Monetary Policy and Industrialization in an Emerging Open Economy: Lessons from Nigeria

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Abstract

Is monetary policy, as one of the toolkits of macroeconomic management, still important for economic growth of nations? Is Industrialization still a pivotal driver of the development process? With these underlying affirmative presumptions, this paper empirically assesses the impact of monetary policy on industrialization in Nigeria as an open economy, deploying macroeconomic time series variables of industrial output, exchange rate, interest rate, money supply, balance of trade, and total reserves. Using vector error correction mechanism of ordinary least squares econometric technique as the estimation method, the study revealed that these variables have statistically significant impact on industrialization. It submits that monetary policy should be consistent and transparently defined in response to the dynamics of the domestic and global economic developments.

Keywords: monetary policy, industrialization, cointegration, open economy

1. Introduction

Appropriate fine tuning of fiscal and monetary policies have been seen as being capable of achieving industrial growth. Over the years, these two issues have been subjects of debate in this regard. First is the issue of superiority of each of these policies in achieving industrialization. While the Keynesians argued that fiscal policy is more potent than monetary policy, the Monetarist on the other hand believed that monetary policy is better. Although, it is not the focus of this research to join or extend the debate, countries' experience and the fact that monetary policy is often free from political interference provides the justification to attempt an analysis of how effective monetary policy had been in promoting industrialization in Nigeria.

Industrialization has always constituted a major objective of development strategy and government policy. Through industrialization, developing nations aspire to achieve higher economic growth, and to eventually attain developed nation status. Yet, it remains doubtful whether the approach of industrial policy-making in Nigeria has indeed been successful in transforming the economy. Over the past three decades, the outlook of industrial growth and development in Nigeria has been gloomy and uncertain. Industrial output, measured in terms of aggregate index and its contribution to GDP has fluctuated very widely. The industrial contribution to GDP which went up from 17.2 per cent in 1996 to 18.1 per cent in 1998, declined to16.1 per cent in 2002. Existing evidence highlights the main constraints to industrial development in Nigeria to include such diverse problems as poor infrastructure, scarce human capital, and limited access to inputs, high macro-volatility, poor legal and judicial systems, small product market and thin financial markets (Obitayo, 1991, Asogwa, 2003, Nnanna, 2003). The problem of financing (especially, long-term funds) has however been pre-eminent and dominated attention because of its crucial importance.

In the 1970s (pre-SAP), government and monetary policy emphasized the financial sector's capability to disburse credit to sectors /activities given priority by planners. Credit was also inexpensive as interest rates were kept low. This depressed the rates of interest the banks could offer to depositors, thus leading to negative real deposit rates. As a result of this and other reasons, a shallow financial system evolved.

The industrial sector in Nigeria is regarded as the engine of economic growth and the financial sector is widely acknowledged as the lubricant of that engine. There cannot but be a synergetic relationship between these two sectors. For this synergy to take place, a sound monetary policy is a pre-requisite (Udeala, 2002). Therefore, this study aims at assessing the impact of monetary policy on industrialization in an emerging open economy like Nigeria, by making use of unit root and co-integration tests so as to correct the mistakes of most previous studies (e.g. Olorunfemi and Dotun, 2008) that were based on spurious regression. Also, previous studies were not sector-specific in assessing the impact of monetary policy in Nigeria; rather such studies focused on the economy as a whole. Herein lies the uniqueness of the study: by using contemporary econometric techniques and also specifically focusing on the industrial sector which is regarded as the engine of economic growth. The remaining part of the paper is divided into eight sections. Following the introduction is the review of relevant literature and theoretical underpinnings in section 2. Section 3 takes a look at monetary policy in Nigeria; overview of industrial policies is in section four, while section five reviews monetary policy industrialization nexus. Data and model specification is in section six while the interpretation of empirical results is in section seven. Section eight concludes the work.

2. Review of Relevant Literature and Theoretical Underpinnings

2.1 Review of Relevant Literature

According to Busari (2004), for Nigeria to begin a genuine march to industrialization, as experiences of industrializing countries have shown, a well articulated and implemented macroeconomic policy framework needs to be put in place to actualize the benefit of capital in the industrialization process. He further stated that the mobilization and utilization of savings requires a sound macroeconomic policy. The policy among other things should include prudent fiscal and monetary policies.

Agba (2004) affirms that a sound monetary policy is a pre-requisite for industrial development. The monetary authority (CBN) should direct their policies towards making financial resources available to private sector organizations .The banks should be encouraged to provide incentives that will attract greater savings. This, combined with positive real interest rate will enable the banking sector to mobilize savings that can be channeled to the industrial sector.

The world bank (2002) stated that high interest rate in the Nigerian financial system is a reflection of the extremely poor infrastructural facilities and inefficient institutional framework (monetary and fiscal framework) necessary to bring about substantial reduction in the rates associated with financing in an extremely traumatized economy. Martin (2008) pointed out that the efficacy of monetary policy in Nigeria has been historically undermined by fiscal dominance as well as persistent liquidity overhang which in part derive from the former. In spite of the various stages of transformation which the framework for monetary policy management has been subjected to over the years, these albatross have not abated. The successful conduct of monetary policy depends on myriad of complex elements which range from legal framework to payment system and the structure of the financial institutions. In Nigeria, too much emphasis is placed on interest rates and savings mobilization while the precursor to these (real income) is discounted. Credit to the private sector, though improved yet, is below the industry demands. There is therefore the need to engender competitiveness among the financial institutions through appropriate monetary policy (Abeng, 2006, Ncube, 1998).

In his submission, Eltony (2005) places the success of monetary policy squarely on the ambit of the monetary authority (Central Bank) which must be actively involved in the money market to ensure the existence of reciprocal market in bank reserves. He further suggests that the Central Bank should switch gradually from being the principal market maker to creating and supporting financial deepening of the market. In this capacity, the monetary authority should withdraw (or inject) reserves at own initiatives in anticipation of surpluses (or deficits) emerging in the market while leaving market participators to make their own decisions. He suggests that indirect monetary policy instruments are therefore critical in the development process of the financial sector and the economy of any nation. The use of indirect monetary policy

instruments influences the supply of bank reserves and by implication money supply in the economy which in turn directly generate a price change in financial asset.

In the same vein, Olorunfemi and Dotun (2008) examined the impact of monetary policy on the economic performance in Nigeria using simple regression. The study found out that there was a negative relationship between interest rate and GDP on the one hand and inflation and GDP on the other. The study did not disaggregate the impact of monetary policy on the various sectors of the economy like the industrial sector. Abeng (2006) explained that monetary policy is valid only for a highly monetized economy. Thus, if the economy is not highly monetized, the efficacy of monetary policy is restricted, for instance, in an undeveloped economy where a large proportion of output is produced in a subsistence sector would be independent of the supply of money. Monetary policy therefore, would not be a better tool to manage the economy.

In their separate study, Odozi (1992), Andabai (2008) contended that the impact of monetary policy may be assessed first in terms of the behaviors of the intermediate targets, namely, output growth and price stability. Accordingly, the effectiveness of monetary policy on regulating the money supply depends to a large extent on government fiscal deficit. They further asserted that whenever fiscal policy was moderately expansionary, money supply growth usually falls in line with the goal of monetary policy. Thus, the achievement of financial sector stability is fundamental to the maintenance of macro-economic stability, specifically, industrial growth which is a sine-qua-non for sustainable economic growth and development.

Major macroeconomic price variables- inflation, interest and exchange rates- all have an impact on production, investment, export, and the competitiveness and growth of the manufacturing sector across all industries. Inappropriate monetary policies on the other hand, would create imbalance leading to low savings, underinvestment and an inability to adequately industrialize and compete in the world export market.

One view of the transmission mechanism is that monetary policy action affects the economy primarily through their impact on the money supply. In a nutshell, the role of money and monetary authority as highlighted above makes it highly desirable for the latter to exercise appropriate control over the monetary sector through which monetary policy measures are channeled to achieve the desired macro-economic objectives. Most of the studies assessing the impact of monetary policy in Nigeria tend to pay so much attention to the economy as a whole without disaggregating the impact of this policy on the various sectors of the economy. Specifically, Olorunfemi and Dotun (2008) applied the quantitative approach but used simple regression and also focused on the economy as a whole. This study compensates for this gap by making use of unit root and co-integration test, thus avoiding the tendency of spurious regression, the drawback of previous studies.

Several traditional, orthodox theories of monetary policy (Classical quantity theory of money, the Keynesian and the Monetarist theories of money) are both primarily and collaterally relevant for this study. However, for our purpose, we will only review the Classical quantity theory of money on which this research is anchored.

2.2 *Theoretical Framework*

According to Ndiyo and Udah (2003), the classical quantity theory of money is best illustrated with the help of Irving Fisher's (1911) equation of exchange:

$$MV = PY \qquad (1)$$

Where:

M = the average stock of money
V = the velocity of circulation of money
P = the price level
Y = the real income or output

Equation (1) is basically an identity which simply says that the money stock is multiplied by a constant V or the number of times money is used to buy final output. We obtain total expenditure which must be equal to the product of P and Y or the value of output bought. Although the above mechanism looks elegant and simple but one important "classical" economist- Thomas Malthus was unconvinced and rather took a critical view of the classical analysis. This "crack" in the classical wall and its implications for economic thought has been given considerable attention in Keynesian economics (Ghatak, 1981). According to Keynes, the demand for Money or liquidity preference, M^d, is an inverse function of interest rate(r).

$$\text{Thus, } M^d = f(r) \qquad (2)$$

Although to Keynes, the interest rate is purely a monetary phenomenon, Hicks (1937) argues that a truly general theory of interest rate determination should be stated in a framework of general equilibrium analysis. The Hicksian synthesis of the classical and the Keynesian theories can be summarized as:

$$M^d = f(r, y) \qquad (3)$$

If the M^d is written as a demand function for real balances, we have

$$M^d/P = f(r, y) \qquad (4A)$$

Or

$$M^d = P.f(r, y) \qquad (4B)$$

In his reaction to the Hicksian synthesis, Mckinnon put forward a hypothesis relating to the basic complementarity between money and physical capital in contrast to the traditional theory where a substitution relationship is assumed (Mckinnon, 1973). This complementarity is given in the following demand for money function as shown below:

$$M^d/P = f(I/Y, Y/P, r-p^*) \qquad (5)$$

Where:

M/P = the real money stock
I/Y = the ratio of investment to output

Y/P	=	the real output
r-p*	=	the real deposit rate of interest
since r	=	the nominal interest rate
and p*	=	the expected future rate of inflation
P	=	the price level

In this equation (5), Mckinnon argues that large real money holdings are normally the result of the monetary system maintaining high and stable real returns to the holders of money. This complementarity hypothesis leads to policy conclusions about inflationary finance and about deposit rates of interest for accelerating development that are quite different from the corpus of accepted monetary theory. With a given preference of the people for money and currency, the money supply function recorded in Ghatak (1981) and Branson (1979) is:

$$M^S = M(r) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \tag{6}$$

Where:

$$dm/dr > 0$$

the equilibrium condition in the money market is written as

$$M^S/P = M^d/P \quad - \quad - \quad - \quad - \quad - \quad - \quad - \tag{7}$$

Thus, equations (4B) and (6) at equilibrium give

$$M(r) = P.f(r, y)- \quad - \quad - \quad - \quad - \quad - \quad - \tag{8}$$

Based on equations (5) and (7)

$$M^S/P = f(I/Y, Y/P, r-p*) \quad - \quad - \quad - \quad - \quad - \quad - \tag{9}$$

Up to this point, it is assumed that the central bank can change the level of the money supply when it chooses. The central bank controls the level of the money supply first by setting reserve requirement against demand deposits, and then by changing the amount of reserves it supplies, both on its own initiative and on the initiative of commercial banks. According to Branson (1979), the Central bank provides unborrowed reserves (UR), mainly by buying government securities in the bond market. It also supplies borrowed reserves (BR), by lending to the commercial banks through the discount mechanism. These reserves are in turn allocated to three uses. The banks can allocate their reserves to required reserves (RR) or to excess reserves (ER), which is defined as total bank reserves less required reserves (TR-RR). In addition, some of the reserves provide by the central bank through open market purchase of bonds will end up as currency in the hands of the public (CP). Since both sources and uses must sum up to total reserves –TR, this gives us the basic reserve identity:

$$UR +BR \equiv TR \equiv RR+ER+CP \quad - \quad - \quad - \quad - \quad - \quad - \tag{10}$$

The reserves identity in equation (10) gives an expression for another monetary policy instrument that the monetary authority directly controls.

In the production and employment sector of an economy, the relationship between output (equals income-Y) and the level of employment of labor (N), and capital (K) can be written as

Y $\quad$ = $\quad$ y(N, K); where y $\quad$ = $\quad$ min(Zn, Vk) $\quad$ - $\quad$ - $\quad$ - $\quad$ (11)

Where N $\quad$ = $\quad$ the quantity of labor employed

K $\quad$ = $\quad$ the quantity of capital employed and

z $\quad$ = $\quad$ Y/N $\quad$ = $\quad$ fixed output- labor ratio

v $\quad$ = $\quad$ Y/K $\quad$ = $\quad$ fixed output-capital ratio

The expression 'min' on the right hand side of equation (11) means the maximum output that is achievable is determined by the size of the terms zN and vK. If for example vK < zN, then the availability of capital limits output to a level less than what could be achieved if all labor were employed with adequate capital. This is likely the case in a developing economy with excess supply of labor (Ndiyo and Udah, 2003).

Since factor proportions are fixed for all levels of output, it can be stated that:

Y/N $\quad$ = $\quad$ dY/dN = $\quad$ z $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ (12)

Equation 12 states that the average output equals the marginal output – labor ratio (Burrows and Hitiris, 1974). From equation 12, we have

Y $\quad$ = $\quad$ zN $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ (13)

This equation says that the total output supplied is equal to output per unit of labor input z times the labor input.

The main result of this neo-classicists' analysis can be interpreted in per capita terms which does have certain advantages when it is considered further the characteristics of the equilibrium model in equation (9). Collapsing equation (12) into equation (9) and ignoring signs gives

M^S/P $\quad$ = $\quad$ f(I/Y, Y/P, Y/N, r, p*) $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ (14)

We can then condense the expression of the total reserves controlled by the Central bank by simply introducing TR from equation (10) into equation (14). Manipulating further and rearranging gives

Y/N $\quad$ = $\quad$ f(M^S/P, Y/P, r, p*, TR) - $\quad$ - $\quad$ - $\quad$ - $\quad$ (15)

Where:

Y/N $\quad$ = $\quad$ the ratio of output to labor input

TR $\quad$ = $\quad$ the total reserves

In an open economy, the algebraic sum of imports and exports on current account is known as the balance of trade. The balance of trade account, in money terms therefore, is given by the balance of trade surplus B. Thus, it can be written as:

B $\quad$ = $\quad$ X(e)-Z(Y,e) $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ - $\quad$ (16)

Where B $\quad$ = $\quad$ balance of trade (measured in units of domestic currency)

x $\quad$ = $\quad$ the value of exports

z   =   the value of imports
e   =   exchange rate
y   =   output level

Equation (16) asserts that a country's balance of trade depends on both the rate of exchange and the domestic output level which could be written in a general form as

B   =   b(Y, e) -   -   -   -   -   -   -   (17A)

dB/dy < 0 and dB/de > 0

An increase in output only affects the import side adversely and deteriorates the balance of trade. But however, an adjustment in equation (17A) is permitted by the Marshall-Lerner condition for a favorable effect of devaluation on the balance of trade (Vanek, 1962). Thus an increase in the exchange rate, de > 0, which means the devaluation of the domestic currency improves the balance of trade (Burrows and Hitiris, 1974). From equation (17A), we can derive the balance of trade equation which determines the equilibrium value of "e" that sets B = 0.

B-b(Y, e) = 0   -   -   -   -   -   -   -   -   (17B)

Condensing equation (17B) into equation (15) we have

Z   =   Y/N   = $f(M^S/P, Y/P, r, p^*, H, B, e)$ -   -   (18)
Thus,

z   = $f(m, y, r, p^*, H, B, e)$ -   -   -   -   -   (19)
 where, as earlier defined
z   =   output labor ratio
m   =   real money supply
y   =   real income level
r   =   interest rate
 p^* =   inflation rate
H   =   total reserves
B   =   balance of trade
e   =   exchange rate

3. Monetary Policy in Nigeria

Monetary policy is an aspect of macroeconomics which deals the use of monetary instruments designed to regulate the value, supply and cost of money in an economy, in line with the expected level of economic activity. Such monetary instruments include money supply, inflation rate, interest rate, balance of payments, external reserves and exchange rate policies. In other words, monetary policy is a major economic stabilization weapon which involves measures taken to regulate and control the volume, cost, availability and direction of money and credit in an economy to achieve some specified macroeconomic policy objectives and to counter all undesirable trends in the economy (Anyanwu, 1993, Gbosi, 1998, Okowa, 1995). These undesirable trends are unemployment, inflationary pressures, sluggish economic growth and

external sector instability. Thus, the objectives of monetary policy are the attainment of internal and external balance to ensure sustainable economic growth and development.

In Nigeria as in other developing countries, the objectives of monetary policy include full employment, domestic price stability, adequate economic growth and external sector stability. Over the years, Nigeria monetary policy has undergone profound changes. It has gone from an era of direct to indirect instrument of monetary management. Before the Structural Adjustment Programme (SAP), which started in 1986, monetary management depended mainly on the direct monetary instruments such as credit ceilings, selective credit, exchange rates, interest rates, cash reserve requirements and special deposit. It is observed that the market based-instrument was not widely used during this period. The reasons for this were due to the narrowness and underdeveloped nature of the Nigerian financial markets, and the inadequate supply of the relevant debt instruments and the deliberate restraint on interest rates. During the period, the defense of the balance of payment (BOP) was the focus of monetary policy (Gbosi, 1998).

By the end of 1974, inflation had become the most serious macroeconomic problem that faced the nation. This was due to disruption of production by the civil war and the unrealistic wage increases awarded by the Adebo and Udoji commission of 1971 and 1974 respectively. To deal with this problem, the Central bank of Nigeria (CBN) encouraged the commercial banks to direct a greater percentage of their credit allocation to the productive sectors, reducing the liquidity of commercial banks through the issuance of stabilization securities, where the CBN can sell or purchase them from any banking institution (CBN, 1975, 2009).

The major objectives of monetary policy under SAP were the stimulation of output and employment and the promotion of domestic and external stability (CBN, 1993, 2009). In the 1990s, there existed excess liquidity in the economy. In order to reduce this excess liquidity, the monetary authorities adopted several monetary policy measures. These measures include the reduction in credit growth by banks, special deposit requirements against outstanding external payments arrears, abolition of foreign exchange guarantees/currency deposit as collateral for naira loans and the withdrawal of public sector deposits from the banks (CBN, 1988).

In 1988, problems of unemployment, inflation and disequilibria in the balance of payments remained crucial. To deal with problems, the CBN decided to shift from the direct to indirect system of monetary control. This was aimed at strengthening the effectiveness of monetary policy and the overall efficiency of the financial markets. Thus, in September 1992, in pursuit of the new monetary policy framework, the ceiling imposed on individual bank's credit growth was removed (Odozi, 1992). The main instrument of monetary policy used at this period was the open market operations (OMO). According to Ojo (1993), OMO involves the CBN discretionary power to purchase or sell securities in the financial market in order to influence the volume of credit and subsequently interest rates that consequently affect money supply. Specifically, the stance of monetary policy in 1993 was restrictive in nature. This was designed to ensure stability of key macroeconomic variables to prevent deviations from prescribed targets. To this end, the objectives of monetary and credit policies in 1993 were: to reduce

inflationary pressure in the economy; to eliminate pressures on the BOP in order to boost external reserves and stabilize the exchange rate of the naira; and to support government's effort in solving the problems of low productivity, decreased capacity utilization and output (CBN, 1988, 2009).

The post SAP monetary policy (up till date) is aimed at a drastic reduction in the rate of inflation; stabilizing the naira exchange rate; and reduction of pressure on BOP. To achieve the above objectives, the post SAP monetary policy since 1994 centered on a high growth rate of the gross domestic product (GDP), a single digit inflation rate and accumulation of external reserves (CBN, 2005). At present, the monetary policy is anchored on four pillars, viz: enhancing the quality of banks, establishing financial stability through banks liquidity management activities, enabling healthy financial sector evolution and ensuring that the financial sector contributes to the economy. Monetary management is currently geared towards improving the liquidity and efficiency of the financial market (Sanusi, 2010)

4. Overview of industrial Policies Incentives and Institutional Assistance

Udah (2010) stated that Nigeria has since independence put in place various policies, incentives and institutions to drive industrial development. These policies and strategies embarked upon in Nigeria since independence are as summarized below.

Import substitution industrialization policy was the first industrial strategy embarked upon by the Nigerian government immediately after attaining independence. The objectives of this policy among others include to lessen overdependence on foreign trade and to save foreign exchange by producing those items that were formerly imported like detergents, household appliances, to mention but a few. In 1972, the Nigerian indigenization policy was adopted following the perceived failure of the import substitution industrialization strategy. The major objective of this policy was to strengthen the ownership and control of the Nigeria economy by Nigerians. In 1972, the Act that resulted in the indigenization policy was amended and eventually replaced with the Nigerian Enterprise Promotion Act in 1977. The 1972 Act contained 11 schedules while the 1977 Act contained 111 schedules.

Structural Adjustment Programme (SAP) was adopted in June, 1986 and it received the blessings of Breton Wood institutions. SAP was considered as the recipe that would bring the desired transformation of the economy from agrarian to industrial. Specifically, this policy came into being in order to right the wrongs of earlier policies. It aims and objectives include promoting investment, stimulating non-oil exports and providing a base for private sector led development through privatization and commercialization of public investments. The SAP induced industrial policies include interest rate deregulation, debt conversion (equity) swap, privatization and commercialization and new export policy incentive.

In 1989, Trade and Financial Liberalization Policy were enacted purposely to foster competition and efficiency in the financial sector. Its aims and objectives include stimulating competition among the domestic firms and between the domestic imports competing firms and foreign

firms. The objective was to promote efficiency, reduction of levels both tariff and non –tariffs barriers, scrap the commodity marketing boards and market determination of exchange rate as well as deregulation of interest rates meant to foster efficiency and productivity. The National Economic Reconstruction Fund (NERFUND) was set in the same year as complementary institution to the industrial policy. NERFUND seeks to address the medium and long term financial constraints experienced by small and medium scale entrepreneurs, provide the required financial resources to participating merchant and commercial banks to lend to small medium scale firms and provide foreign denominated loans to participating firms for a period of five to ten years with a grace period of one to three years.

Bank of industry (BOI) established in 2000 was introduced as a development institution to accelerate industrial development through the provision of long-term loans, equity finances and technical assistance to industrial enterprises. The bank is made up of the combination of the following institutions: Nigerian Industrial Development Bank (NIDB), Nigerian Bank for Commerce and Industry (NBCI), Industrial and Insurance Brokers (IDIB), Leasing Company of Nigeria Limited (LECON). The objectives of this bank include providing the long term loans, assist in employment generation, to mention but a few.

As a complement to the Bank of Industry, Small and Medium Industries Equity investment Scheme (SMIEIS) was also set up in 2000. The objective of this scheme include but not limited to assist in the co-ordination of the scheme with a guideline that 60 per cent of the SMIEIS fund should go to core real sector, 30 per cent to services and 10 per cent to micro enterprises through NGOs.

Also, as part of effort to boost industrialization, the National Integrated Industrial Development (NIID) blueprint was adopted by the Federal Government in 2007. The NIID is a country service framework developed by the United Nations Industrial Development Organization (UNIDO) in collaboration with Federal Ministry of Industry and other stakeholders. The framework comprised four integrated programmers, viz: industrial governance and public/private sector partnership, strengthening industry's institutional support base, the challenge of low power generation and utilization to be addressed through rural renewable energy and rural private sector agro-industrial development.

In addition, the federal government adopted the recommendation of the Presidential Committee on Revival of the Textile Industry in Nigeria with the approval of a 50 billion naira loan to the textile subsector. Efforts to boost the development of SMEs through the construction of one industrial park in each of the six geo-political zones of the country by the Small and Medium Enterprise Development Agency of Nigeria (SMEDAN) continued. The parks were conceived against the background of providing industrial plots with regular power supply, potable water and sewage system.

To support this initiative of the Federal Government, the Nigerian Electricity Regulatory Commission (NERC) issued 14 new licenses in 2007 to private operators for the establishment of independent power plants with varied capacities and expected total output of 6,010 MW. All

the licensed generating plants were gas-based. This brought the total number of licenses issued by the commission to 23 with expected total output of 9,152MW. Two new distribution agencies were also granted licenses to commence operation (Ndebbio and Ekpo, 1991, CBN, 2007, Udah, 2010).

In pursuance of these objectives, Udah (2010) avers that the government experimented with a number of incentives aimed at growing the productivity of the industrial sector. Some these incentives include tax holidays, tariffs, outright ban on certain goods to encourage domestic production, building of Export Processing Zones and Industrial Raw Material Research and Development Council (IRMRDC).

5. Monetary Policy-Industrialization Nexus

The process through which changes in the monetary policy gets transmitted to the ultimate objectives like inflation or industrialization has come to be known as monetary transmission mechanism. Interestingly, economists often refer to the channels of monetary transmission as a black-box. This implies that we know that monetary policy forces influence industrial output and other variables but we do not know for certain how precisely it does. Besides, it has been argued by Effiom and Ubi (2010) that the existence of widespread currency substitution has serious implications on the effectiveness of monetary policy, thus by default compromising the latter's effectiveness in catalyzing the industrialization process.

In their study, Ndiyo and Udah (2003) stated that there are various views among economist on the exact mechanism by which monetary policy affects the economy. Nevertheless, money supply, inflation rate and balance of trade channels have been generally accepted as possible channels through which monetary policy influences economic activity (Anyannwu, 1993) .Others are liquidity and credit channels. Under the liquidity channel of monetary transmission, changes in the money supply initiated by the various techniques of monetary policy influence interest rates (short and long term). In this way, the initial monetary impulse is transmitted to economic activities (consumption, investment etc) through the effect of the changes in interest rate on cost of capital .The credit channels works mainly through portfolio adjustment in banks, households and firms' balance sheets in favor of assets that have higher returns during periods of monetary fluctuations. Under normal circumstances, those assets commanding higher demand would be produced more and thus stimulate the economy. In relatively open economies, exchange rates transmit monetary changes to internal and external sectors of the economy. Basically, the existence of interest and exchange rate differentials, resulting from monetary policy actions, induces substitution between domestic and foreign assets (foreign currencies, bonds, securities and real estate) as well as domestic and foreign goods and services. The various channels do not work in isolation but reinforce one another in realizing the objectives of monetary policy (CBN, 2007, Ndiyo and Udah, 2003).

6. Data and Model Specification

An annual time series data had been used to examine the interactions between monetary policy and industrialization in Nigeria taking into account the non-stationary of the data or the variables. The data on the variables were drawn from various issues of the Statistical Bulletin and Annual Report and Statement of Accounts of the Central Bank of Nigerian (CBN). The basic sample period is 1970-2009 as this is the longest period for which all the series we used are available. From the transmission mechanism and the Classical theoretical framework of monetary policy presented above, there is a theoretical relationship between monetary policy and output, with the functional form of the model presented as:

INQ   =   f(MS, R, EXR, BOT,TR) -   -   -   -   -   (20)

Putting it in an estimation form, we have

INQ   =   a + bLogMS + cR + dEXR + gLogBOT + hLogTR + U   -   (21)

Apriori =   a and b > 0 while c, d, g, and h < 0

Where:
INQ   =   industrial output
MS   =   Money supply
R   =   Interest rate
EXR   =   Exchange rate
BOT   =   Balance of trade
TR   =   Total reserves
U   =   Stochastic error term

7. Empirical Results

Using the augmented Dickey-Fuller tests, the results as presented in Table 1 above has shown that only industrial output (INQ), balance of trade (BOT) and money supply (MS) are stationary at the level while other series (variables) are stationary at first difference. That is, the result indicates that the variable, INQ, BOT and MS are integrated of order zero – I(0) while other variables – EXR, R and TR are integrated of order one – I(1).Therefore, a co-integration test was carried out to confirm and determine the existence of a long-run relationship among the variables.

7.1 Cointegration Test

The Johansen cointegration test reveals that there is a long-run relationship between industrial output (INQ) and other variables captured in the model. The result indicates five co integrating equation(s) at 5 per cent levels. The conclusion drawn from the result is that that there exists a

unique long-run relationship between LOG(INQ), LOG(BOT), LOG(MS), EXR, R and LOG(TR). Since there are five co integrating vector, an economic interpretation of the long-run on industrial output in Nigeria can be obtained by normalizing the estimates of the unconstrained counteracting vector on industrial output. The identified co integrating equations can then be used as an error correction term (ECM) in the error correction model. This series will form the error correction variable, similar to the residuals generated when using the Engle-Granger two-stage method.

Having established the extent and form of co integrating relationships between the variables of the model, an over parameterized error correction model as shown in Table 3 was estimated. At this level, the over parameterized model is difficult to interpret in any meaningful way: its main function is to allow us to identify the main dynamic patterns in the model.

But this study will be concerned with the parsimonious model which is more interpretable. Table 4 shows the result of the parsimonious model. From Table 4, the current value of exchange rate (EXR) is negative and conforms to economic theory. This implies that a 1 per cent decrease in current exchange rate will lead to 0.710545 per cent increase in industrial activities of the current or present year, ceteris paribus. Also, the coefficient of the current exchange rate is statistically significant at 5 per cent level.

Also, the lagged value of exchange rate has a negative sign that is in line with economic theoretical expectation. The coefficient of lagged exchange rate (EXR(-1) is statistically insignificant at 5 per cent level. The implication of this result is that a 1 per cent rise in previous year's exchange rate will lead to 0.015477 per cent decrease in industrialization, all things being equal. This result further supports the study by Ndiyo and Udah (2003) who investigated monetary policy and poverty dynamics in a developing economy and concluded that exchange rate stability was very important for economic growth and development.

The coefficient of balance of trade (BOT) is correctly signed (negative) and statistically significant at 5 per cent level. This means that a decrease in the volume/value of balance of trade will enhance the rise in industrialization by 0.110135 per cent, ceteris paribus.

In the same table, the value of interest rate and its one year lagged value are contemporaneously negative and are all statistically insignificant at 5 per cent level. This means that interest rate does not play any important role over the years in industrial activities. This may not be unconnected with the fact that the economy is undermonetised. In the same vein, the short-run regression coefficients of money supply and total reserves are in consonance with the theoretical expectations and are significant at 5 per cent level. This implies that if all other variables are held constant, a 1 per cent increase in money supply will boost industrialization by 0.101754per cent, all things being equal. Also, the total reserve variable (TR) captured in this model is similarly explained.

The strong significance of the coefficient of the error correction mechanism (ECM) supports our earlier argument that the variables are indeed cointegrated. The ECM shows a relatively high

speed of adjustment (53 per cent) of the short-run and long-run equilibrium behavior of industrialization (INQ) and its explanatory variables.

The adjusted R^2 shows that about 72 per cent of the total variation in industrialization is determined by changes in the explanatory variables. Thus, it is a good fit. The F-statistics (22.3) indicates that all the variables are jointly statistically significant at 5 per cent level. The Durbin Watson statistics of 2.1 reveals that it is within the acceptable bounds, thus it is good for policy analysis.

8. Concluding Remarks

This paper investigated the possible impact of monetary policy on industrialization in an emerging open economy like Nigeria. The analysis was done using the Classical quantity theory of money as the theoretical framework that incorporates the role of balance of trade and reserves. The paper has shown, using the error correction mechanism of the ordinary least squares regression technique, that the efforts of monetary policy at influencing the level of industrialization in Nigeria through exchange rate, money supply, balance of trade and reserves have statistically significant impact on industrialization. The policy implication therefore, is that monetary policy should be set in a way that the objective it is to achieve is clearly and transparently defined in response to the dynamics of the domestic and global economic developments.

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Table 1: Augmented Dickey Fuller unit root test

Variables	ADF Statistics (Computed)		5% Critical Value		Remark
	Level	1st difference	Level	1st difference	
Ln(INQ)	-4.754394	-	-1.949609	-1.949609	I(0)
Ln(BOT)	-2.701618	-	-1.949609	-1.949609	I(0)
EXR	-1.867091	-4.224422	-1.949609	-1.949609	I(1)
R	-0.277566	-6.951417	-1.949609	-1.949609	I(1)
Ln(MS)	-5.192355	-	-1.949609	-1.949609	I(0)
Ln(TR)	-0.210330	-3.373476	-1.949609	-1.949609	I(1)

Source: Computed by the authors.

** ln = log.

Table 2: Unrestricted Cointegration Rank Test(Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.999959	954.7674	125.6154	0.0001
At most 1 *	0.999092	591.4515	95.75366	0.0001
At most 2 *	0.991582	339.3117	69.81889	0.0001
At most 3 *	0.976008	167.3273	47.85613	0.0000
At most 4 *	0.465548	33.04612	29.79707	0.0204
At most 5	0.174846	10.49166	15.49471	0.2448
At most 6	0.094484	3.572995	3.841466	0.0587

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level

Table 3: Result of the over-parameterized model/estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(INQ(-1))	0.832269	0.082379	1.110297	0.8040
D(EXR)	-0.006988	0.000958	7.297433	0.0000
D(EXR(-1))	-0.008968	0.001908	-4.700997	0.0005
LOG(BOT)	-0.003087	0.019069	-3.161871	0.0041
LOG(BOT(-1))	-0.009579	0.017769	-0.539113	0.5997
D(R)	-0.001294	0.006300	-2.205386	0.0007
D(R(-1))	-0.006054	0.007339	-2.824906	0.0055
LOG(MS2)	0.030466	0.180996	-4.168326	0.0001

LOG(MS2(-1))	0.071743	0.171463	-0.418416	0.6830
D(LOG(TR))	-0.025228	0.026212	-2.962455	0.0048
D(LOG(TR(-1)))	-0.071455	0.037118	1.925086	0.0782
ECM(-1)	-0.820048	5.797628	-3.832628	0.0103
C	2.086537	0.710023	2.938688	0.0124

R-squared	0.852940
Adjusted R-squared	0.805879
F-statistic	140.6346
Durbin-Watson stat	2.047366

Source: Authors' computation

Table 4: Parsimonious model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR)	-0.710545	0.002879	3.662858	0.0015
D(EXR(-1))	-0.015477	0.005841	-1.649922	0.2154
LOG(BOT)	-0.110135	0.056990	-2.932553	0.0076
D(R)	-0.011924	0.018542	-0.643037	0.5275
D(R(-1))	-0.006024	0.015245	-0.395136	0.6969
LOG(MS2)	0.101754	0.099016	-3.027656	0.0004
D(LOG(TR))	-0.210409	0.081582	-2.579122	0.0179
ECM(-1)	-0.530207	1.873207	-2.931690	0.0001
C	9.883485	0.607332	-6.273601	0.0000

R-squared	0.803999
Adjusted R-squared	0.725599
F-statistic	22.25505
Durbin-Watson stat	2.116116