Interest Rate Reform and Real Sector Performance: Evidence from Nigeria

By

[1]Okoye, Lawrence Uchenna, [2]Nwakoby, Clem I. N.and [3]Modebe, N. J.

[1]Department of Banking & Finance, Covenant University Ota, Ogun State

[2]Department of Banking & Finance, Nnamdi Azikiwe University Awka, Anambra State

[3]Department of Banking & Finance at the Enugu Campus of the University of Nigeria Nsukka, Enugu State

ABSTRACT

This study seeks to identify the effect of the interest rate liberalization policy of the government (introduced in 1986 under the structural adjustment programme) on the performance of the industrial sector in Nigeria. Specifically, the study examines the extent to which movements in lending or loan rate and its major determinants like exchange rate, inflation rate and financial depth (independent variables) account for the trend in output performance of Nigeria's industrial sector (dependent variable). Annual data on the variables, sourced from the publications of the Central Bank of Nigeria, were analyzed using the analytical technique of the vector error correction model (VECM). The study shows that exchange rate volatility has an insignificant positive impact on industrial output performance. It also shows evidence of significant positive impact of lending rate and financial depth on industrial output growth. However, evidence from the study shows that inflation has a significant negative effect on the output of the sector. To enhance the performance of the sector in Nigeria, government should seek to stabilize exchange rate movements through proper diversification of sources of foreign exchange inflow as well as reduce its outflow in order to support her import-dependent industrial sector while simultaneously pursuing the development of an adequate and efficient infrastructure base for the economy. Properly functioning infrastructure will, among other things, greatly enhance the realization of low price levels and hence low level of inflation required to boost domestic production capacity.

KEYWORDS: Interest Rate, Liberalization policy and Real Sector

INTRODUCTION

A primary concern of many developing nations, including Nigeria, during the early stages of nationhood is often the desire to stimulate domestic output growth through the development of a vibrant financial sector capable of supporting economic activities. In this regard, since the attainment of political independence in 1960, Nigeria has vigorously pursued the development of a vibrant financial system, starting with the establishment of the Central Bank of Nigeria and development relevant institutions and legislations.Such institutions include financial intermediaries like commercial banks.Prior to financial sector deregulation in

Nigeria under the Structural Adjustment Programme (SAP) adopted in 1986, the monetary policy of the government was development-oriented as banks were required to lend at concessionary rates to priority sectors like agriculture and manufacturing. The policy thrust of the government was to promote real sector development by offering low rates of interest on loans to the sectors. Interest rate regulation during the period ensured that the spread between deposit and lending rates was maintained within the specified limits. Interest rates were largely managed or fixed below the rate of inflation in the economy.

However, the policy regime which fixed interest rates below inflation rate (interest rate repression) failed to deliver on government's economic objective of real sector growth. This assertion was alluded to by then Nigerian Military President, Gen. I. B. Babangida who explained that pegging of interest rate, contrary to expectation, did not achieve its desired objective of stimulating new investments, nor did it result in increased capacity utilization (Federal Government Budget Speech, 1987).

With the introduction of SAP in 1986, the mechanism for interest rate management was liberalized thereby setting the stage for a transition from fixed to market-determined interest rate regime. Under SAP, the banking sub-sector witnessed wider spreads between deposit rates and lending rates. Interest rates became positive in real terms, as they rose above inflation rates for most part of the period.

Bank lending in the liberalized Nigerian financial sector was hardly extended to promotion of new investments, expansion of existing real ventures and promotion of exports but were rather diverted to foreign exchange trading which banks consider a vibrant and profitable activity (Ogunleye, 1999). Thus, funding of requisite production imports through bank credit substantially reduced.

Towards the attainment of optimal economic growth rate in Nigeria, we seek to empirically determine the role of interest rate on output performance in a deregulated Nigerian economic environment, using the industrial sub-sector as proxy. The sub-sector is widely acknowledged as the engine of growth and economic development due, largely, to its pivotal role in broadening the productive base of the economy, enhancing its revenue earning capacity, reducing the growth of unemployment and poverty as well as checking rural-to-urban migration, according to the Central Bank of Nigeria (2012), is comprised of crude petroleum and natural gas, solid minerals (including coal mining, metal ones, quarrying and other mining activities) and manufacturing (including oil refining; cement production; food and beverages, and tobacco; textiles, apparel and footwear; wood and lumber products; pulp, paper and publishing; non-metallic products; domestic/industrial plastic and rubber; electrical and electronics; basic metal, iron and steel; motor vehicle and miscellaneous assembly.

Issues of effective interest rate management have featured prominently in government monetary and fiscal policy considerations aimed at achieving enhanced and sustained economic growth. Towards an effective management of interest rate in Nigeria, the monetary authorities have adopted two major policies on interest rate. First, in the post-independence period, the policy thrust was to keep interest rates as low as possible, often below the rate of inflation (interest rate repression), to enable the government and private sector operators borrow cheaply to fast-track the process of economic growth and development. Basic features of the regime (which lasted until the mid-1980s) include the use of administrative controls such as the introduction of ceilings on interest rates and prioritization of certain sectors of the economy so as to control the volume and direction of credit flow in the economy. However, this policy failed to achieve its underlying objectives and was discontinued in 1986. According to the Federal Government of Nigeria, "the pegging of interest rate, contrary to expectation, has not achieved its desired goal of stimulating new investments, nor did it result in an increased industrial capacity utilization" (Federal Government Budget Speech, 1987).

Following the introduction of the SAP in July 1986, the structure of interest rate in Nigeria changed dramatically as interest rates became positive in real terms. SAP aimed at restructuring and redirecting the economy, eliminating price distortions and diversifying the export base of the economy (CBN, 1995).With regard to the banking sector, SAP sought to deregulate banking, liberalize banking operations, promote competition and make banking operation more market-driven (Okafor, 2011). The policy regime was designed to enhance effective deposit mobilization and promote efficient allocation and utilization of financial resources and in the process steer the economy towards the path of growth and development.

Owing to the rising trend in interest rate (particularly lending or loan rate) since the introduction of SAP, real sector operators like manufacturers have continued to cry aloud over the negative impact of lending rate on their operations. The Manufacturers Association of Nigeria (MAN) have on occasions attributed the low rate of capacity utilization in the sub-sector to high lending rates, among other factors (see for example, MAN Economic Review, 2003-2006,2009) The trend has not ceased to engage the attention of other stakeholders in the Nigerian project. A former Nigerian President, Olusegun Obasanjo, had in the first quarter of 2002, raised serious concerns over the level of interest rate in the country (which according to him was one of the highest in the world), noting that its rising trend holds little prospect for enhanced productive sector.

Critics of the regime argue that the emerging high interest rates correlate negatively with the rate and level of investment and thereby reduce output growth.

At high interest rates, lending or credit institutions have to contend with a larger portfolio of sub-optimal risk assets (loans) because, according to Soyibo and Olayiwola (2000), low risk investors tend to shy away from bank loans while high risk investors are the ones who apply for such loans. The implication is that loan applicants who eventually get selected are often those most likely to default, hence a higher risk of adverse selection. Also, borrowers are easily tempted to engage in high risk ventures that offer mouth-watering but unrealistic returns and thereby divert the borrowed funds away from their intended purpose, impairing the productivity of borrowed funds in the process.

An investigation into the performance of the real sector shows that during the period 1986-2013, aggregate output (GDP) grew at an annual average of 4.71 per cent with minimum and maximum growth rates of 1.7 per cent and 9.57 per cent recorded in 1988 and 2003 respectively. The sub-optimal performance of the economy has continued to engage the attention of the government, the academia and other stakeholders.

In view of the issues emerging from the introduction of the reformed interest rate regime in the country, this paper seeks to provide empirical evidence on the role of deregulated interest rate in the promotion of economic growth in Nigeria. Of concern to us in this study is the lending rate which is the rate at which real sector operators access funds from lending institutions.

Major determinants of interest rate behavour like exchange rate, inflation rate, etc were also introduced to enhance the robustness of the study.

Studies on the subject area have largely either not focused on specific policy impact of interest rate (see for example, Obamuyi, 2009; Adebiyi and Obasa, 2004; Obamuyi and Olorunfemi, 2011 and Udoka and Anyinyang, 2012) or are directed at aggregate output (see also, Akinlo, 2005; Akpan, 2004 and Odhiambo, 2009).This study seeks to examine the effect of a specific government policy (interest rate reform) on a particular economic sector (the industrial sector) of the Nigerian economy.

The rest of the paper is arranged in sections, namely: conceptual framework, theoretical framework, empirical review of related literature, research methodology, data presentation and analysis, summary of findings, and recommendations.

CONCEPTUAL FRAMEWORK

Interest rate is one of the economic price variables (like exchange rate, wage rate, etc.) which determines the flow of economic activity. Just like the wage rate refers to the price of labor used in production, interest rate relates to the price paid for capital or money used in the production of goods and services. As a concept, interest has been defined in a variety of ways even among economists. Jhingan (2001), documents the views of some renowned economists on the concept.

For instance, Mill conceives interest as the remuneration for mere abstinence. According to Mill, since abstinence from consumption is often painful and disagreeable, fund owners should be compensated in the form of interest. Fisher defines interest as the premium for time preference. He considers interest as an inducement to postpone present enjoyment of goods to the future. Keynes on the other hand defines interest as payment for the use of money or the reward for parting with liquidity.

Interest can be explained as a financial benefit which the fund user (borrower) gives to the fund owner (lender) for using the fund. It is often expressed as a rate per cent per year.

Interest can also be explained as the reward or compensation to an entrepreneur for risk-taking. Therefore, for a rational entrepreneur, the higher the risk of an economic activity, the higher the expected reward or return associated with it.

Two major polices of interest rate management are interest rate regulation and interest rate reform. Interest rate regulation often embodies the practice of interest rate repression and entails the use of quantitative or administrative controls by the monetary authorities to influence the magnitude as well as direction of credit. A characteristic feature of the regulated regime is maintenance of interest rate at levels lower than the rate of inflation (interest rate repression). Repression of interest rate targets maintenance of low and negative real interest rates to support economic growth through provision of cheap finance (credit) to industry operators. On the other hand, interest rate reform refers to liberalization of the framework for interest rate determination. Movement of interest rate during a liberalized or reformed policy regime is directed by the market forces of demand and supply. Interest rate levels under the regime reflect the inflationary trend in the economy and are therefore often perceived to be high, particularly in the developing economies that are characterized by high inflation rates. Liberalization policy aims at promotion of effective deposit mobilization and efficient allocation of funds to achieve output growth.

An intriguing aspect of the concept is that the different policies impact differently on different economic agents. For instance, while savers are reluctant to make deposits during a repressed regime, borrowers have an incentive to borrow at the cheap rates to fund their operations. The reverse position however occurs during a period of interest rate reform thereby presenting an obvious challenge to the monetary authorities with respect to formulation of a functional policy that will simultaneously stimulate savings as well as promote entrepreneurship since both are necessary conditions for growth.

Though there are other forms of interest rate, for our purpose in this paper, emphasis is on deposit and lending rates.

The deposit rate is the return that accrues to fund owners (the surplus economic units) for placing their funds at the disposal of the banks (intermediating agents) while the lending rate is that which accrues to the banks for making the mobilized savings available to borrowers (the deficit spending units). The difference between the two rates (the spread) represents an income for the banks.

THEORETICAL FRAMEWORK

Literature on development finance is replete with evidence of theoretical arguments as well as empirical findings on the role of finance in the process of economic growth and development. While some have identified finance as driving the process of economic growth (see for example, Gurley and Shaw, 1967; Mckinnon, 1973; King and Levine, 1993; Jayaratne and Strahan 1996; Beck et al, 2000; Driscoll, 2004; Bundesbank, 2005), some others identify finance not as the driver of growth but as being led by growth (see also, Gurley and Shaw, 1995; Robinson, 1952). A third school in the finance-growth nexus, however, posits that finance and growth are unrelated (see for example Lucas 1988; and Lardy, 1998).

In spite of diverging views on the capacity of finance to propel growth and development, there appears and a near consensus that a well-functioning financial sector is a basic requirement for the efficient allocation of financial resources and the exploitation of an economy's growth potential (Odeniran and Udeaja, 2012). Proponents of this view are known as the finance-led or supply leading theorists. They contend that banks and others financial intermediaries drive the process of economic growth through their primary role of financial intermediation.

Financial intermediation involves the mobilization of funds from the surplus spending units, at a cost (the deposit rate), for on-lending to the deficit spending units, at a price (the lending rate), both within and outside the shores of a country (Ogunleye, 1999). The capacity of lending institutions like banks to effectively deliver on their role as financial intermediaries however depends on their ability to offer interest rates that would stimulate savings (deposit rate) and promote borrowings (lending rate) to fund economic activities.

Interest rate relates to the price paid for capital or money used in the production of goods and services. As a price variable, theory suggests a negative relationship between interest rate movements and output response. This implies that high interest rate contracts output growth. Thus output growth is expected to be accelerated during a regime of low or repressed interest rate. Low interest rates make it cheaper to borrow and may promote consumption and investment, leading to higher aggregate demand and hence economic growth. It may also promote profligacy as well as fuel inflationary pressures. Adoption of repressed interest rate regime in Nigeria in the immediate post-

independence period up to June 1986 failed to stimulate the growth of the economy (Federal Government of Nigeria Budget Speech, 1987). Ogwuma (1993) attributes the inability of the regulated interest rate regime to promote economic growth to distortions and inefficiencies arising from the use of administrative controls to determine the direction and volume of credit to different economic sectors. Obamuyi (2009) posits that interest rate repression impacts negatively on both the quantity (volume) and quality of investment, and hence retards economic growth.

A major argument against the capacity of a repressed rate regime to promote growth is the tendency for potential savings to be diverted to acquisition of hedge assets like jewelry, and foreign currency or to informal credit institutions that offer higher (real) rates on deposits and who in return offer prohibitive rates (only suited for high risk projects) on loans. It may also promote capital flight to economies that offer real returns on capital. Cheap funds may also encourage waste through poor project planning an implementation leading to project abandonment and or promote over-investment in physical capital leading to wrong choice of production technique thereby promoting inefficiency and waste.

The adoption of a reformed interest rate regime in mid-1986 aimed at promotion of efficiency in resource allocation as bank credits are directed to their best uses. Proponents of the deregulated rate policy argue that under a reformed interest rate regime, only efficient firms capable of profitably contributing to job creation, technology promotion, etc. borrow to fund their operations (Nwankwo, 1989; Eze and Ogiji, 2013). However, rather than enhance output growth through promotion of effective deposit mobilization and efficient allocation of mobilized funds to productive activities, the deregulated regime has been blamed for the sub-optimal performance of the real sector in Nigeria (see for example, Ojo, 1988; Nnanna, 2001; Akpan, 2004 and MAN Economic Review, 2003-2006, and 2009).

EMPIRICAL REVIEW OF RELATED LITERATURE

An investigation into the activities of the banking sub-sector in Nigeria over the review period shows that while lending rates have remained within the double digit bracket, private sector credit (a potential driver of economic activity) as a percentage of total credit declined from 27.04 per cent in 1992 to about 0.15 per cent by 2012 (CBN, 2012). The CBN (2012) also shows that interest rate on loans peaked at 36.09 per cent in 1993 while rates paid on deposits significantly declined during the period, ebbing at 1.43 per cent in 2011. The period 2004-2012 saw deposit rates crash from 4.19 per cent in 2004 to 1.43 per cent in 2011 before it marginally increased to 1.70 per cent in 2014.

The sustenance of low rates on deposits vis-à-vis high lending rates may be linked partly to liquidity surfeit in the banking system following the success of

bank recapitalization exercise of the 2004/2005 period which saw minimum bank capital in Nigeria raised from #2 billion to #25 billion. This development however did not show any significant reduction in lending rates which only recorded a marginal decline from 20.82 per cent in 2004 to 18.36 per cent in 2007 before rising again. Over the period 2009-2012, lending rates maintained an annual average of 22.76 per cent. On the other hand, the regime of low interest rates on deposits could also be associated with the domiciliation of public sector accounts (quite a significant proportion of the sub-sector's deposit liabilities) in the commercial banks as well as deposits from the blue chips or high net-worth corporate organizations and individuals. Banks, however, negotiate higher rates to attract and retain this category of depositors while offering abysmally low rates to low income depositors who incidentally are in the majority.

Empirical studies on the capacity of the reformed interest rate to promote the growth of the real sector, and by extension the growth of the entire economy, show mixed results. For instance,

Odhiambo (2009) examined the effect of interest rate liberalization on economic growth in Zambia. Regression results show evidence of a strong support for positive impact of interest rate on financial deepening. He also finds that financial deepening granger-causes growth. Other findings of the study are (i) lagged financial depth leads to further financial depth (ii) bi-lateral causation exist between savings and growth (iii) financial development has long-run causation on savings.

Torlagh (2013) examined the impact of high bank lending rates on manufacturing output in Nigeria. Data were sourced through the use of questionnaires. He finds that inadequate bank funding impairs the capacity of the sector to produce as banks are often reluctant to provide long-term finance required for manufacturing operations. He explains that when banks eventually lend to the sector, the rates are so high to support manufacturing activity.

Mohammed (1990) examined the effect of interest rate and other selected macroeconomic indicators on manufacturing operations in Nigeria using the co-integration and error correction models. He finds that interest rate and government deficit spending hamper the growth of the sector Nigeria. Akpan (2004) examined the effect of financial liberalization (using interest rate and financial deepening as proxies) on economic growth in Nigeria. He finds a positive impact of financial liberalization on economic growth.

Obamuyi and Olorunfemi (2011) examined the implication of financial reforms and interest rate on economic growth in Nigeria. Data over the period 1970-2006 were analyzed using the co-integration and error correction analytical techniques. The result indicates that financial reform and interest rate have significant positive

impact on economic growth. They recommend that government should embrace growth-enhancing reforms as well as monitor closely movements in interest rate.

Obamuyi (2009) investigated the relationship between interest rate and economic growth in Nigeria using data over the period 1970-2006. Employing error correction analysis, he finds that lending rate exerts a significant negative impact on growth while deposit rate shows a significant positive effect on growth. The result also shows a significant negative impact of inflation on growth.

Okoye (2006) examined the effect of interest rate on productive activities in Nigeria using data on selected manufacturing industries. The study shows evidence of positive effect of interest rate on savings but a negative effect on manufacturing output.

Adebiyi and Obasa (2004) examined the impact of interest rate policy on the financing of Nigerian manufacturing sub-sector using annual data for the period 1970-2002. They find that interest rate exerts a negative impact on the growth of the sub-sector in Nigeria.
Gbadamosi (1989) studied the effect of high (reformed) interest rate on the development of the deregulated Nigerian economy. He finds a positive impact of high interest rate on saving mobilization and a negative impact of interest rate on investment.

Udoka and Anyinyang (2012) examined the effect of interest rate changes on economic growth in Nigeria using annual data over the period 1970-2010. Employing the technique of the ordinary least squares (OLS) analytical technique, they find a significant negative effect of interest rate on economic growth. They also find evidence of a significant difference between the growth of the economy in pre and post reform periods.

Akinlo (2005) analyzed the impact of macroeconomic factors on total factor productivity in Sub-Saharan African countries. He finds evidence of positive impact of interest rate liberalization on economic growth.

Adofu, Abula, and Audu (2010) examined the effect of interest rate deregulation on agricultural sector productivity in Nigeria. Annual data over the period 1986-2005 were analyzed using the technique of the ordinary least squares (OLS). They find a significant positive effect of interest rate on agricultural output during the period.

Charles (2012) investigated the performance of monetary policy on the manufacturing sub-sector in Nigeria. He finds a positive impact of money supply on manufacturing output. The study however reveals that lending rate, corporate tax, inflation and exchange rate have negative impact on the performance of the sub-sector in Nigeria.

Tomola, Adebisi, and Olawole (2012)

analyzed bank lending, economic growth and the performance of manufacturing in Nigeria. They find a significant impact of bank lending rate and manufacturing capacity utilization rate on manufacturing output in Nigeria.

METHODOLOGY

The study covered the period 1986 to 2013, and in terms of sectoral coverage it was restricted to the industrial sector of the Nigerian economy. This sector, according to CBN classification, is made up of three sub-sectors: crude petroleum and natural gas; manufacturing; and solid minerals.

Quantitative research technique based on ex-post facto research design which involves the use of available data on research variables to explain the extent to which they relate to the event was adopted for the study. Data on exchange rate, lending rate, inflation rate, and financial deepening (sourced from the publications of the Central Bank of Nigeria) were used to explain the extent to which liberalization of interest rate in Nigeria has impacted on the growth of the industrial sector of the economy during the period 1986-2013.

The study utilized an econometric model to determine the effect of interest rate liberalization on industrial output performance in Nigeria. The time series properties of the data as well as their short-run and long-run dynamics were examined. The Augmented Dickey-Fuller (ADF) and Phillip Perron (PP) unit root tests were used to test for stationarity of data. Johansen and Juselius (1990) maximum likelihood technique was adopted in testing for co-integration while the vector error correction mechanism (VECM) was used to capture the convergence or divergence of the system.

The model employed in this study was developed from a similar work by Obamuyi (2009) with slight modifications to suit our purpose. Obamuyi (2009) used financial depth (proxied by ratio of broad money to GDP, expressed as M2/GDP), real lending rate, real deposit rate, inflation rate and domestic saving to GDP ratio (as well as a dummy variable that captured the policy shift from regulation to deregulation) to explain growth rate of GDP in Nigeria using the methodology of the vector error correction technique. Our model however, expressed industrial output performance as a function of exchange rate, lending rate, financial depth, and inflation rate. The implicit representation of the model is expressed as:

OUTP= f (EXR, FINDEP, LR, INFL) …(1)

Where;

OUTP = industrial output to GDP

LR = lending rate

EXR = exchange rate volatility expressed as rate of change in exchange rate.

FINDEP = financial depth

INFL = inflation rate

The explicit form of the model in equation (1) is expressed as:

$OUTP_t = \beta 0 + \beta 1 EXR_t + \beta 2\ FINDEP_t + \beta 3 LR_t + \beta 4 INFL_t + \varepsilon t$ .....(2)

Where;

$\beta 0$ = constant term

$\beta 1 \ldots \beta 4$ = coefficients of the exogenous variables to be estimated

εt = error term

A priori Expectations

The exogenous variables are expected to relate with the endogenous variable in the following manner:

The exchange rate variable proxied by its volatility is expected to have a negative sign owing to distortions and uncertainty associated with it which could reduce the scale and rate of investments in the sector.

Interest rate, being a price variable, is expected to bear a negative sign. Higher interest rates raise production cost which is likely to impede the capacity to produce.

Inflation: Economic theory postulates that high inflation rates lead to high nominal interest rates which induce high production costs leading to a fall in output growth. Inflation therefore is expected to bear a negatively signed co-efficient.

Financial depth as measured by ratio of private sector credit to GDP is expected to correlate positively with output as higher ratios imply higher volume of credit to the domestic economy and hence enhanced capacity to produce.

DATA PRESENTATION AND ANALYSIS

The results of the econometric tests are presented as follows:

Table I: Unit Root Analysis
(Augmented Dickey Fuller test at levels and first difference)

Variable	ADF Test @Levels	ADF Critical value @ 1%	Test @ First Difference	ADF Critical value	Order of Integration
OUTP	-0.607091	-3.752946	-4.687125***	-2.998064	Integrated of order 1
EXR	-2.809629	-3.724078	-7.611245***	-2.809629	Integrated of order 1
INFL	-2.438370	-3.699871	-3.283745**	-3.004861	Integrated of order 1
LR	-4.217132***	-3.699871	-5.718607***	-3.724070	Integrated of order 0
FINDEP	-1.366013	-3.699871	-4.178491**	-3.711457	Integrated of order 1

Table II: Phillip Perrons (PP) test at levels and first difference

Variable	PP Test @Levels	PP Critical values @ 1%	Test @ First Difference	PP Critical values @ 1%	Order of Integration
OUTP	-2.534504	-3.699871	-11.03825***	-3.711457	Integrated of order 1
EXR	-6.433227***	-3.699871	-18.79008***	-3.711457	Integrated of order 1
INFL	-2.438370	-3.699871	-5.106970***	-3.711457	Integrated of order 1
LR	-4.210269***	-3.699871	-13.23258***	-3.711457	Integrated of order 0
FINDEP	-1.378268	-3.699871	-4.033444***	-3.711457	Integrated of order 1

From the results of the unit root test presented in tables I and II, the null hypothesis of unit root cannot be rejected for all the variables at levels. For the Phillip Perron test, exchange rate was stationary at level while lending rate was stationary at level for both ADF and PP test. This implies that the other variables (output, inflation rate and financial development) contained unit root at their levels. The variables were therefore differenced to achieve a stationary series at first difference.

Co-integration Analysis:

Trend assumption: Linear deterministic trend
Series: OUTP EXR INFL LR FINDEP
Lags interval (in first differences): 1 to 1

Table III: Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.796689	100.4085	69.81889	0.0000
At most 1 *	0.681206	58.99006	47.85613	0.0032
At most 2	0.519897	29.26660	29.79707	0.0575
At most 3	0.256966	10.18896	15.49471	0.2665
At most 4	0.090508	2.466596	3.841466	0.1163

Trace test indicates 2 co-integrating eqn (s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table IV: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.796689	41.41849	33.87687	0.0052
At most 1 *	0.681206	29.72346	27.58434	0.0262
At most 2	0.519897	19.07764	21.13162	0.0946
At most 3	0.256966	7.722363	14.26460	0.4076
At most 4	0.090508	2.466596	3.841466	0.1163

Max-eigenvalue test indicates 2 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The Johansen and Juselius (1990) maximum likelihood co-integration test adopted for the study shows evidence of long run relationship between the endogenous and exogenous variables.The test revealed two co-integrated equations for both the trace and maximum Eigen value statistics. This implies that a long-run relationship exists between industrial output and its determinant or explanatory variables namely exchange rate, inflation rate, lending rate and financial depth, an indication that the variables do not have a tendency to drift apart.

Vector Error Correction Estimates

Table V: Vector Error Correction Estimates

Standard errors in ( ) & t-statistics in [ ]

Co-integrating Eq:	CointEq1
OUTP(-1)	1.000000
EXR(-1)	0.273086
	(0.15557)
	[1.75537]
INFL(-2)	-0.600006
	(0.08756)
	[-6.85266]
LR(-3)	4.150565
	(0.37915)
	[10.9472]
FINDEP(-1)	0.899122
	(0.12400)
	[7.25096]
C	-142.9845

Error Correction:	D(OUTP)	D(EXR)	D(INFL(-1))	D(LR(-2))	D(FINDEP)
CointEq1	-0.253616	-0.367033	0.856858	-0.179806	-0.117681
	(0.11557)	(0.31406)	(0.23574)	(0.12943)	(0.12900)
	[-2.19444]	[-1.16869]	[3.63469]	[-1.38919]	[-0.91222]

Analysis of the estimated co-efficient shows an insignificant positive impact of exchange rate volatility on industrial output in the long run. The result implies that a unit increase in the rate of change of the domestic currency relative to the foreign currency increases output by 0.273086 units. Though not consistent with a priori theoretical expectations, it suggests that the sector is unduly dependent on the external sector for its operations. Thus, demand for production imports is inelastic.

Inflation rate shows significant negative effect on industrial output growth. A unit increase in inflation rate lagged to the second period retards industrial output growth by 0.600006 units, all things being equal. This result aligns with theory.

The third lagged co-efficient estimates for lending rate suggest a significant direct impact on output. Lagged values of lending rate increased output by 4.150565. This implies that industrial output growth responds positively to high interest rates associated with the reform policy and it is consistent with the outcome in Adofu et al (2010), Obamuyi and Olorunfemi (2011), Akpan (2004) and Akinlo (2005).

Statistically the previous period financial sector development suggests a significant positive impact on current level of output in long-run. Specifically a unit increase in the ratio of private sector credit to GDP increases output by 0.899122 units.

The error correction estimate shows evidence of convergence in the system such that 25.36 percent of the errors associated with the system are corrected in the short-run. This indicates a very moderate speed of adjustment and further implies that in the incidence of external shocks, the system would revert to its long run steady state within one year.

SUMMARY OF FINDINGS

Evidence presented in the preceding section shows existence of co-integrating or long-run relationship between the exogenous and endogenous variables.

The vector error correction estimates revealed an insignificant positive impact of exchange rate on the output of the industrial sector in Nigeria.

The result also shows a significant negative effect of inflation on industrial output over the period of the study.

Lending rate under the reformed interest rate regime shows a significant positive impact on industrial output.

Further evidence from the study shows that financial depth proxies by the ratio of total credit to the private sector to aggregate output of the economy (GDP) has a significant positive effect on industrial sector output.

With respect its short-run dynamics, the model shows a moderate speed of adjustment of approximately 25.36 per cent to short-run disequilibrium conditions.

RECOMMENDATIONS

Given the outcome of this study, we

recommend that:

Government should vigorously pursue policies aimed at stabilizing exchange rate movements in order to achieve an investment-friendly climate. Such policies include economic diversification into sectors like agriculture, solid minerals, tourism as well as those that de-emphasize outflows of foreign exchange such as development of health and educational institutions.

Government should also seek to achieve and sustain low levels of inflation rate in the economy through pursuit of enabling monetary and fiscal policy operations as well as a programmed development of domestic infrastructure. Adequate and properly functioning infrastructure base lowers cost of production and by extension the general price level.

Finally, government should consolidate on the gains of the financial sector liberalization through policies that support enhanced credit delivery to the private sector in order to promote output growth.

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