FINANCIAL SECTOR DEVELOPMENT AND THE QUEST FOR INDUSTRIALIZATION IN NIGERIA:
A Multivariate Analysis

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ABSTRACT

The performance of the industrial sector in relation to financial development is examined in this study using manufacturing index as a major industrial sector development indicator. A structural variance autoregressive (SVAR) model with structural breaks was formulated and applied to Nigerian data spanning 1970 to 2015. The results from the analysis revealed that with the continuous upward swings in the official lending interest rates as expected theoretically, shocked off investment and ultimately manufacturing output. This phenomenon was not restricted to the conventional deposit money banks (DMB), but also to the Bank of Industry (BOI) and allied financial institutions whose loan processes are fraught with bureaucratic bottlenecks and political intrigues. The level of financial deepening (M2/GDP) positively influenced manufacturing output though not statistically significant. This calls for more concerted efforts on the part of the monetary authorities to implement the recent cashless monetary policy to the letter in order to reduce the liquidity ratio in deposit money banks and make investible funds available for the manufacturing and allied subsectors in Nigeria. The radioactive decay syndrome exhibited by a lag of the manufacturing index is novel and a sine qua non for policy makers and executors and is a factor that must be considered by policy makers and executors. It implies that manufacturing output will continue to accentuate as long as industrialization policies and strategies are initiated, implemented and sustained in Nigeria. Exchange rates misalignment has the least influence on manufacturing output as shown in the analysis. The

paper further recommends that for industrialization to be achieved and sustained, the yawning gap between interest rates on savings and lending — interest rates spread should be bridged to stimulate credit for the private sector for maximum manufacturing output and the exchange rates misalignment currently experienced in Nigeria will ultimately fizzle out.

JEL classification: E44, O16

1. Introduction

Industrialization refers to structural changes in which industrial production dominates primary and agricultural production. A nation is said to be industrialized when an agrarian economy dominated by the use of elementary tools gives way to one in which machines and power tools are widely developed within a structural automated factory environment. Key features of industrialization include: application of scientific method to solve problems, mechanization and factory-based mass production, liberalization of the financial subsector, and enhanced labour mobility spatially and socio-economically (Mailafia, 2016).

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 to be capable of increasing the pace of economic growth and ensuring swift structural transformation of the economy. The critical role of the industrial sub-sector predicated on the fact that it acts as an engine of growth by broadening the productivity and export base of the economy, reducing unemployment and minimizing rural-urban drift as well as helping to reduce poverty.

Despite the abundance of natural and human resources, Nigeria has failed to achieve industrial development. Different policies and reforms by various governments aimed at turning the industrial sector around have largely been unsuccessful as the sectoral contribution of the industrial sector to gross domestic production remains very low and insignificant (Ewetan and Ike, 2014).

While there is 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 link between financial development and industrial growth. There is also extensive literature on the transmission mechanism between financial development and economic growth. One of these transmission channels centres on the driving role that financial development could play in a country's industrialization process through improved access to credit for industries (Kanbango and Paloni, 2011).

Financial development connotes improvement in the functioning of the financial intermediation, greater diversification opportunities, improved information quality and better incentives for prudent lending and monitoring (Alege and Ogunrinola, 2008; Okodua and Ewetan, 2013; Acemoglu and 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 generates a positive impact for economic growth. Financial deepening enhances financial sector development, which is usually accomplished by elimination of the constraints to credit access facing domestic firms, especially small and medium industries.

Theories of economic development recognize industrialization as an integral and fundamental part of the 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, the United Industrial Development Organization (UNIDO) stated: "industrialization is integral to economic growth and development. Scarcely any country has grown without industrializing" (UNIDO, 2009).

Historically, economists accorded great importance to the role of the financial sector in the development of new markets and as a 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 hence financial inclusion, and industrialization, and the direction of casualty between financial inclusion and industrial output. This

paper therefore investigates the links between financial sector development and industrialization in Nigeria.

2. Review of Related Literature

Industrialization is about the introduction and expansion of industries in a particular place, region or country (Obioma & Ozughalu, 2005). It is a situation where many industries are established in different parts of the country. As industries are established in a country, different types of products are produced. Industrialization, therefore, is a process of building up a country's capacity to produce a large variety of goods, extract raw materials and manufacture semi-finished goods. Anyanwu et al. (1997) described industrialization as the process of building up a nation's capacity to process raw materials and other inputs to finished goods and to manufacture goods for other production or for final consumption.

Industrialization could be described as the process of transforming raw materials with the aid of human resources and capital goods into: (a) consumer goods; (b) new capital goods, which allows more consumer goods (including food) to be produced with the same human resources; and (c) social overhead capital which together with human resources provides new services to both individuals and businesses (Ekpo, 2005). Kirkpatrick et al (1985) posited that industrialization involves a number of changes in the economic structure of a country, such as a rise in the relative importance of the manufacturing industry, a change in the composition of industrial output and changes in production techniques and sources of supply for individual commodities.

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

There is mixed evidence within the literature supporting either a positive or negative link between financial sector development and industrialization. For instance, Larrian (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. Larrian (2006) found a significantly negative coefficient on the interactive terms, and argued that low

volatility output occurs in sectors with higher external dependence and in countries with better financial development.

Raddatz (2006) found that financial development reduces the volatility of industries that require large amounts of liquidity. Udoh and Ogbuagu (2012) employed an aggregate production framework and the autogressive distributed lag (ARDL) co-integration technique and found that both the long-run and short-run dynamic coefficients of financial sector development variables have negative and statistically significant impacts on industrial output in Nigeria. Similarly, Lin and Huang (2012) found that banking sector volatility exerts a negative effect on the growth of industries that rely more on external finance.

On the contrary, Loayza and Rancière (2006) found a positive long-run linkage between financial development and output growth, co existing with a mostly negative short-run association between financial fragility (namely banking crisis) financial sector volatility, and output growth. Also, Ang (2008) used an augmented neoclassical growth framework and found evidence suggesting that financial development exerts a 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) found that financial liberalization generates a strongly positive effect on productivity growth for EU members.

Ewatan and Ike (2014) examined the long-run and casual relationship between financial sector development and industrialization in Nigeria. Their analysis provides evidence of a long-run relationship between financial sector development and industrialization in Nigeria and the Granger causality test reveals a long-run unidirectional causal links running from industrialization to financial development.

Oderinde (2008) examined the determinants of manufacturing sector performance in Nigeria over the period 1970-2004. The result of the analysis showed that trade liberalization is important for the performance of the manufacturing sub-sector. Other important determinants include lending rates, real GDP, human capital development and availability of infrastructural facilities.

Apparently, there are a lot of studies on the relationship between financial development and industrialization in Nigeria. While some of the studies obtained

positive relationships, others were negative, and some cases were mixed. This study is therefore another attempt to shed more light on, and probably lay to rest the argument on the nature of the link between financial sector development and industrialization in Nigeria.

3. Overview of Nigeria's Industrial Policies and Strategies

Many industrial policies have been adopted since the political independence of Nigeria in 1960. Nigeria's industrial policies over the years are classified and discussed as follows:

a. Import Substitution Industrialization Strategy (ISI)

Import substitution industrialization (ISI) was adopted in Nigeria in 1960 (Ndebbio, 1994) and persisted till 1985 (Busari, 2005). It was an inward-looking strategy of industrialization. It refers to the domestic production of manufactured goods for domestic markets. It involves processing of raw materials and setting up of manufacturing factories locally, to produce manufactured goods which were originally imported by a country, thereby saving the country the cost of importation of such commodities into local markets (Ekpo, 2014).

The motives for adopting the ISI strategy in Nigeria, like in Latin American countries, were: to reduce the volume of imports and export dependence as a result of increased reliance on goods manufactured domestically, save foreign exchange, create favourable balance of trade and payments, encourage technological development as well create employment (Egwuakhide, 1997; Busari, 2005). Furthermore, imported inputs were substituted for local inputs.

To facilitate the implementation of ISI in Nigeria, high tariff rates were imposed on importation of intermediate and capital goods, and even on finished goods; import licensing, quota and outright prohibition of certain consumer goods were also implemented (Bankole, 2005). A wide range of fiscal, monetary and infrastructural incentives were granted to the private sector in the 1960s through the 1970s to reduce business costs. Such incentives included tax holidays, income tax reliefs, capital allowances, depreciation allowances and others.

Contrary to the success story of the ISI strategy in Latin American countries and the high expectations in Nigeria when it was introduced, its performance in

Nigeria was unsatisfactory. Though manufacturing capital utilization was high within this period, ISI did not facilitate an industrial leap-forward in Nigeria because it focused on the production of consumer goods instead of technologically-advanced capital goods which sustain industrialization. Consequently, before the middle of 1986, it became obvious that the ISI strategy had failed in Nigeria and needed to be jettisoned.

b. Export Promotion Industrialization Strategy (EPI)

The urgent need to generate more foreign exchange, particularly from non-oil sources, to meet the country's rising import bills, mounting external debt obligations, rising fiscal responsibilities of the government and to attend to and socio-economic responsibilities resulted in the introduction of the Structural Adjustment Programme (SAP) in Nigeria in July 1986 and eventually a shift in Nigeria's industrial policy thrust from the ISI approach to export promotion industrialization (EPI).

The export promotion industrialization (EPI) strategy, otherwise described as outward-oriented industrialization, involves domestic production of manufactured goods for export. It is a government's deliberate effort to expand the volume of a country's exports through export incentives and other means to generate more foreign exchange and improve the current account of the balance of payments (Banjoko et al., 2012).

The Structural Adjustment Programme (SAP) included industrial policies such as the new export promotion decree in 1986, the interest rate deregulation policy, the privatization and commercialization policy of 1988, the new export promotion policies and incentives, the new Industrial Policy of Nigeria in 1989 and the debt conversion (equity swap) policy (Ndebbio, 1994). With SAP, export license for exportation of manufactured goods was abolished, export credit guarantee and insurance schemes were introduced, commodity boards were scrapped to allow market forces to be more active, and export-free zones were established at various locations in the country (Essia & Ibor, 2005). The hitherto regulated interest rate in the country was deregulated to stimulate foreign capital inflow, encourage Nigerians to repatriate capital flight, increase savings and retain credit expansion. The privatization and commercialization policy which was aimed at reducing the dominance of unproductive investment in the public

sector, downsizing the public sector and increasing private sector participation in the economy, led to many companies being privatized.

By 1996, from all indications, the export promotion strategies had not made much impact on Nigeria's industrial sector and seemed not to have yielded the expected benefits. Agreeing with this assertion, Uniamikogbo (1996) noted that the EPI strategy in Nigeria, which emphasized the promotion of value added non oil exports, especially manufactures, had not actually achieved significant results. Ekpo (2005) also noted that SAP and the EOI approach to industrialization produced mixed results in Nigeria. While it reduced the size of public sector investment in the economy, it increased private sector participation in the industrial sector and provided more access to foreign markets. The adverse effects of devaluation, high interest rates and the tight monetary policy which prevailed during the period, increased the cost of production and reduced the profit margin of the firms; SMEs were most hit. The approach also depended on foreign technologies and inputs. The raw materials, machines, spare parts, and other inputs for EPI were imported from abroad at very exorbitant rates. In addition, the success of Nigeria's EPI had been strongly hampered by deliberate attempts by industrial countries to keep unindustrialized countries perpetually unindustrialized through imposition of high tariffs and quotas that do not favour manufacture of exports by less-developed countries like Nigeria.

Given this scenario and the general poverty that pervaded the country as a result of SAP, like the ISI and EPI strategies, it was substantially modified (Essien, 2005).

c. Foreign private investment-led industrialization strategy (FPII)

Many years of military dictatorship in Nigeria (1966-1979, 1983-1999, excluding the interim civilian administration of August-November 1993) made the country unattractive to foreign investors, hence, the Nigerian economy was shut off from meaningful foreign investment. On assumption of power in 1999 by a civilian administration, there was urgent need to reverse the trend, restore investors' confidence in the Nigerian economy and convert Nigeria from the pariah status it had assumed to an investor-friendly nation. Moreover, there was the need to attract massive inflow of foreign capital because the high level of corruption and mismanagement prevalent in the country strongly constrained mobilization and utilization of domestic resources for expected level of

industrial development (Ekpo, 2014). This marked the introduction of foreign-private investment-led industrialization (FPII) into the Nigerian industrial policy palace as another industrialization strategy.

Foreign private investment is a direct investment into production or business in a country, by an individual or company in another country, either by using a company in the target country or by expanding the operations of an existing business in that country. In a narrow sense, it involves building new facilities; broadly speaking, it includes building new facilities, mergers and acquisitions, reinvesting profit earned from overseas operations and intra-company loans.

Under the FPII, the Land Use Act and the Nigerian Export Promotion Decree were abolished and the Nigerian Investment Promotion Commission was instituted to hasten the processing of applications for entry into Nigeria by prospective foreign investors as well as the registration and establishment of businesses. The industrial master plan was initiated in 1999 to strengthen industrial research and commercialize research findings as well as source for technical assistance for industrialists in the area of technology transfer and capacity building.

On the benefits of the FPII, obviously, the rate of net inflow of foreign private investment into the country increased. However, the insecurity threat in the country posed by Boko Haram insurgence, political violence, ethnic militia and secession as well as the twin monsters of decaying infrastructure and corruption, if not properly handled, may hamper the inflow of foreign private investment and jeopardize the success of the FPII in Nigeria. From all indications, the performance of the manufacturing sector is weak as shown by the dwindling level of capacity utilization. The profit margin of firms is low due to high cost of production caused by shortage of critical infrastructure like electricity, transportation, etc. and the fact that machinery, spare parts, raw materials and technology are imported.

d. Financial industrial policy initiatives

In order to achieve an accelerated pace of industrial development and make the sector the prime mover of the economy, government, in 1988, launched an industrial policy with the aim of promoting small-scale industries, and ensuring that Nigeria's manufactured exports are competitive.

In addition, the continuing evolution of policies toward increased market orientation in a series of policy reforms, which reached its peak in the early 1990s and affected primarily the banking, capital trade and tax systems, had a significant impact on the industrial sector (Olorunshola, 2002). In particular, the Nigeria Investment Production Commission Decree 16 and the Foreign Exchange (Manufacturing and Miscellaneous) Production Decree 17 were promulgated. These decrees provided the necessary legal backing to the Autonomous Foreign Exchange Market (AFEM), liberalized substantially foreign exchange flows in the late 1990s to stimulate the instruments and source of funds for the market and specified the role of the principal actors in the AFEM, among other provisions.

Further, in order to facilitate adequate supply of funds to the sector, the unwieldy industrial financial arrangements were rationalized and streamlined to make them efficient and effective.

In this regard, the erstwhile Nigerian Industrial Development Bank (NIDB) and the National Economic Reconstruction Fund (NERFUND) were merged to form the Bank of Industry. Today, the Bank of Industry is the hub of industrial finance in Nigeria in the provision of industrial loans to prospective investors and existing corporate organizations. Other monetary policies have been put in place in recent times to further deepen the activities of the BOI within the semi-urban and rural settings. These include industrial loans by conventional deposit money banks (DMB), and establishment of one-stop investment centres by the Nigerian Investment Promotion Commission to hasten the process of application for entry into Nigeria by prospective foreign investors, as well as registration and establishment of businesses.

To sanitize and establish the financial system, banking sector reforms including the universal banking strategy of 2002 and the bank consolidation exercise of 2005 were carried out. Other measures adopted include the evolvement and implementation of strategic management industrialized development through an industrial master plan since 1999. As provided for in the plan, state-owned enterprises have been reviewed with the aim of completing or rehabilitating viable ones and eventually privatizing them. In the master plan, there is a provision to strengthen industrial research and commercialize research findings as well as source for technical assistance for industrialists in the area of technology transfer and capacity building. In addition, the Small and Medium

Enterprises Development Agency in Nigeria (SMEDAN), an umbrella agency for small and medium enterprises (SMES), has been established to cater for the development of SMES.

4. Methodological Issues

The motive of financial reforms are to sanitize and stabilize the financial system for maximum impact on the various sectors of the economy including the industrial sector. The performance of the industrial sector in relation to financial development/deepening is examined using industrial performance indices such as index of industrial and manufacturing production, percentage contribution and value added to the gross domestic product, manufacturing capacity industrialization, percentage growth rate, manufacturing share in total export, import and employment. The examination of industrial sector performance involves its sectoral components. The components of the industrial sector are manufacturing, mining, electricity, construction, water and gas (Kirkpatrick et al., 1984). In this work, we concentrate on manufacturing since the degree of manufacturing in the country is a measure of the extent to which other components have been effectively utilized (Ndebbio, 1994).

This study takes the index of manufacturing production (INDM) as the manufacturing sector performance indicator. This is in consonance with other works in this area, while the explanatory variables are indices of financial development which include interest rate on lending (LINT), the ratios of narrow and broad definition of money supply to gross domestic product (M2/GDP), liquidity ratio (LQR) in deposit money banks, market capitalization (MCAP), total listed equities and government stocks (TEGS) and official exchange rates (OEXR).

4.1 The model

Following Sims' (1980) seminar paper, the vector auto regressive (VAR) model has become one of the leading approaches employed in the analysis of dynamic economic interactions. This study follows suit by employing the VAR model to examine the short- and long-run effects of the various monetary policy options on industrialization in Nigeria. The VAR approach is founded on Granger's (1969) specification of causality. Causality in the Granger sense is inferred when

values of a variable, say *X*, have explanatory power in a regression of *Y*, on lagged values of *Yi* and *Xi*

Following the above mentioned approach, we consider a VAR model of order K, thus:

$$INDM_t = \lambda_0 + \lambda_1 INDM_{t-1} + \lambda_2 LINT_{t-1} + \lambda_3 MCAP_{t-1} + \lambda_4 M2/GDP_{t-1}$$

$$+ \lambda 5 LQR_{t-1} + \lambda_6 TEGS_{t-1} + \lambda_7 OEXR_{t-1} + U_{1t} \quad (1)$$

Specifying a VAR model of order *P*, the general form of an unrestricted reduced form of a VAR is shown below:

$$N_t = \lambda + \sum_{t=1}^{p} \alpha t + N_{t-1} + U_t \quad (2)$$

The matrix form of equation (2) could be presented as:

$$\begin{pmatrix} INDM_t \\ LINT_t \\ MCAP_t \\ M2/GDP_t \\ LQR_t \\ TEGS_t \\ OEXR_t \end{pmatrix} = \begin{pmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \\ \lambda_5 \\ \lambda_6 \\ \lambda_7 \end{pmatrix} + \begin{pmatrix} a^1_{11} & a^1_{12} & a^1_{13} & a^1_{14} & a^1_{15} & a^1_{16} & a^1_{17} \\ a^1_{21} & a^1_{22} & a^1_{23} & a^1_{24} & a^1_{25} & a^1_{26} & a^1_{27} \\ a^1_{31} & a^1_{32} & a^1_{33} & a^1_{34} & a^1_{35} & a^1_{36} & a^1_{37} \\ a^1_{41} & a^1_{42} & a^1_{43} & a^1_{44} & a^1_{45} & a^1_{46} & a^1_{47} \\ a^1_{51} & a^1_{52} & a^1_{53} & a^1_{54} & a^1_{55} & a^1_{56} & a^1_{57} \\ a^1_{61} & a^1_{62} & a^1_{63} & a^1_{64} & a^1_{65} & a^1_{66} & a^1_{67} \\ a^1_{71} & a^1_{72} & a^1_{73} & a^1_{74} & a^1_{75} & a^1_{76} & a^1_{27} \end{pmatrix} \begin{pmatrix} INDM_{t-1} \\ LINT_{t-1} \\ MCAP_{t-1} \\ M2/GDP \\ LQR_{t-1} \\ TEGS_t \\ OEXR_{t-1} \end{pmatrix} + \begin{pmatrix} U_{1t} \\ U_{2t} \\ U_{3t} \\ U_{4t} \\ U_{5t} \\ U_{6t} \\ U_{7t} \end{pmatrix}$$

a^1 denotes variables at their first lag.

U_{1t} denotes error terms.

VAR estimations are very sensitive to the lag structure of variables. Using a sufficient lag length may help to reflect the long-term impact of variables on others. However, including long lag lengths will lead to multi-collinearity problems and will increase the degree of freedom (DOF) (Wooldridge, 2006).

Empirical simulations show that with any K≥11, the model will become divergent with at least one auto-regressive root that is greater than one. According to sequential modified likelihood ratio test statistics, lag orders between 1 and 3 are recommended for models of this nature (Wooldridge, 2006). Accordingly, to determine the optimal lag length to use for our model, we employ five different lag order selection criteria (LR, FPE, AIC, SIC, HQ) to guide our decision. The essence of the battery of tests is for confirmatory analysis.

To further improve the quality of this study, a structural vector auto-regressive (SVAR) model was employed. This is because the construction of impulse response functions (IRFs) and variance decomposition (VDC) from vector error correction mechanisms (VECMs) is not as theoretically robust as from a SVAR model (Chang and Wong, 2003).

A SVAR model has a better empirical fit than other classes of vector auto-regressive models and it allows one to identify structural shocks with respect to economic theory, thereby making it possible to analyse the net effects of an unexpected change in one variable (monetary policy) on other variables in the system (Ozak and Pekkumaz, 2010).

The compact form of the SVAR of model 1 is presented thus:

$$B^{*}y_t = r_0 + r_{1*}y_{t-1} + r_{2*}y_{t-2} + \sum_t \tag{3}$$

The reduced form of the model can be written as:

$$y_t = B^{-1}r_0 + B^{-1}\, r_{1*}y_{t-1} + B^{-1}{}_{r-2*}y_{t\_2} + B^{-1}\sum_t \tag{4}$$

We can further simplify the notation in equation (4) by the following definitions:

$$A_0 = B^{-1}r_{0,}\, A_1 = B^{-1}\, r_{1,}\, A_2 = B^{-1}\, r_2 \text{ and } e_t = B^{-1}\sum_t$$

where e_t is the vector of residuals. The simplified form of our model is thus:

$$y_t = A_0 + A_1 y_{t-1} + A_2 y_{t-2} + e_t \tag{5}$$

where y is a vector of seven endogenous variables y = (*INDM*, *LINT*, *MCAP*, *M2*/*GDP*, *LQR*, *TEGS*, *OEXR*)

4.2 Identification scheme for recursive VAR

Since SVAR models are suited to track and identify structural shocks with respect to identifying economic theory, it is necessary to impose some restrictions on the system of equations to retrieve the structural shocks of the model. This means that we must use the underlying theoretical expectations to identify the parameters and the shocks of the structural model.

The standard approach in the identification scheme is to impose a recursive structure of the VAR, with the ordering of variables. Technically, this amounts to estimating the reduced form, then computing the Cholesky factorization of the reduced form VAR covariance matrix. In other words, the relation between the reduced form errors and the structural disturbance is given by the covariance matrix:

The covariance matrix

$$\begin{pmatrix} V_t^{OEX} \\ V_t^{MCA} \\ V_t^{M2} \\ V_t^{LINT} \\ V_t^{LIQR} \\ V_t^{TEGS} \\ V_t^{INDM} \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & a_{24} & 0 & a_{26} & 0 \\ 0 & a_{32} & 1 & 0 & a_{35} & a_{36} & a_{37} \\ 0 & a_{42} & 0 & 1 & a_{45} & a_{46} & a_{47} \\ 0 & a_{52} & a_{53} & a_{54} & 1 & a_{56} & 0 \\ 0 & a_{62} & a_{63} & a_{64} & a_{65} & 1 & 0 \\ a_{71} & a_{72} & a_{73} & a_{74} & a_{75} & a_{76} & a_{27} \end{pmatrix} \begin{pmatrix} U_t^{OEXF} \\ U_t^{MCAI} \\ U_t^{M2} \\ U_t^{LINT} \\ U_t^{LIQR} \\ U_t^{TEGS} \\ U_t^{INDM} \end{pmatrix}$$

From a non-recursive identical form which assumes a contemporaneous relationship between variables on which this study is based, official exchange rates are strictly exogenous, hence shocks to other variables do not affect them. Thus, the official exchange rates in the period under review were determined by the monetary authorities (official). Other variables do respond intermittently to other shocks in the system as shown in the covariance matrix. The last equation suggests that industrial output responds immediately to all other variables in the system except the ratio of narrow money to gross domestic product. It is the

most endogenous because it is affected by virtually all the structural shocks in the system, hence there is no restriction imposed on it.

Formally, the coefficients of covariance matrix will form the basis of our analysis with emphasis on the lower triangular matrix.

4.3 Impulse response functions (IRFs)

The IRF is an essential tool in empirical causation and policy effectiveness, especially monetary policy. Impulse response analysis provides extremely useful information with which to characterize the dynamics of a model by illustrating the evolution over time of effects of shocks on variables and importantly, on the persistence of the effects of the shocks over a long period. An IRF traces out the response of a variable of interest to an exogenous shock. This means that the ultimate effects of a shock can vary depending on the state of the system at the time of the impact of the shock and the sign and magnitude of the shock.

We need to identify the instances of an unexpected shock-industrial output (INDM), which in our model is associated with a shock to liquidity (LQR). Bermanke and Blinder (1992) point out that to identify the impact of an exogenous shock to a variable without identifying the entire model structure, it is sufficient to assume that policy variables react contemporaneously to non-policy variables but not vice versa.

Solving this identification problem is tantamount to finding a matrix that satisfies the Saxegaard (2006) specification of the reduced form of the covariance matrix as:

$$A_1^{-1}\begin{bmatrix} y_t \\ m_t \end{bmatrix} = A^{-1}c_1\begin{bmatrix} L \end{bmatrix}\begin{bmatrix} y_{t-1} \\ m_{t-1} \end{bmatrix} + \begin{bmatrix} U^y{}_{it} \\ U^m{}_{it} \end{bmatrix} \qquad \text{For } i = 1, 2 \ldots$$

or

$$A_1^{-1}\begin{bmatrix} V^y{}_{it} \\ V^m{}_{it} \end{bmatrix} = \begin{bmatrix} U^y{}_{it} \\ U^m{}_{it} \end{bmatrix} \qquad \text{For} \quad i = 1, 2, \ldots$$

where:

U^{y}_{it} = regime dependent vectors of non policy with diagonal covariance matrices, $A_i \sum^{y}_{i} A_i$; while

U^{m}_{it} = regime dependent vectors of policy shocks with diagonal covariance matrices $A_i \sum^{m}_{i} A_i$ as earlier shown in the covariance matrix.

5. Results and Synthesis

5.1 Unit root with structural breaks

Most traditional unit root tests have been on the basis of a failure to allow an existing break, leading to a bias that reduces the ability to reject a false unit root null hypothesis. To overcome this, this study undertook unit root with structural breaks as presented in table 1.

Table 1. Unit Root with Structural Breaks (Zivot & Andrews)

Variable	Break	At level	1st Diff	Critical V.	Remark
INDM	1998	-3.021	-3.730	-3.140	I(1)**
LINT		-1.391	-3.596	-3.211	I(1)**
MCAP	2005	-1.736	-3.724	-3.993	I(1)**
M_2/GDP	2010	-2.633	-3.926	-3.440	I(1)**
LQR		-2.410	-2.711	-2.560	I(1)**
TEGS		-2.412	-3.621	-3.896	I(1)**
OEXR	2013	-2.141	-2.930	-2.569	I(1)**

Source: Author's computation.

Notes: (1) * & ** sig. at 1% and 5% respectively

(2) The attached year(s) are the break years.

The result from the unit root test shows that some of the variables had a major structural shock. These include the index of manufacturing (INDM) that experienced a boost after the structural adjustment programme introduced in July 1986. The various SAP-enhanced industrial policies and incentives adopted helped to boost manufacturing production after 1986. While stock market capitalization (MCAP) received shocks with the introduction of the automated

trading system as a follow-up to the Central Security Clearing System (CSCS) coupled with the graduation to T + 3 cycle transaction days in 2005.

Broad money supply ratio to gross domestic product (M2/GDP) received a boost following the increase in the use of quasi money in 2010 and with the advent of automated teller machines (ATM), official exchange rates surged (misalignment) with the introduction of flexible exchange rates in 2012.

These stocks make most of these variables non-stationary at levels. However, these series become stationary after taking first differences.

5.2 Optimal lag length selection

The effects of regressors in dynamic models are known to spread over time and as such appropriate lag length for the variables is required. The vector auto-regressive (VAR) lag order selection method is needed. The optimal lag length selected is based on final prediction error (FPE), Akhaike information criterion (AIC), likelihood ratio (LR), Hannan Quinn (HQ), and Schwarz criterion (SC) (see table 2).

Table 2. VAR Lag Order Selection Criteria

Lag	LR	FPE	AIC	SIC	HQ
0	NA	39.142	27.26	28.154	25.432
1	912.414	14.291	14.691	15.341	15.242
2	832.392	5.159*	5.455*	6.375*	4.893
3	741.491	0.007	-1.694	-2.462	4.092*
4	112.651*	0.009	2.562	-2.534	-3.146
5	96.321	0.116	-4.678	1.591	-3.093
6	89.451	0.145	-0.345	2.321	-1.011
7	78.149	0.006	0.749	1.006	2.459
8	56.465	0.070	0.541	3.419	2.316

Note: * indicates lag order selected by the criteria.

Source: Computed by the Author using Eviews 9.

In table 2, the values asterisked indicate the lag selected by the criterion. The final prediction error criterion (FPE), Akaike information criterion (AIC), and the Schwarz information criterion (SIC) all selected lag order 2, while the likelihood ratio (LR) tool and the Hannan Quinn information criterion (HQ)

selected lag order 2 and 3 respectively. Since FPE, AIC and SIC criteria selected order 2, we estimate a SVAR model of k = 2.

5.3 SVAR estimates

A major advantage of SVAR modelling is that it allows one to identify the effects of structural shocks, taking cognizance of the underlying economic theory, thereby making it possible to analyse the net effects of an unexpected change in one variable on other variables in the system. Given the structural factorization specified in section 3, and the identifying restrictions imposed on the SVAR model, table 3 represents the coefficient estimates of the elements in the B matrix as specified in the covariance matrix. The coefficient as presented in table 3 provides a baseline intuition or vague representation of the basic relationship that exists among the variables.

Table 3. Structural VAR Estimates

Variable	Coefficient	Std. error	Z-Score	Pro-val
B(1)	2.095	0.532	0.452	0.742
B(2)	-0.687	0.347	-0.075	0.097
B(3)	-0.375	0.808	-0.275	0.105
B(4)	-2.191	2.005	-0.079	0.101
B(5)	-2.365	0.243	-0.079	0.037
B(6)	0.643	0.075	0.354	0.385
B(7)	2.346	0.754	0.275	0.428
B(8)	1.345	0.250	1.423	0.429
B(9)	0.937	0.821	0.465	0.674
B(10)	-1.476	0.476	-3.340	0.497
B(11)	1.362	0.521	0.311	0.051
B(12)	-2.112	0.362	-3.461	0.046
B(13)	0.131	0.926	1.399	0.322
B(14)	0.731	0.492	3.587	0.049
B(15)	1.434	0.429	2.641	0.011

Source: Computed by the Author.

From table 3, our primary interest is on the coefficients of B(1) through B(15). B(15) represents the impact of a shock on the index of manufacturing

output lagged by a period. From the table, the value 1.434 with the Z-statistic of 2.641 shows that the index of manufacturing responds positively and significantly to shocks from itself. The level of financial development as proxied by M2/GDP positively induced the level of manufacturing product as presented by manufacturing index B(11) with a coefficient of 1.362 though not statistically significant confirmed to apriori expectations.

One of the most dynamic indices of financial sector development in Nigeria is lending interest rates over the years, with its upward swings. As expected theoretically, variations in interest rates on lending B(12) shocked off manufacturing output to the tune of 2.112 and highly statistically significant (0.046). This may not be unconnected with the high interest rates charged by financial institutions in Nigeria, including the Bank of Industry (BOI) whose loan processes are fraught with bureaucratic bottlenecks and political intrigues. Total listed equities and government stocked (TEGS) as designated by B(14), though with marginal impact on manufacturing index by 0.731 and not statistically significant as most bonds are either diverted to other uses, unredeemed and the little available for production are ravaged by high cost of production in Nigeria due to poor infrastructure and other stock market development bottlenecks. Bank liquidity ratio as designated by B(13) has a marginal positive (0.131) impact on index of manufacturing against theoretical expectations, though statistically insignificant.

To have a clearer picture of the nature of the relationships, we turn to the impulse response function from the SVAR equations.

5.4 Analysis of impulse response functions (IRFs)

Impulse responses trace the responsiveness of the dependent variable in the SVAR to shocks from the other restricted variables. Thus, we analysed changes in the manufacturing index to shocks in the model using the IRFs technique. Table 4 depicts the combined structural responses of the manufacturing index indicator to one standard deviation innovation to itself and other variables.

The table shows that in period 1, the manufacturing index is to a greater extent auto-regressive with the highest value of 8.941 among the contemporaneous variables in the model. However, this positive effect falls progressively as it declined into the past. The debilitating effect of lending interest rates on manufacturing index is also evident as it oscillates between

positive and negative values with more of the latter. The response of the manufacturing index to the level of financial deepening is positive though highly unstable, oscillating between 0.493 and 5.430. The stock market capitalization also has some appreciable impact on the index of manufacturing, though it falls progressively. The response of the manufacturing index to liquidity ratio and official exchange rates misalignment is negligible as most of the values fall between 0.003 and 2.874 for liquidity ratio and -4.493 and 0.384 for official exchange rate respectively. Total listed equities and government stock have an effect on manufacturing index (positive) but this effect falls asymptotically.

Table 4. The Response of the Industrial Manufacturing Index to Itself and Other Variables

Period	INDM (-1)	LINT	MCAP	M_2/GDP	LQR	TEGS	OEXR
1	8.941	0.487	5.306	0.493	1.365	1.487	-1.837
2	3.453	1.648	3.520	5.590	2.398	3.094	-4.283
3	8.765	-3.432	2.3I2	1.475	1.978	2.398	1.640
4	4.732	3.709	0.472	3.573	2.874	3.857	0.636
5	3.354	-0.863	1.476	5.439	1.532	1.402	-0.493
6	0.846	3.I54	0.974	0.478	0.144	0.857	0.375
7	0.562	0.576	0.587	1.563	0.573	0.603	0.384
8	-0.736	-1.758	0.039	0.597	0.002	0.948	0.059
9	0.482	-1.578	1.546	3.864	0.593	0.784	0.382
10	0.375	1.497	0.373	0.864	1.002	0.032	0.085

Source: Computed by the Author.

5.5 Variance decomposition analysis (VDA)

Variance decomposition analysis (VDA) provides a tool for analysing the relative importance of the independent variables in explaining the variations in the dependent variable. In other words, after identifying the structural shocks, the VDA analysis shows what percentage of the forecast-error variance for the index of manufacturing product in the economy is explained by the various shocks as represented by the included variables in the model. The result of VDA over a 10-year time horizon is summarily shown in table 5.

It can be observed from the table that most of the variations in the forecast error of the index of manufacturing output are explained by the shocks to itself. That is, 83 per cent of the variations in the manufacturing index can be explained

by the shock from itself over a 10-year period, though decreasing asymptotically. The second most influential determinant of the manufacturing index in Nigeria is shocks from the lending interest rates. On the average, 14.9 per cent of the variation in the manufacturing index in Nigeria is caused by the variation in lending interest rates. This is the why most monetary policies over the years have been aimed at reducing the interest rates spread, though without much success.

Table 5. Variance Decomposition of INDM and Other Variables

Period	S.E	INDM (-1)	LINT	MCAP	M_2/GDP	LQR	TEGS	OEXR
1	6.632	83.000	9.473	0.256	4.398	3.493	3.101	0.487
2	8.237	71.253	10.376	0.5132	1.036	5.765.	8.309	2.492
3	10.349	74.486	10.496	0.478	2.498	2.735	4.956	0.465
4	11.342	74.487	12.875	3.409	3.023	2.498	1.385	3.386
5	14.013	71.343	11.285	1.764	3.084	5.946	8.485	0.657
6	15.265	43.074	14.076	2.286	4.950	0.856	6.386	0.964
7	14.476	6.582	23.964	2.509	3.598	3.498	3.573	0.675
8	11.368	65.497	12.487	0.487	1.397	1.528	13.365	0.962
9	13.165	59.497	17. 875	7.765	5.476	5.754	2.598	0.748
10	15.465	55.497	265.486	3.320	5.076	3.908	10.543	0.296

Source: Computed by the Author.

Approximately 2.532 percent on average of the variation in the manufacturing index results from the total listed equities and government shocks which have been the prime movers of most developing countries' economies like the Asian tigers. This low percentage revealed a lot of inefficiencies including undue delays, cancellation and frequent issuance of certificates, failure to exploit capital market gains and failed trades in Nigerian stock market. These inefficiencies rendered the market relatively illiquid and unattractive to many investors despite the introduction of Central Securities Clearing System (CSCS). This percentage is lower than that of the lending interest rates (14.9) because lending interest rates to a great extent determine the level of domestic funds available to the private sector and constantly manipulated by deposit money banks.

The liquidity ratio in deposit money banks with a variation value of 4.32 units on the average measures the banks' ability to give out credit facilities. The

higher the ratio, the lower the banks' ability to give out funds and vice versa. The level of financial deepening in the economy is designated by (M2/GDP) which stood at 4.09 units. Stock market capitalization (MCAP) and official exchange rate misalignment influences on manufacturing index are relatively marginal. Both stood at an average of 2.532 and 2.00 units respectively, with official exchange rate misalignment accounting for the least contribution to observed variation.

6. Policy Implication

One of the most dynamic consequences of financial sector development in the banking sector in Nigeria is variation in lending interest rates and the ratio of broad money supply to gross domestic product (M2/GDP) over the years, with continuous upward swings in lending interest rates as expected theoretically, shocked off investment and hence the manufacturing index. This phenomenon is not restricted to the conventional deposit money banks but even the Bank of Industry (BOI) and allied financial institutions whose loan processes are fraught with bureaucratic bottlenecks and political intrigues. The level of financial deepening, as proxied by M2/GDP, positively influenced the manufacturing index, and though statistically insignificant, calls for more effort on the part of the monetary authorities to further pursue the cashless policy more rationally and reduce the liquidity ratio in deposit money banks, making them available for the manufacturing and allied subsectors in Nigeria.

From the capital market front, it is noteworthy that with the introduction of the automated trading system as a follow up to the CSCS, coupled with the graduation to T+3 cycle transaction days, the efficiency of the market has been enhanced, but its impact on the manufacturing subsector is minimal. Undue delays, cancellation and frequent issuance of certificates, failure to exploit capital gains, failed trades and confidence crisis that still characterize this subsector should be bridled by concerned authorities to make the market relatively liquid and attractive to investors.

The radioactive decay effects exhibited by a lag of the manufacturing index variable is a thing of interest for policy makers. It shows that the manufacturing index will continue to accentuate as long as industrialization is encouraged by different governments. In short, it is the most influential shock of manufacturing

index variations among the variables specified, while exchange rate misalignment has the minimum influence in Nigeria.

From the analysis, for industrialization to be attained and sustained in Nigeria, the yawning gap between interest rates on savings and lending, that is interest rates spread, should be stemmed to stimulate credits to the private sector for maximum industrial output and by extension, the exchange rates misalignment currently being experienced in Nigeria will fizzle out.

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