

DOES FINANCIAL SECTOR DEVELOPMENT PROMOTE INDUSTRIALISATION IN NIGERIA?

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Abstract

This paper examines the long run and causal relationship between financial sector development and industrialization in Nigeria for the period 1981 to 2011 using time series data. Results from a multivariate VAR and vector error correction model provide evidence of long run relationship between financial sector development and industrialization in Nigeria. The two measures of financial development had contrasting effects on industrial output. Ratio of private sector bank credit to GDP has a positive relationship with industrial output while the ratio of broad money stock to GDP has a negative relationship with industrial output. Granger causality test reveals long-run unidirectional causal link running from industrialization to financial development. There is therefore the urgent need for government to consolidate on past financial sector reforms to address the challenges of financial intermediation in the domestic financial sector to improve loan disbursement to the industrial sector of the Nigerian economy.

Keywords: *Financial Sector Development, Industrialization, Cointegration, Granger Causality*

JEL Classification: *G00, 016*

1. Introduction

While there is a vast theoretical and empirical literature on the links between financial sector development and economic growth that emerged from the debate of Mckinnon (1973) and Shaw (1973) on financial intermediation and economic growth, not much has been done to examine the links between financial development and industrial growth. There is also an extensive literature on the transmission mechanism between financial development and economic growth. One of these transmission channels centers on the driving role that financial development could play in a country's industrialization process through improved access to credit for industries (Kabango & Paloni, 2011).

Financial development connotes improvements in the functioning of the financial sector. These include increased access to financial intermediation, greater diversification opportunities, improved information quality, and better incentives for prudent lending and monitoring (Ewetan & Okodua, 2013; Alege &

Ogunrinola, 2008; Okodua & Ewetan, 2013; Acemoglu & Zilibotti, 1997).

The scholarly works of Schumpeter (1912), Mckinnon (1973) and Shaw (1973) provide evidence of strong links between financial intermediation and economic growth. These scholars argue that financial deepening and savings, enhance investment particularly in the industrial and manufacturing sectors which generate a positive impact on economic growth. Financial deepening enhances financial sector development which is usually accompanied by relaxation of the credit access constraint facing domestic firms, especially small and medium industries.

Theories of economic development recognize industrialization as an integral and fundamental part of structural transformation of economies. Many economists and institutions still consider it to be a precondition for increasing GDP per capita, and improving the livelihood of the people. In its Industrialization Report (2009), the United Industrial Development Organization (UNIDO) stated: "Industrialization is integral to economic growth and development, scarcely any

country has grown without industrializing” (UNIDO, 2009).

Industrialization is said to be a significant measure of modern economic growth and development but the Nigerian industrial sector has suffered from decades of low productivity. Industrialization is generally argued as capable of increasing the pace of economic growth and ensuring swift structural transformations of the economy. The critical role of the industrial sub-sector is predicated on the fact that it acts as an engine of growth by broadening the productive and export base of the economy, reducing unemployment and minimizing rural-urban drift as well as helping to reduce poverty.

Despite the abundant natural and human resources, Nigeria has failed to achieve industrial development. Several policies and reforms by various governments to turn around the industrial sector have largely been unsuccessful as the sectoral contribution of the industrial sector to the gross domestic product has remain very low and insignificant.

Historically, economists accorded great importance to the role of the financial sector in the development of new markets and as catalyst for industrialization and economic growth (Gerschenkron, 1962). Although the nexus between financial development and economic growth has long been a subject of intense scrutiny, few studies have examined the relationship between financial development and industrialization as well as the direction of causality between financial development and industrial production. This paper therefore attempts to investigate the links as well as the direction of causality between financial sector development and industrialization in Nigeria.

2. Literature Review

The relationship between financial development and economic growth has been explored extensively in the literature. Theoretically, financial intermediaries and financial markets mitigate the costs of acquiring information, enforcing contracts, and making transactions. The positive effects on growth occurs through changes in the incentives and constraints facing economic agents, improved information flows, capital allocation, corporate governance, ameliorating risk, pooling saving and easing exchange (Acemoglu & Zilibotti, 1997; Khan, 2001; King & Levine, 1993). Empirically both time series and cross-country studies (Alege & Ogunrinola, 2008; Ewetan &

Okodua, 2013; Okodua & Ewetan, 2013; Mccaig & Stengos, 2005; Beck & Levine, 2004; Levine, Loayza, & Beck, 2000) offer strong and robust evidence supporting the view that both well-functioning banking systems and well developed stock markets independently spur economic growth. That is, banking systems and stock markets provide different, but complimentary, growth-enhancing financial services to the economy.

The extensive literature on the finance-growth nexus reveals four possible scenarios on the nature of the relationship between financial development and economic growth. These are finance-led growth referred to as supply-leading hypothesis, growth driven finance referred to as demand-following hypothesis, bi-directional relationship referred to as feedback, and no relationship between financial development and economic growth. Different techniques which include cross-country, panel, time series, country specific, industry level, and case study-study analyses have been used to investigate the links between financial development and economic growth (Levine, 1997, 2005; Aug, 2008; Beck, 2009; Ewetan & Okodua, 2013; Akinlo & Egbetunde, 2004)

Okodua and Ewetan (2013) examine the effects of stock market performance on economic growth and find that in the long-run, overall output in the Nigerian economy is less sensitive to changes in stock market capitalization as well as the average dividend yield. On the contrary, Thumrongvit, Kim, and Pyun (2013) in a study on the effects of bond markets as a third key component of the financial system on economic growth find that government bonds positively relate to economic growth, while the effects of corporate bonds change from negative to positive as domestic financial structures expand in size and diversity. On the contrary Cecchetti and Kharroubi (2012), argue that more finance does not always produce better outcomes, because the financial sector competes with the rest of the economy for scarce resources. They find that financial sector size exhibit an inverted U-shaped effect on productivity growth. That is, further enlargement of the financial system beyond a certain point can reduce real growth

Considering firm’s access to external finance, Demirguc-Kunt and Maksimovic (2002) find that firms do not grow faster in either market-based or bank-based financial systems. Thus, the overall level of financial development matters for economic growth, rather than the development of a

specific component of the financial systems (Levine, 1997, 2005; Ang, 2008; Beck 2009).

There is mixed evidence within the literature supporting either a positive or negative link between financial sector development and industrialization. For instance, Larrain (2006) and Raddatz (2006) used the methodology of Rajan and Zingales (1998) to revisit the effect of financial development on industrial growth volatility, using cross-industry (firm) data. Larrain (2006) finds a significantly negative coefficient on the interaction term, arguing that lower volatility output occurs in sectors with higher external dependence and in countries with better financial development. Raddatz (2006) finds that financial development reduces the volatility of industries that require large amount of liquidity. Udoh & Ogbuagu (2012) employed an aggregate production framework and autoregressive distributed lag (ARDL) cointegration technique and find that both the long-run and short-run dynamic coefficients of financial sector development variables have negative and statistically significant impact on industrial production in Nigeria. Similarly, Lin and Huang (2012) find that banking sector volatility exerts a negative effect on the growth of industries that rely more on external finance.

On the contrary, Loayza and Ranciere (2006) find a positive long-run linkage between financial development and output growth, coexisting with a mostly negative short-run association between financial fragility, namely, banking crises, financial sector volatility, and output growth. Similarly, Ang (2008) used an augmented neoclassical growth framework and find evidence suggesting that financial development exerts positive impact on economic development in Malaysia. Beck and Levine (2002) using industry-level data found evidence that greater financial development accelerates the growth of financially dependent industries. Recently, Gehringer (2013) finds that financial liberalization generates a strongly positive effect on productivity growth, investment, industrial output, and economic growth for the EU members. Apparently, there are few studies on the relationship between financial development and industrialization in Nigeria. This study is therefore another attempt to shed more light on the links between financial development and industrialization in Nigeria.

3. Methodology and Data

The study investigates the existence of a long-run relationship and dynamic interaction among the study variables using annual time-series data from 1981 to 2011. Empirical models are first specified to capture the hypothesized relationships in the study. These are then estimated using appropriate estimation techniques. Data for all variables were obtained from the Central Bank of Nigeria (CBN) Annual Statistical Bulletin (2011) edition. Data for the study is analyzed using the econometric software, Stata 10.0.

3.1 Model Specification

The baseline model estimated for this study is first specified in its functional form below:

$$Y_t = f(L_t, K_t, MCY_t, CPS_t, INT_t, C) \quad (1)$$

Where: Y_t is the aggregate output of the industrial sector at a point in time t , K_t is the total capital stock at a point in time t , L_t is the stock of labour at a point in time t . Total Factor Productivity (TFP) as a function of financial depth is captured by M2 to GDP (MCY) ratio and the ratio of private sector Bank credit to GDP (CPS), the interest rate (INT), and C is the error term. This functional relationship is stated as follows:

$$A_t = f(MCY_t, CPS_t, INT_t, C) \quad (2)$$

Equation (2) expressed in its non-linear form becomes:

$$A_t = MCY_t^{\alpha_3} CPS_t^{\alpha_4} INT_t^{\alpha_5} C_t \quad (3)$$

Equation (1) in its functional form is specified below

$$Y_t = C_t K_t^{\alpha_1} L_t^{\alpha_2} MCY_t^{\alpha_3} CPS_t^{\alpha_4} INT_t^{\alpha_5} \quad (4)$$

In order to obtain a more explicit and estimable linear function of equation (4), the variables on both sides are transformed into their natural logs (L) to obtain the following:

$$\ln Y_t = \alpha_0 + \alpha_1 \ln K_t + \alpha_2 \ln L_t + \alpha_3 \ln MCY_t + \alpha_4 \ln CPS_t + \alpha_5 \ln INT_t + \varepsilon_t \quad (5)$$

The coefficient estimates in this case are interpreted as constant elasticities which essentially capture the sensitivity of the dependent variable to a unit variation in each of the explanatory

variables. Theoretically, the InY_i is expected to be more than proportionately sensitive to marginal variations in each of the explanatory variables holding all other constant in each case.

3.2 Model Estimation Technique

In terms of econometric methodology, the multivariate cointegration approach offers useful insights towards testing for causal relationship. In principle, two or more variables are adjudged to be cointegrated when they share a common trend. Hence, the existence of cointegration implies that causality runs in at least one direction. However there could be exceptions to this expectation. The cointegration and error correction methodology is extensively used and well documented in the literature (Banerjee, et al. 1993; Johansen and Juselius, 1990; Johansen, 1988; Engle and Granger, 1987). Johansen (1988) multivariate cointegration model is based on the error correction representation given by:

$$\Delta X_t = \mu + \sum_{i=1}^{\rho-1} \tau_i \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t \quad (6)$$

Where X_t is an $(n \times 1)$ column vector of ρ variables, μ is an $(n \times 1)$ vector of constant terms, Γ and Π represent coefficient matrices, Δ is a difference operator, and $\varepsilon_t \sim N(0, \Sigma)$. The coefficient matrix Π is known as the impact matrix, and it contains information about the long-run relationships. Johansen's methodology requires the estimation of the VAR equation (6) and the residuals are then used to compute two likelihood ratios (LR) test statistics that can be used in the determination of the unique cointegrating vectors of X_t . The cointegrating rank can be tested with two statistics, the trace test and the maximal eigenvalue test.

3.3 Vector Error Correction Model (VECM)

The error correction version pertaining to the six variables (Y, K, L, MCV, CPS, INT) used in the study is stated below:

$$\Delta Y_t = \alpha_0 + \sum_{i=0}^n \alpha_{1i} \Delta Y_{t-1} + \sum_{i=0}^n \alpha_{2i} \Delta K_{t-1} + \sum_{i=0}^n \alpha_{3i} \Delta L_{t-1} + \sum_{i=0}^n \alpha_{4i} \Delta MCV_{t-1} + \sum_{i=0}^n \alpha_{5i} \Delta CPS_{t-1} + \sum_{i=0}^n \alpha_{6i} \Delta INT_{t-1} + \lambda_1 ECM_{t-1} + \varepsilon_t \quad (7)$$

Where ECM_{t-1} is the error correction term and ε_t is the mutually uncorrelated white noise residual. The coefficient of the ECM variable contains information about whether the past values of variables affect the current values of the variable

under study. The size and statistical significance of the coefficient of the error correction term in each ECM model measures the tendencies of each variable to return to the equilibrium. A significant coefficient implies that past equilibrium errors play a role in determining the current outcomes. The short run dynamics are captured through the individual coefficients of the difference terms. The short run dynamics are captured through the individual coefficients of the difference terms. Financial development (FD) does not Granger cause economic growth (GY) if all $\alpha_{2t} = 0$, and Economic growth (GY) does not Granger cause financial development (FD) if all $\beta_{2t} = 0$. According to Akinlo and Egbetunde (2010), and Mehra, (1994) these hypotheses can be tested using standard F statistics.

3.4 Stationarity Tests

There is the possibility of co-integration when each variable is integrated of the same order $d \geq 1$. This necessary, but rarely sufficient, condition implies that the series share a common trend. Therefore to ascertain whether mean reversion is characteristic of each variable the paper used both Augmented Dickey-Fuller (ADF) test by Dickey and Fuller (1979, 1981), and Phillip-Perron (PP) test by Phillips (1987) and Phillips Perron (1988) to infer the stationarity properties of the study series. This is conducted, with intercept only and intercept and trend respectively, on the levels and first difference of the series.

3.5 Granger Causality Test

Granger causality tests are performed to find out the direction of the causal link between financial development and economic growth. The Granger causality approach measures the precedence and information provided by a variable (X) in explaining the current value of another variable (Y). The basic rationale of Granger causality is that the change in financial sector development Granger causes the change in economic growth if past values of the change in financial sector development improve unbiased least-square predictions about the change in economic growth. The null hypothesis H_0 tested is that X does not granger-cause Y and Y does not granger-cause X.

4. Empirical Results and Discussions

This section presents the results of the unit root, cointegration, vector error correction, and Granger causality tests conducted.

4.1 Stationarity Test

To avoid spurious regression outcomes, the paper used the Augmented Dickey-Fuller (ADF) test to establish the existence of unit root in each of the time series. Table 1 below summarizes the results of the ADF test conducted,

Table 1 : Test for Stationarity

Series	Levels		LAG	Remarks	1 st Difference		Remarks	LAG	Order of Integration
	ADF	Critical Value at 5%			ADF	CV at 5%			
LnY	2.591	-2.886	0	NS	-3.718*	-2.889	S	0	I(1)
LnK	-1.865	-2.996	0	NS	-4.960*	-2.889	S	0	I(1)
LnMCY	-0.578	-2.786	0	NS	-4.615*	-2.889	S	0	I(1)
LnCPS	-0.556	-2.786	0	NS	-4.760*	-2.889	S	0	I(1)
LnINT	-2.256	-2.786	0	NS	-6.507*	-2.889	S	0	I(1)
LnL	0.248	-2.786	0	NS	-4.767*	-2.889	S	0	I(1)

Note: *, ** and *** indicate 1%, 5%, and 10% significance respectively.

Source: Author's Estimation using Stata 10.0

A variable is stationary when the absolute value of the ADF is greater than the absolute value of the critical value at a given level (1%, 5%, 10% denoted as *, **, ***, respectively). NS and S refer to non-stationary and stationary respectively. Since all the variables were not stationary in levels they were all differenced once, and all the variables became stationary meaning that the variables are I(1) series.

4.2 Cointegration Result

The cointegration test is used to establish the existence of a long run relationship among the variables. Table 2 reports the cointegration test results.

Table 2 : Test for Cointegration among Series

Maximum rank	Eigen value	Trace Statistic	5% Critical value	Max-Eigen Statistic	5% Critical Value
0	.	118.0919	99.15	45.6298*	38.47
1	0.88744	74.2738*	67.52	28.7276	35.75
2	0.72787	46.6599	48.21	25.3576	28.18
3	0.69117	22.0814	28.68	13.7423	23.84
4	0.46329	9.5273	18.41	9.3732	16.19
5	0.35987	0.3640	4.76	0.2831	4.97

Source: Author’s Estimation using Stata 10.0

The trace statistic indicates the presence of two cointegrating equations while the max-eigen statistic indicates the presence of one cointegrating equation, both at the 0.05 level of significance. Thus, the results confirm the existence of cointegration

between indicators of financial sector development, industrial sector output, real interest rate, labour and capital. The trace statistic and max-eigen statistic reject the null hypothesis of no cointegration at 5 per cent level of significance.

Table 3 : Long Run Normalized Cointegration Estimates

Normalized Cointegrating Coefficients (standard error estimates)					
LnY	LnL	LnK	LnCPS	LnINT	LnMCY
1.000000	-1.45215 (0.0572477)	0.0026032 (0.016781)	-0.2975154 (0.0818639)	-0.1076028 (0.0220378)	0.0077553 (0.093274)
	{-26.36}	{0.12}	{-3.56}	{-3.62}	{0.09}
P> z	0.000	0.818	0.001	0.000	0.834

Note: Standard error and Z-Statistics are stated in parenthesis as () and { } respectively

Source: Author’s Estimation using Stata 10.0

Table 3 above shows the normalized cointegration coefficients of the variables in the study model. The results in the table are explained with respect to the signs and magnitude of the variables in the normalized cointegration result. The probability (P>|z|) statistic is used to determine whether or not a variable is significant at a 5% level. The null hypothesis states that the variable is not statistically different from zero and is thus insignificant while the alternative hypothesis states that the variable is statistically different from zero and is thus significant. With a P-value less than 0.05, the null hypothesis cannot be accepted that the variable is statistically different from zero and is thus significant. The coefficient of the variables shows if the independent variable has a positive or negative relationship with the dependent variable

The coefficient values of credit to the private sector (CPS), the deposit rate (INT), and labour force (L) have a positive and significant relationship with the industrial sector output (Y) in accordance with a priori expectation at 0.05 level of significance while the gross fixed capital formation (K) and the ratio of broad money stock to GDP (MCY) have a negative

and insignificant relationship with the output of the industrial sector at 0.05 level of significance which deviates from a priori expectation.

4.3 Error Correction Model

The error correction term measures the speed of adjustment to restore equilibrium in the dynamic model. The error correction coefficient shows how quickly/slowly variables return to equilibrium and it should have a statistically significant coefficient with a negative sign between 0 and 1. A highly significant error correction term is further proof of the existence of a stable long-term relationship (Bannerjee et al. 1993). The Z statistic and the probability (P) statistic are used to test the null hypothesis that the coefficient is statistically different from zero. Coefficients having a p-value of 0.05 and less are termed significant therefore the null hypothesis cannot be accepted and it is concluded that the coefficient is significantly different from zero. However, if the p-value is greater than 0.05, the null hypothesis cannot be rejected and it is concluded that the coefficient value is not significantly different from zero.

Table 4 : Vector Error Correction Estimates

Variable	LnY	LnL	LnK	LnCPS	LnINT	LnMCY
CE1	-0.283476	0.020132	-0.327673	3.056923	2.653366	1.632864
Standard Error	(0.0960767)	(0.0144654)	(1.573296)	(0.7412366)	(0.8843342)	0.4744643
Z-Statistic	[-3.03]	[0.30]	[-0.28]	[3.40]	[2.41]	[3.06]
P > z	0.002	0.692	0.796	0.001	0.021	0.002

Source: Author's Compilation using Stata 10.0

Table 4 above shows that the error correction coefficient of industrial output (Y) is -0.283476. Thus, the speed of adjustment is -0.2834 suggesting that about 28.3 percent of errors generated in the current period within the model are automatically corrected in subsequent periods. The coefficient also has a p-value of 0.002 and so the null hypothesis that the variable is not statistically different from zero is rejected and it is concluded that the variable is significant at a 5% level. The significance of the error correction mechanism supports cointegration and suggests that there exists a steady long-run

equilibrium relationship between the output of the industrial sector and the explanatory variables.

4.4 Granger Causality Test

The Granger Causality test shows the causal relationship which exists between the dependent variable and each of the independent variables in the equation.

Table 5 : Granger Causality Wald Tests

Variables	Excluded	Chi ²	df	Prob>chi ²
LnY	LnCPS	1.0039	2	0.707
LnY	LnMCY	0.0392	2	0.895
LnY	ALL	3.0783	4	0.573
LnCPS	LnY	8.0396	2	0.019
LnCPS	LnMCY	3.5587	2	0.113
LnCPS	ALL	13.2034	4	0.018
LnMCY	LnY	6.6063	2	0.039
LnMCY	LnCPS	3.4088	2	0.184
LnMCY	ALL	9.2277	2	0.063

Source: Computed by the Author using Stata 10.0

Table 5 above presents the result of the Granger causality test carried out to determine the direction of causality between industrialization and financial sector development in Nigeria. The P-value of the joint effect of bank credit to the private sector as a ratio of GDP, and broad money stock as a ratio of GDP on industrial output is 0.562. Therefore, we cannot reject the null hypothesis that financial sector development does not Granger cause industrialization in Nigeria. This therefore suggests that the supply-leading hypothesis and bidirectional causality do not hold between these two variables in Nigeria. Upon

further inspection, we notice that industrial output has a significant P-value with the ratio of bank credit to the private sector and broad money stock with P-values of 0.019 and 0.039. Therefore, in both instances we cannot accept the null hypothesis that the output of the industrial sector does not Granger cause financial development which is captured by these two financial depth variables. This therefore means that industrial output or industrialization Granger causes financial development in Nigeria and confirms the applicability of demand-following hypothesis in the Nigerian economy.

5. Conclusion and Policy Implications

This paper examined the relationship between financial sector development and industrialization in Nigeria over the period, 1981 to 2011 using the multivariate cointegration approach and generated a number of findings. First, significant evidence supports the existence of a long-run relationship between financial development and industrialization in Nigeria. Second, credit to the private sector had a significant positive effect on industrialization in Nigeria, while ratio of broad money stock to GDP had had an insignificant negative effect on industrialization in Nigeria. Third, the granger causality test provides evidence in support of the demand-following hypothesis in the Nigerian economy as industrialization granger causes financial sector development, and further confirms the finding of Udoh and Ogbuagu (2012). This suggests that despite the several financial sector reforms that have been carried out in the Nigeria economy, the financial sector has failed to impact positively on the industrial sector of the economy.

This paper therefore recommends that government should consolidation previous financial sector reforms to make the financial sector strong to support industrialization in Nigeria. Sound and developed financial system, improves financial intermediation and the efficiency of economic activities. Moreover, the unidirectional causality from industrialization to financial development supports the recent industrial revolution policy of Jonathan administration, if well implemented should promote financial sector development in Nigeria.

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