slow uptake of the technology. This slow moving process could reflect phases of change in the industrial sector of the Nigerian economy, with the growth of a new credit flow initially consumed in the service of debts, and only later may productivity gains be obtained which can be attributed to the Solow-Swan Growth Model emphasis on capital accumulation

(Solow, 1956). The meaningless impact of government spending (the inability to reject the second null hypothesis) is opposed to Abdullahi (2024), who associated infrastructure spending with manufacturing benefits, but possibly is due to inefficiency (corruption or misappropriation) and therefore such spending is not multiplied (Akanbi & Kadsar, 2020). In Nigeria, fiscal leakages and oil revenue dependence often redirect funds from productive infrastructure to recurrent spending, limiting long-term industrial impacts (Ezenwobi & Anisiobi, 2021).

This tiny R-squared indicates that such models require expansion in terms of these unmodeled variables and justifies the change in policy i.e. targeted SME lending and interest rate stabilisation to ease financial intermediation to achieve the objective of diversification in Nigeria. In general, these outcomes emphasise the need to correct structural inefficiencies to utilise credit and spending towards sustainable industrial development.

5. CONCLUSION

This paper analysed how credit and government spending by Deposit Money Banks (DMBs) affect industrial productivity in Nigeria between 1981 and 2020 and found that the relationship between these two variables is subtle and somewhat counterintuitive, highlighting the problem of financial intermediation and fiscal policy in a resource-based economy. Empirical evidence based on an error correction model suggests that DMB credit has a negative and significant short-run impact on total industrial output, possibly due to its misallocation to collateral-rich but less productive firms and to high interest rates that discourage investment. Though positive lagged effect implies that sustained financing payoff lagged it, it did not have any significant impact on government expenditure that represents inefficiencies in resource allocation that are not reflected in anticipated improvements in productivity. These results indicate the null hypothesis about DMB credit but not government expenditure to be rejected based on the previous evidence of lending constraints (El-Yaqub & Ismail, 2025) and the leakages in the fiscal system (Akanbi & Kadsar, 2020), and contradict studies that find the positive effect of infrastructure (Abdullahi, 2024; Musa & Magaji, 2024). In general, the analysis suggests that until structural barriers are tackled, credit and public spending risks increasing, but not reducing, industrial stagnation in Nigeria, making it difficult to diversify beyond oil dependence.

These conclusions are however tempered by significant limitations of the study. The simplicity of this model involving only DMB credit and government spending is probably the reason why the R-squared (0.28) is low, which means that it does not explain much and that there may be the possibility of missing a variable. It was not able to model the macroeconomic volatility (e.g. inflation and exchange rates), external shock (e.g. world oil prices) or sector specific variables (e.g. technology adoption rates) that may be driving the unexplained variation, and what relationships may be observed (Mohammed, 2024). Additionally, there is sub-sector heterogeneity which may be hidden by aggregate secondary data and the time-series approach presumes that the relationship will be constant even when they vary across economic regimes.

In spite of these shortcomings the results have practical policy implications. To reverse the short-run effects of DMB credit, which are otherwise negative, the Central Bank of Nigeria must set specific lending quotas to SMEs in high-productivity sub-sectors such as manufacturing, decreasing dependency on collateral by introducing credit guarantee schemes (e.g., expanding the already existing Development Bank of Nigeria programmes) to counteract adverse selection, and encouraging efficient allocation of capital as postulated by the Financial Intermediation Theory. Interest will be high, the policymakers could have limited prime lending to 15 per cent on industry loans and could even subsidise rates of priority sector with the fiscal incentive and this will stimulate investment and will be as per the Keynesian theory of demand stimulation. In government spending, the insignificance of the identified insignificance of the model can be reduced by enhancing the transparency of government spending by developing digital tracking infrastructure and making all government spending devoted to verifiable productivity-enhancing projects (e.g. energy and transport upgrades) that directly address the insignificance of the identified insignificance. Based on evidence of misallocation and lagged benefits found in the study, these recommendations have the potential to promote long-run industrial growth when coordinated by mutual monetary-fiscal systems.

FURTHER RESEARCH

Future research should address the identified gaps by incorporating omitted variables into more comprehensive models, such as vector autoregression (VAR) frameworks with panel data disaggregated by sub-sectors (e.g., manufacturing vs. mining). Exploring the role of digital banking innovations in improving credit access for SMEs or conducting comparative analyses with other oil-dependent economies, would further illuminate pathways to sustainable industrialization in Nigeria.

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