THE IMPACT OF ECONOMIC LIBERALIZATION POLICY ON PERFORMANCE OF THE NIGERIAN INDUSTRIAL SECTOR

1. Introduction

Economic progress and development have been closely identified with industrialization since Industrial Revolution from late eighteenth century. This thinking has continued to influence policy makers especially so in developing countries (Jomo, 1993). In an attempt to enhance industrial performance and economic growth the Nigerian government has, since independence in 1960, implemented various economic policies. Such policies include: the Import Substitution Industrialisation (ISI) Strategy in the 1960s; and the indigenization policy of 1972 and reinforced in 1977 (Adenikinju and Chete, 2002; Mesike *et al*., 2008; Agboli and Ukaegbu, 2006), which largely reflected government's effort to directly control and coordinate economic activities in order to achieve macroeconomic goals.

The year 1986 was to be the great water shed in the history of the Nigerian economy with the implementation of the structural adjustment programme which lasted up to 1993. After SAP economic policies in Nigeria have been towards a market driven economic system. Therefore the focus of this study is on the economic liberalization policy implemented in 1986 through the adoption of the structural adjustment programme and the successive reforms aimed at further liberalizing the economy.

Economic liberalization is a subset of globalization and it is multifaceted as it encompasses trade, financial, telecommunication liberalization, etc. According to Kareem (2009), economic liberalization entails freedom in the movement of goods and services across the border of the trading countries. Economic liberalization may be described as the freedom to engage in economic activity at home and/or abroad, a freedom subject to institutional and policy constraints needed to guarantee public interests at large.

While some scholars believe that liberalization does translate into substantial industrialization and economic growth, others believe that it leads to the development of underdevelopment and further

impoverishment of peripheral nations in the unequal relationship it creates amongst nations, a situation which is referred to as the "Mathew effect" (Okowa, 2005).

In the early 1980s, the Nigerian economy took a downward turn, partly due to declining oil revenues, inconsistent and *ad hoc* macroeconomic policies and intensive primitive accumulation of wealth. All austerity and stabilization measures put in place failed to reverse the declining trend (Ekpo, 1995) and the adoption of the Structural Adjustment Programme (SAP) in July 1986 was "inevitable". It was expected that a liberalized economic regime would stimulate industrial output expansion and enhance the performance of the economy (Prasad *et al*., 2003). However, contrary to expectations the industrial sector, beside the oil and gas subsector, seems not to have made any significant contribution to export earnings, and economic growth until 2006 remained at a very low level.

With the liberalization of the Nigerian economy and continued policies of government to further open it to the rest of the world, one expects that Nigeria would have reached the Rostow's take-off stage if not surpassed it. But up to this moment epileptic power supply, low manufacturing capacity utilisation, infinitesimal marginal productivity in the agricultural sector, monumental infrastructural decay, are the banes of economic growth in Nigeria. More importantly this precarious situation has been in the face of increasing indexes of aggregate industrial production, manufacturing production and mining production. For instance, the index of manufacturing production quarterly average for the period before liberalization, 1970Q1 to 1986Q2, increased by more than double from 42.8 to 89.31. While the indexes of mining production and industrial aggregate grew relatively marginally from 102.08 and 100.41 to 116.36 and 107.24 respectively, that of electricity grew by far more than double from 49.42 to 137.54 (CBN Statistical Bulletin, 2007; and Annual Report, 2012).

Furthermore, recent statistics showed that at 2.6 percentage points, the services sub-sector had the largest contribution to GDP growth. This was followed by wholesale and retail trade with 1.9 percentage points; and agriculture with 1.6 percentage points; building and construction and industry contributed a meager 0.3 and 0.2 percentage points, respectively in 2012. Also, the growth of sectoral GDP showed that the industrial sector is lagging behind. It recorded negative growth of -3.4 in 2008 and increased dramatically to 5.6 in 2010 but this was not sustained as the growth rate declined to 1.2 percent in 2012 compared to the agricultural sector which

grew at the rate of 6.3 per cent in 2008 and an average of 5.7 percent between 2009 and 2011 and declined to 4.0 percent in 2012 (CBN Annual Report, 2012).

The above developments have been in the presence of liberalized financial sector and external trade; increased capital accumulation and foreign private investments and importantly, increased efforts by government to further liberalize the economy thus raising puzzles. There is no doubt whatsoever that a plethora of empirical works exists on the area of liberalization/globalization, but most of them have been on economic growth and straight line regression. For instance Tamuno and Edoumiekumo (2012) focused on industrial sector performance and globalization, Bakare and Fawehinmi (2011) focused on trade openness and industrial performance, Udegbunam (2002) focused on trade openness and economic growth in Nigeria but all of them failed to account for the possible structural break that may have occurred as a result of the policy change in 1986. Elijah (2007) who used a structural break model focused on economic growth, and Yusuf and Akinlade (2011) were concerned with trade liberalization and exchange rate policies on the performance of the agricultural sector.

This study examines the impact of economic liberalization policy on the Nigerian industrial sector as a whole, and also looks into the various subsectors of manufacturing, mining and querying, and power and departs from previous works by arguing that the interaction of economic liberalization policy with other variables such as Degree of Openness (DOP), Financial Deepening (FIND), Energy Consumption (ENC), and Labour Force Growth may have enhanced or dampened the performance of the Nigerian industrial sector as a whole, and the manufacturing, mining and querying and power subsectors respectively, and will thus bridge the identified gap in the literature.

There is no gainsaying the fact that industrialization is an engine for modern economic growth. This study therefore provides insight to how various subsectors of the Nigerian real sector fared before liberalization and what the situation is with liberalization, thus providing grounds for consideration in future liberalization policy. A study of this kind therefore provides useful information for government and policy makers especially those involved in the management of the external sector of the economy. It will also provide a platform for further studies on world economy, liberalization and international economic relations, and bridge a currently existing gap in the literature thereby making it relevant to the academics as well.

2. Literature review

2.1 Theoretical Underpin

Over the years economists have sought ways to explain how countries could gain from opening up their economies to external competition and specialization, which has been a source of serious debates the world all over. In what follows we consider specific trade theories starting with the Smithian laissez-faire economic principles of trade to the modern trade theories.

This study adopts the opportunity costs theory of trade. Gottfried Haberler (1930) improved on the Ricardian comparative advantage theory and concluded that opportunity cost propels countries to trade with one another. Unlike the comparative advantage theory which suggests that labour is the only factor of production, Haberler looked at the issue of production differently. First, he argued that other factors are also required for the production of goods and services and therefore, presented his production function as: Q = F(K, R, L), where Q= Output, K= Capital, L= Labour, and R= Land. Second, labour is not homogenous but heterogeneous, of different kinds and grades divided into many non-competing groups; labour is used in varying proportions in the production of different commodities; and labour is also substitutable for capital and vice-versa.

Haberler's opportunity cost theory states that if a country can produce either of commodities X and Y, the opportunity cost of producing commodity X is the amount of commodity Y that must be given up in order to get one more unit of commodity X. Thus the exchange ratio between the two commodities is expressed in terms of their opportunity costs. The theory was explained in terms of the production possibility frontier.

A production possibility frontier (curve) shows the various alternative combinations of the two commodities that a country can produce most efficiently by fully utilising its factors of production with the available technology. The slope of the production possibility frontier measures the amount of one commodity that a country must give up in order to get an additional unit of the other commodity. It is the shape of the production possibility frontier under different opportunity cost conditions that determines the basis and the gains from trade. If the amount of Y required to be given up to get an additional unit of X remains constant, the production possibility curve would be a straight line and it will indicate constant opportunity costs. If more quantity of Y is required to be given up for an additional unit of X, the production possibility curve would

be concave to the origin and it will indicate increasing opportunity costs. Lastly, if less quantity of Y is required to get an additional unit of X, the production possibility curve will be convex to the origin and it would indicate diminishing opportunity costs. Haberler argued that in any of these cases both countries, due to specialisation will gain from trade. More goods will be available for consumption and more income will be generated so long as the prices of the respective commodities were not the same in both countries before trade.

2.2 Empirical Literature

Over the years studies have been carried out to examine the impact of liberalization/globalisation on either the performance of the industrial sector or economic growth. In what follows we explore the existing literature on evidence from Nigeria.

Onyeonoru (2003) examined the impact of the neoliberal globalisation of African economies on industrial performance in Nigeria and found that, contrary to claims by the World Bank, the economic performance of firms in the manufacturing sector during the globalisation were adversely affected by the process. Furthermore, he confirmed the position that the globalisation project that aims at the structural economic transformation of modern capitalist relations in Africa is associated with a process of deindustrialisation. On the basis of conclusions reached, Onyeonoru highlights critical lessons for African countries – the need to be critical in the implementation of the IMF/World Bank open-economy, and the "hands off" market-driven, noninterventionist development model premised on Adams Smith's "invisible hand".

Alum (2010) examined the relationship between trade openness and economic growth in Nigeria. Using time-series data over the period 1970-2007, and a non-monotonic and an ANCOVA econometric model, he showed that there is an inverted U-shape (non-monotonic) relationship between openness and output growth in Nigeria and the optimum degree of openness for the economy is estimated to be about 67%. Also, the Structural Adjustment Program had positive economic effect on economic growth. Alum, concluded that unbridled openness may have deleterious effect on the growth of the Nigerian economy.

Atoyebi *et al*. (2012) examined the impact of international trade on economic growth in Nigeria over the period 1970-2010. They found export, foreign direct investment and exchange rate to be

positively related to real GDP while other variables such as import, inflation rate, and openness exert a negative influence on real GDP.

Tamuno and Edoumiekumo (2012) examined the impact of globalization on the Nigerian industrial sector using the Error Correction Mechanism and Johansen's co-integration test. They found a long-run relationship between the index of industrial output and the globalisation proxy variables which included the degree of openness, foreign direct investment, external debt, and nominal exchange rate. Included in the model was gross capital formation as a measure of domestic investment. They showed that gross fixed capital formation and degree of openness negate *a priori* expectations. They concluded that the Nigerian industrial sector has a weak base and cannot compete favourably with her foreign counterparts. Tamuno and Edoumiekumo further argued that domestic investment was weak and unreliable.

Oduh (2012), in his "Trade Openness and Ouput Variablity in Nigeria: implications for EU-ACP Economic Partnership Agreement" examined the extent to which trade openness affects output volatility as a mirror of the likely implications of free trade arrangement between Nigeria and the EU. Using the EGARCH-M(1,1) multivariate model, he showed that non-oil revenue and household spending volatility have stabilizing effect, while openness, oil revenue, government spending, exchange rate, private investment volatility and monetary policy rate are pro-cyclical.

Osagie (2011) explored the impact of globalization on human resource development in Nigeria and concluded that business driven globalization is uprooting old ways of life and improving livelihoods in Nigeria. Money, technology and new materials move ever more swiftly across national borders, along with products and finances, ideas and cultures, and have resulted in the development of human resources in Nigeria.

Elijah (2007) examined the effect of globalization on employment and wages in Nigeria by looking at what happened before, during and after globalization in Nigeria. His results showed that globalisation of the Nigeria economy through various economic reforms, deregulation and privatisation has led to downsizing of employment in civil service thereby compounding the widespread job queuing in Nigeria. The collapse of some of the private firms led to retrenchment of workers following stiff competition from import after liberalisation thereby increasing both rural and urban unemployment in Nigeria. Further revealed, is the problem of increase in income inequality in the country. Elijah asserted that there appeared to be a wide gap

between earnings of the skilled and unskilled workers in the country and that many less skilled workers and experienced workers have also lost their jobs as a result of globalisation. On the positive side, Elijah revealed that globalisation has led to high employment creation in the informal sector compared with the job lost in the formal sector, due to the increasing number of private firms and that most of the jobs created in the informal sectors are insecure despite the higher pay compared to wages in the formal sector.

Olotu and Kaine (2011) examined the relationship between globalization and employment in the Nigerian industrial sector and empirically showed that globalisation does not affect demand for labour positively; also the impact of the ratio of total trade to non-oil GDP on aggregate employment was negative. They concluded that higher propensity towards openness does not have any meaningful impact on labour absorption contrary to strong theoretical assertion. The policy implication according to Olotu and Kaine is that Nigeria is opening up too much in the direction that seriously undermines the employment situation in the country. Openness should therefore be cautiously carried out in the right direction.

Ogbadu and Ameh (2012) examined the long-run relationship between trade openness and international marketing, using a cointegration model and submitted that there is no long-run relationship between globalization and Nigeria's involvement in international marketing. Nigeria is less integrated with the rest of the world in terms of global marketing. It has been suggested that for Nigeria to be linked to global marketing system, there is need to develop programmes and implement strong and stable political, social and economic strategies.

Mesike *et al*. (2008) using data for the period 1960-2004 showed that the liberalization of trade has exposed Nigerian rubber industry to the fluctuations in global rubber prices and the instability in the natural rubber prices has been a disincentive for rubber production and exports.

Udegbunam (2002) examined the implications of trade openness for industrial growth in Nigeria using data for the period 1970-1997 and the OLS regression model. His study suggested that openness to world trade and stock market development are among the key determinants of industrial output growth in Nigeria. The other important factors are human capital input, non-military expenditure, gross domestic product (GDP), which reflects the size of physical capital, and inflation.

Aremo and Aiyegbusi (2011), investigated into the effects of globalisation on economic growth in Nigeria using Error Correction Mechanism. They submitted that globalisation has negative impact on economic growth in the long run, but positive in the short run. They therefore warned that while Nigeria participates in globalisation exercise, caution should be exercised in opening up all its growing sectors to international competition, so as not to permanently stiffen the growth of these sectors in the long run with its accompanied negative impacts on the economy.

Loto (2011), investigating into the impacts of globalization on Nigeria's economic growth adopted the Mundell-Fleming model of open macroeconomics based on the notion of one price. His openness model was estimated using OLS. Loto submitted that inflation rate, exchange rate, as well as trade openness negatively affected growth. He emphasized the need for sound macroeconomic policies to reinforce the globalization exercise for a better result.

Bakare and Fawehinmi (2011) examined the relationship between trade openness and industrial performance, using the OLS technique. They did not only found the formal trade openness of the 1986 to have a sustainable impact on the non-oil industrial sector of the Nigerian economy, but also that public domestic investment, saving rate, capacity utilization and infrastructure negatively impacted on Nigeria's industrial performance. They concluded that more progress could be achieved if the conditions needed for a deregulated trade system to work properly are set in place.

Effiom and Samuel (2012) were concerned with the relevance of trade liberalization for developing countries and posed the following questions:

> "how does trade openness directly impact on the savings capacity of economic agents of participating economies in international trade?"

By disaggregating economic growth into its various proximate causes of savings, investment, human capital and technological progress, the study singularly analysed the impact of trade liberalization on domestic savings in Nigeria. A dynamic model was specified and estimated using the Vector Error Correction Mechanism (VECM) of Ordinary Least Square (OLS) econometric technique. The study established a mixed impact in the short run of trade openness on domestic savings. In the long run however, their results established a positive and significant impact of liberalization on savings. It suggests that the present effort of government in absolutely withdrawing subsidy on fuel, though good economics, will

further impoverish Nigerians and thus render their ability to save compromised. The enthronement of consistent trade policies at the external front may perhaps be the recipe to stabilize expectations, thus leading to growth of domestic savings.

Udah, (2011) attempted using OLS estimation technique to investigate the open macroeconomic variables that could be applied as policy instruments to make the Nigerian economy more resilient to adverse effects of participation in international trade. The results showed that the variables of interest were statistically significant and conform to *a priori* economic expectations.

These include the export diversification index, external reserves, government expenditure on economic and social services and financial sector variables.

The result revealed that for Nigeria to strengthen her resilience to external and domestic distortions, she needs to deepen her financial markets, strengthen government expenditures on economic and social services, diversify her export portfolio of goods and also strengthen the external reserves. The external reserves could be applied to projects that enhance economic growth and development during period of economic and financial crises and stabilize aggregate demand without having to fear any future cuts in public expenditures or a rise in tax rates.

Saibu (2011) investigated the relative effectiveness of trade and policy shocks on sectoral output growth in a small open Nigerian economy. A CVAR model was specified to assess the effects of policy shocks on real aggregate and sectoral output measures. The model included oil price shock and an interactive term of trade openness as measures of supply and external shocks to the economy. The empirical results showed that there was remarkably difference in sectoral output responses to policy distortion.

The effects of monetary policy shocks were positive and significant on manufacturing, service and industrial sector while fiscal policy shock was only significant and positive on agricultural output growth. The result further showed that international oil price shock and trade openness had pronounced negative effects on both sectoral and aggregate outputs. In addition, oil and trade openness' negative effects overwhelmed the positive effects of fiscal and monetary policy shocks. The policy implication of the finding is that the effectiveness of domestic macroeconomic policy is constrained by the external shocks from both oil price and trade openness. Thus, confirming the open economic version of policy ineffectiveness proposition of the new classical macroeconomics in Nigeria.

Obaseki (2002) examined the concept of globalisation and the place of Nigeria in the web of international relationships involving trade in goods and services and financial intermediation. The paper identifies two major categories of globalisation. These are the integration of goods and services markets across national boundaries and the integration of financial markets across the globe. Obaseki observed that labour markets across the globe are not as integrated as the two categories mentioned above owing to factors including immigration laws. He concluded that Nigeria has not benefitted from globalisation owing to the undue dependence on crude oil exports, low manufacturing exports and the under-development of the domestic, financial markets.

Abdul-Raheem (2003) investigated into the influence of globalisation on the Nigerian economy and came to the conclusion that if necessary measures are not put in place Nigeria may be excluded in the process and globalization of poverty rather than prosperity will occur.

Onwuka and Eguavoen (2007) posited that the world has witnessed increased interdependence in the last two decades. This interdependence subordinates domestic economies to global market conditions and practices, and that developed nations are the beneficiaries of globalization as their share of world trade and finance has been expanded at the expense of developing countries. Thus, the process exacerbates inequality between the world's regions and poverty in the developing world. Onwuka and Eguavoen reached the conclusion that Nigeria has not benefited from globalization due to monocultural export, inability to attract increased foreign investments and huge indebtedness.

Haliru (2009) examined the impact of financial liberalization on liquidity and efficiency of the Nigerian stock market over the period 1986-2005 and reported that financial liberalization has significant positive impact on the liquidity and efficiency of the Nigerian stock market.

Sulaiman *et al*. (2012) examined the effect of financial liberalization on economic growth in developing nations with focus on Nigeria for the period 1987 to 2009. Their study used gross domestic product as a proxy for economic growth. Lending rate, exchange rate, inflation rate, financial deepening (M2/GDP) and degree of openness were used as proxies for financial liberalization. Using Johansens Cointegration test and Sulaiman *et al*. Error Correction Mechanism found a long-run equilibrium relationship among the variables and high coefficients of determination (R^2) from both the

Over-parameterized (95%) and Parsimonious (91%) error correction models. They concluded that financial liberalization has a growth-stimulating effect on Nigeria.

Omojimite and Akpokodje (2010) examined the effect of exchange rate reforms on Nigeria's trade performance during the period 1986-2007. They reported a positive effect of exchange rate reforms on non-oil exports through the depreciation of the value of the country's currency. It was also found that the structure of imports which is pro consumer goods remained unchanged even after the adoption of exchange rate reforms. Exchange rate reforms were found not to constrain imports as anticipated. Rather, they stimulate imports but statistically insignificantly.

Ogwumike and Ofoegbu (2012) used the ARDL model built on the McKinnon complementary hypothesis framework to investigate the impact of financial liberalization on Nigerian domestic savings over the period 1970 to 2009. Their study revealed that, given domestic savings immediate past financial liberalisations had minimal positive effect but did not last long as the effect became negative in the long-run.

Fowowe (2010) using an index which measures the gradual progression and institutional changes involved in financial liberalisation, empirically evaluated the impact of financial liberalisation on financial fragility in Nigeria, and reported that liberalisation has exerted a significant negative effect on financial fragility in both the short run and long run.

Bekana (2011) contended that economic liberalization is neither essentially evil nor good. Liberalization is better seen as following from recognitions of its deontological processes and teleological perspectives than as an ideal limit on government intervention.

Ikhide and Alawode (2001) used discriminant analysis to demonstrate that the health of banks deteriorated following reforms in Nigeria and identified a wrong sequencing process as a major factor in the poor performance of the financial sector reforms, but agreed that a lot more research needs to be done in this area.

Adenikinju and Chete (2002) investigated the relationship between trade liberalization and the market structure and productivity performance of the Nigerian manufacturing sector. The study used firm-level panel data for the three years from 1988 to 1990, a period of considerable liberalization in the country. The data cover 382 manufacturing firms. The study showed that in general, the productivity level of Nigerian manufacturing is very low. This

reflects in part an outcome of years of industrialization strategy that stressed factor accumulation rather than the efficiency with which factors are utilized. The findings from the study showed that sectors with a high component of local raw materials generally performed better than those depending on imported inputs. The study also showed that foreign ownership has an important bearing on firm performance and foreign-owned firms generate positive spillover effects on the other firms in the industry. Moreover, their findings support the current trade liberalization effort of the government, but emphasized that the government needs to exercise some caution with the pace of import liberalization, as import growth rate was found to have a negative impact on productivity. While this may be a short-run phenomenon, the implication is that the pace of import liberalization proceeded too fast for domestic firms to cope with.

Obamuyi and Olorunfemi (2011) examined the implications of financial reform and interest rate behaviour on economic growth in Nigeria. The cointegration and error correction models were used on time series data from 1970-2006. The results revealed that financial reform and interest rates have significant impact on economic growth in Nigeria. The results imply that the behaviour of interest rate is important for economic growth in view of the empirical nexus between interest rates and investment, and investment and growth. The study recommended that government must embark on growth enhancing financial reform and be sensitive to the behaviour of interest rates for overall economic growth in the country.

Winters (2004) surveyed the recent literature on trade liberalisation and economic growth. While there are serious methodological challenges and disagreements about the strength of the evidence, the most plausible conclusion is that liberalisation generally induces a temporary but possibly long-lived increase in growth. A major component of this is an increase in productivity. Winters also stressed the importance of other factors in achieving growth, such as investment and institutions, and argued that many of these respond positively to trade liberalisation. He also considered the implementation of liberalisation and noted the benefits of simple and transparent trade regimes.

Yusuf and Akinlade (2011) examined the effects of liberalized trade and exchange rate policies on agriculture in Nigeria using incidence analysis. The agricultural products considered are cocoa, rubber and palm-kernel. The data for this study covering 1970 to 2005 were obtained from secondary sources and were tested for their time series characteristics using Augmented Dickey-Fuller tests. Results

from the Error Correction Model revealed that incidence parameter significantly influenced the relative price level and that exportables and home goods were close substitutes in the liberalization years. The feedback mechanism was higher for equation with food as proxy for home goods compared with the situation, where housing was used. The incidence parameter was significant in the two equations (food index & housing index) for all the agricultural products and cocoa exports, which was only significant in the food index equation indicating that the allocation of resources between home goods and tradable is significantly influenced by the existing trade and exchange rate regimes. The significance of product of dummy and relative import-export price variable in the analysis for total agricultural, cocoa and rubber exports shows that incidence of trade during liberalization differed significantly from that obtained in the pre-liberalization era.

The foregoing revealed that a plethora of empirical works exists on the area of liberalization/globalization, but most of them have been on economic growth and straight line regression. For instance Tamuno and Edoumiekumo (2012) focused on industrial sector performance and globalization, Bakare and Fawehinmi (2011) focused on trade openness and industrial performance, Udegbunam (2002) focused on trade openness and economic growth in Nigeria but all of them failed to account for the possible structural break that may have occurred as a result of the policy change in 1986. Elijah (2007) who used a structural break model focused on economic growth, Yusuf and Akinlade (2011) were concerned with trade liberalization and exchange rate policies on the performance of the agricultural sector. Also in the literature liberalization is taken to be synonymous to globalisation therefore works done always assumed that the Nigerian economy was integrated into the world system even before independence. These could be misleading and tantamount to premature judgement to conclude on the basis of what happened after a policy without giving cognisance to what was.

3. METHODOLOGY

3.1 Data Sources

This study focuses on the industrial sector in Nigeria. The Nigerian industrial sector comprises of the manufacturing, mining and querying and power subsectors. The industrial sector was disaggregated to capture these subgroups. The study covered the

period 1970Q1 to 2012Q4. This period was selected because: first, it covers the period 1970Q1-1986Q2, before the formal liberalization of the Nigerian economy and the period 1986Q3-2012Q4, under which the Nigerian economy was really liberalized and opened. Availability of data is an important factor that was considered in choosing the terminal year of 2012. Beside the indexes of industrial production other indicators used in the study include degree of openness for trade openness, financial deepening for the financial sector development, population growth for labour force growth, energy consumption and a dummy variable proxy for liberalization policy. The dataset for this study were drawn from the Central Bank of Nigeria Statistical Bulletin, and Annual Reports and Statement of Accounts for various years.

3.2 Model Specification

The method of analysis intended for the study is the analysis of covariance (ANCOVA). The analysis of covariance is essential in studying the performance of economic variables after a perceived policy change to account for structural breaks. It is an alternative to the Chow test.

The study fits a Cobb-Douglas production function to the Nigerian industrial sector as a whole, the manufacturing subsector, mining and querying subsector and the power subsector, respectively. To capture the various objectives the following functional relations are relevant

$$IMP = f(GCF, FDI, DOP, FIND, POP, ENC, LIB) \quad (1)$$

$$IMQP = f(GCF, FDI, DOP, FIND, POP, ENC, LIB) \quad (2)$$

$$ELEC = f(GCF, FDI, DOP, FIND, POP, ENC, LIB) \quad (3)$$

$$INP = f(GCF, FDI, DOP, FIND, POP, ENC, LIB) \quad (4)$$

where:

IMP = index of manufacturing production proxy for manufacturing subsector's performance

IMQP = index of mining and quarrying production proxy for mining and quarrying subsector's performance

ELEC = index of electricity consumption proxy for power sector performance

INP = aggregate index of industrial production proxy for the overall industrial sector's performance

DOP = degree of openness (the ratio of total trade to GDP)

FIND = financial deepening (the ratio of total credit to private sector to M_2)

POP = population growth proxy for labourforce growth

ENC = index of energy consumption

LIB = liberalization dummy which takes the value of 1 for periods before 1986Q3 and 10 for periods beginning from 1986Q3. The rationale behind the categorization is simple: as the study is using the Cobb-Douglas production function the equations will be log-transformed and if the normal 0 and 1 categorization is used the logarithm of 0 will be undefined. In this situation the 1 and 10 categorization becomes more appropriate because the logarithm of 1 is 0 and that of 10 is 1.

The econometric models can then be specified as follows:

$$imp = a_1 + \alpha_1 dop + \alpha_2 find + \alpha_3 pop + \alpha_4 enc + \eta_0 lib + \eta_1 libdop + \eta_2 libfind + \eta_3 libpop + \eta_4 libenc + u_{1t} \quad (5)$$

$$imqp = a_2 + \beta_1 dop + \beta_2 find + \beta_3 pop + \beta_4 enc + \varphi_0 lib + \varphi_1 libdop + \varphi_2 libfind + \varphi_3 libpop + \varphi_4 libenc + u_{2t} \quad (6)$$

$$elec = a_3 + \gamma_1 dop + \gamma_2 find + \gamma_3 pop) + \gamma_4 enc + \theta_0 lib + \theta_1 libdop + \theta_2 libfind + \theta_3 libpop + \theta_4 libenc + u_{3t} \quad (7)$$

$$inq = a_4 + \delta_1 dop + \delta_2 find + \delta_3 pop + \delta_4 enc + \pi_0 lib + \pi_1 libdop + \pi_2 libfind + \pi_3 libpop + \pi_4 libenc + u_{4t} \quad (8)$$

where: lowercases represent the log-transformed of the corresponding variable and other variables remain as previously defined; μ_{it} are error terms; α_i's (i = 1,2,3,4) are common elasticities of manufacturing production for periods before and after liberalization with respect to the ith input; η_i's (i = 1,2,3,4) the differential elaticities of manufacturing production with respect to the ith input variable between the periods before and with economic liberalization policy; β_i's (i = 1,2,3,4,5) = common elasticities of mining and quarrying production for periods before and with liberalization with respect to the ith input; φ_i's (i = 1,2,3,4) = the differential elaticities of mining and querying production with respect to the ith input variable between the period before and with economic liberalization policy; γ_i's (i = 1,2,3,4) = common eleasticities of electricity production for periods before and with economic liberalization with respect to the ith input; θ_i's (i = 1,2,3,4) the differential elaticities of electricity

production with respect to the ith input variable between the period before and the period of economic liberalization policy; δ_i's (i = 1,2,3,4) = common eleasticities of industrial production for periods before and after liberalization with respect to the ith input; and π_i's (i = 1,2,3,4) the differential elaticities of industrial production with respect to the various input variables between the period before and with economic liberalization policy.

3.3 Estimation Technique, Procedure and Justification

Most macroeconomic time series are trended and therefore in most cases are non-stationary. The problem with such series is that the standard OLS regression procedures can easily lead to incorrect conclusions.

In such cases it is normal to have very high R^2 (sometimes even higher than 0.95) and very high values of t-ratios (sometimes even higher than 4) while the variables used in the analysis have no relationship. This is the case of spurious regression. To avoid such problems it has become part of time series analysis to test for unit roots to ensure that the series used in the analysis are stationary or integrated.

To avoid the spurious regression problem, estimations started with the Augmented Dickey Fuller (ADF) unit root test and cointegration test for a long-run relationship and lastly the error correction models were estimated.

4. Results and discussion

Before conducting the empirical test variables were subjected to unit root tests, results for which are presented on table 1.

The results showed that although some of the variables were trend stationary they all became stationary after differencing once, I(1). The residuals from the subsectors and the aggregate industrial sector's level from regressions were all stationary at level indicating the existence of a meaningful long-run relationship among the variables.

That is, although there may be short-run fluctuations in the models, the variables have the tendency to converge to a long-run equilibrium.

TABLE 1 - *Augmented Dickey-Fuller Unit Root Test*

Variable	ADF-Statistic		Lag(s)	Model	~I(d)
	Level	1st Difference			
LOG(ENC)	-2.127	-10.126***	2	Drift	I(1)
LOG(POP)	-2.994	-9.879***	2	Trend	I(1)
LOG(FIND)	-2.053	-9.779***	2	Drift	I(1)
LOG(DOP)	-1.647	-10.072***	2	Trend	I(1)
LOG(IMP)	-3.595**	-6.608***	3	Trend	I(1)
LOG(MQP)	-2.557*	-7.403***	3	Trend	I(1)
LOG(ELEC)	-3.564**	-7.313***	3	Trend	I(1)
LOG(INP)	-3.587***	-8.133***	3	Trend	I(1)
LGO(LIB)	-1.279	-13.038***	0	Drift	I(1)
LOG(LIBENC)	-1.251	-13.224***	0	Drift	I(1)
LOG(LIBPOP)	-1.244	-13.001***	0	Drift	I(1)
LOG(LIBFIND)	-2.445	-13.592***	0	Trend	I(1)
LOG(LIBDOP)	-1.872	-10.838***	1	Trend	I(1)
ECM1	-7.443***	-	0	None	I(0)
ECM2	-6.500***	-	0	None	I(0)
ECM3	-5.823***	-	0	None	I(0)
ECM4	-7.647***	-	0	None	I(0)

Source: Author's computation.

4.1 The Manufacturing Sector

The coefficients on table 2 showed a negative differential intercept. Also, the differential slope coefficients for DOP, FIND and ENC were all negative.

This specifically indicates that given the degree of trade openness, financial sector's development, labour force growth and energy consumption, the Nigerian index of manufacturing production has declined by 3.86 percent on the average with the economic liberalization policy.

Also, the interaction of the policy with trade openness, financial sector development and energy consumption retarded the Nigerian index of manufacturing production by 0.05, 0.14 and 0.19 percents, respectively in the short-run. The policy had an enhancing effect through labour force growth as revealed by the differential slope coefficient.

The interaction of the policy with labour force growth increased the index of manufacturing production by 0.46 percent in the short-run.

All the differential slope coefficients were statistically significant indicating the observed differences are not as a result of chance. The ECM term had a negative sign as expected and was statistically significant. It specifically showed that about 30 percent of the previous quarter's errors are corrected in a current quarter, that is the model moves towards its long-run equilibrium at the speed of 30 percent per quarter. About 80 percent of the variability in LOG(IMQ) is captured by the model and the overall regression is statistically significant as revealed by the R-squared value of 0.8008 and F-statistic (prob) of 64.31(0.0000) respectively.

These indicate that economic liberalization policy has a significant impact on performance of the Nigerian manufacturing subsector. The model was robust to serial correlation after correcting for errors.

TABLE 2 - *Manufacturing Subsector's Parsimonious Error Correction Model Estimates*

D(LOG(IMP))	Coefficient	Standard Error	t-statistic	p-value
D(LOG(DOP))	0.1142	0.0343	3.33	0.001
D(LOG(LIBDOP))	-0.0479	0.0197	-2.42	0.017
D(LOG(FIND))	0.2895	0.0976	2.97	0.003
D(LOG(LIBFIND))	-0.1472	0.0559	-2.63	0.009
D(LOG(POP))	-0.0032	0.0237	-0.14	0.891
D(LOG(LIBPOP))	0.4570	0.0482	9.48	0.000
D(LOG(ENC))	0.4128	0.0589	7.01	0.000
D(LOG(LIBENC))	-0.1928	0.0421	-4.58	0.000
D(LOG(LIB))	-3.8604	0.4942	-7.81	0.000
Constant	0.0028	0.0054	0.52	0.604
ECM(-1)	-0.3047	0.5542	-5.50	0.000
R-squared	0.8008			
Adj. R-squared	0.788			
F-statistic (prob)	64.31 (0.0000)			
Durbin-Watson	2.5835			

Source: Author's computation.

4.2 The Mining and Quarrying Subsector

Results for the performance of the mining and quarrying subsector are presented on table 3. The results showed that whereas the differential intercept, differential slope coefficients of DOP and ENC are negatively signed, the differential slope coefficients of FIND and POP are positively signed. This revealed that in the short-run the interaction of economic liberalization with variability in trade openness and energy consumption acts to retard mining and quarrying production while the interaction of the policy with variability in financial sector development and labour force growth act to enhance mining and quarrying production. Specifically the results showed that with the economic liberalization policy the impact of trade openness on mining and quarrying reduced by about 0.13 percent and that of energy consumption reduced by 0.04

percent. Also, the impact of financial sector development on mining and quarrying improved by 0.07 percent while that of labour force growth improved by 0.5 percent. All the differential terms were statistically significant except LIBENC, indicating that the economic liberalization policy has impacted significantly on performance of the Nigerian mining and quarrying subsector. The ECM term was negatively signed as expected and statistically significant. It specifically showed that the model moves at the speed of about 30 percent each quarter towards long-run equilibrium, that is 30 percent of previous quarter's errors are corrected in the current quarter. Both the R-squared and adjusted R-squared showed that about 88 percent of the variability in mining and quarrying production is explained by the model. The overall model is statistically significant and robust to first order serial correction as revealed by the F-statistic (prob) of 124.16(0.000) and Durbin-Watson of 2.5435.

TABLE 3 - *Mining and Quarrying Subsector's Parsimonious Error Correction Model Estimates*

D(LOG(MQP))	Coefficient	Standard Error	t-statistic	p-value
D(LOG(DOP))	0.2939	0.0252	10.48	0.000
D(LOG(LIBDOP))	-0.1335	0.0145	-9.21	0.000
D(LOG(FIND))	-0.3643	0.0715	-5.10	0.000
D(LOG(LIBFIND))	0.0724	0.0409	1.77	0.079
D(LOG(POP))	-0.0110	0.0173	-0.63	0.528
D(LOG(LIBPOP))	0.5042	0.0354	14.24	0.000
D(LOG(ENC))	0.1730	0.0420	4.11	0.000
D(LOG(LIBENC))	-0.0412	0.0304	-1.35	0.178
D(LOG(LIB))	-6.1063	0.3630	-16.82	0.000
Constant	0.0039	0.0040	0.98	0.328
ECM(-1)	-0.2997	0.0503	-5.96	0.000
R-squared	0.886			
Adj. R-Squared	0.879			
F-statistic (prob)	124.16 (0.000)			
Durbin-Watson	2.5435			

Source: Author's computation.

4.3 The Power Sector

Table 4 shows the results for the impact of economic liberalization policy on performance of the Nigerian power subsector. Examination of the differential intercept and slope coefficients revealed D(LOG(LIB)), D(LOG(LIBDOP)), D(LOG(LIBFIND)) and D(LOG(ENC)) had negative signs while D(LOG(POP)) had positive sign. Specifically the results showed that with economic liberalization policy the impact of trade openness, financial sector development and energy consumption on electricity consumption reduced by 0.03, 0.17 and 0.13 percents, respectively while the impact of labour force growth on electricity consumption increased by 0.47 percent. However the differential slope coefficient on DOP was statistically not significant. This again revealed that the economic liberalization policy embarked upon by the Nigerian government through the adoption of the structural adjustment programme has impacted significantly on performance of the Nigerian power sector. The ECM term is negative and statistically significant as expected.

TABLE 4 - *Estimation Results for the Power Sector with Robust Standard Errors*

D(LOG(ELEC))	Coefficient	Standard error	t-statistic	p-value
D(LOG(DOP))	0.0581	0.0458	1.27	0.206
D(LOG(LIBDOP))	-0.0312	0.0263	-1.18	0.239
D(LOG(FIND))	0.2556	0.1299	1.97	0.051
D(LOG(LIBFIND))	-0.1673	0.0748	-2.24	0.027
D(LOG(POP))	0.0373	0.0315	1.18	0.238
D(LOG(LIBPOP))	0.4689	0.0644	7.28	0.000
D(LOG(ENC))	0.3445	0.0767	4.49	0.000
D(LOG(LIBENC))	-0.1338	0.0559	-2.39	0.018
D(LOG(LIB))	-4.1846	0.6616	-6.33	0.000
Constant	0.0074	0.0073	1.02	0.310
ECM(-1)	-0.2215	0.0492	-4.50	0.000
R-squared	0.6952			
Adj. R-squared	0.676			
F-statistic (prob)	36.49(0.000)			
Durbin-Watson	2.7199			

Source: Author's computation.

It showed that the model moves at the speed of 22 percent per quarter towards long-run equilibrium, that is in each quarter 22 percent of previous errors are corrected. About 67 percent of variability in electricity consumption is explained by the model and the overall model is statistically significant as revealed by the adjusted R-squared and F-statistic respectively. The results are also robust to first order positive serial correlation and are therefore useful for policy analysis.

4.4 The Aggregate Industrial Sector

The empirical results of the impact of economic liberalization policy on performance of the aggregate industrial sector in Nigeria are presented on Table 5.

The results showed the differential slope coefficient of DOP and ENC to be negative while that of FIND and POP were positive. Specifically the results showed that with the economic liberalization policy the impact of trade openness and energy consumption on aggregate index of industrial production has declined by 0.075 and 0.19 percents, respectively while that of financial sector development and labour force growth has improved by 0.049 and 0.47 percents, respectively.

All the differential coefficients were statistically significant except that of financial deepening indicating that economic liberalization policy has impacted significantly on the aggregate industrial sector in Nigeria.

About 90 percent of variability in aggregate index of industrial production is explained by the model and the overall model is statistically significant as revealed by the adjusted R-squared and F-statistic respectively. This implies that the variables of interest are important if Nigeria must gain from the ongoing liberalization process.

The ECM term is negative as expected and statistically significant. It showed that about 34 percent of previous errors is corrected in the current quarter (the moves towards long-run equilibrium at the speed of 34 percent per quarter).

TABLE 5 - *Estimation Results for the Aggregate Industrial Sector with Robust Standard Errors*

D(LOG(INP))	Coefficient	Standard error	t-statistic	p-value
D(LOG(DOP))	0.1680	0.0233	7.21	0.000
D(LOG(LIBDOP))	-0.0755	0.0134	-5.63	0.000
D(LOG(FIND))	-0.2470	0.0663	-3.72	0.000
D(LOG(LIBFIND))	0.0491	0.0380	1.29	0.198
D(LOG(POP))	-0.0415	0.0162	-2.56	0.011
D(LOG(LIBPOP))	0.4710	0.0328	14.37	0.000
D(LOG(ENC))	0.5155	0.0395	13.06	0.000
D(LOG(LIBENC))	-0.1907	0.0286	-6.68	0.000
D(LOG(LIB))	-4.7852	0.3359	-14.25	0.000
Constant	0.002	0.0037	0.54	0.589
ECM(-1)	-0.3414	0.0578	-5.91	0.000
R-squared	0.8967			
Adj. R-squared	0.890			
F-statistic (prob)	138.93 (0.000)			
Durbin-Watson	2.4084			

Source: Author's computation.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The major conclusion that can be drawn from this study is that the impact of economic liberalization policy on performance of the Nigerian manufacturing, mining and quarrying, and power subsectors and the aggregate industrial sector is mixed and statistically significant. Periods with economic liberalization policy, 1986Q3-2012Q4 performed differently from periods before economic liberalization policy, 1970Q1-1983Q2 and therefore conforms to the Gottfried Haberler's opportunity cost theory. The interaction of economic liberalization policy with trade openness and energy

consumption acted to retard the performance of the manufacturing, mining and quarrying and power subsectors, and the aggregate industrial sector. The policy also dampened the performance of the manufacturing and power subsectors but enhanced the mining and quarrying and aggregate industrial sector through financial sector developments. Economic liberalization policy enhanced the performance of all three subsectors and the aggregate industrial sector through labour force growth. This implies that the policy change that took place in 1986Q3 and continuous government efforts to further open the economy to the rest of the world has significantly shaped the Nigerian industrial landscape and therefore differs from the study of Tamuno and Edoumiekumo (2012), Bakare and Fawehinmi (2011) and Udegbunam (2002).

5.2 Recommendations

Based on findings, the following recommendations are made:

i. Government should invest heavily on human capital development. This is a precursor to benefiting from the ongoing economic liberalization policy which began in 1986Q3. Labour force growth had enhancing impact on performance of the subsectors of manufacturing, mining and quarrying and power and on the aggregate industrial sector with the economic liberalization policy.

ii. Trade openness should be encouraged but with caution. Focus should be more on increasing and diversifying the export base of the economy after other necessary measures have been put in place. Trade openness had a dampening effect on all the subsectors and the aggregate industrial sector with the liberalization policy.

iii. Energy consumption is also an important factor that cannot be jettisoned. Efforts toward further economic liberalization should be one that encourages development and utilization of the abundant energy resources in the economy. Following the liberalization policy energy consumption dampened the performance of all the subsectors including the aggregate industrial sector.

iv. Government should encourage financial sector development but with care. More credit created should be

channelled to the private sector. Although performance of the manufacturing and power subsectors were dampened by financial sector development the mining and quarrying and the aggregate industrial sectors' performance were enhanced.

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ABSTRACT

This study examined the impact of economic liberalization policy on performance of the Nigerian industrial sector. Annual data were sourced from the Central Bank of Nigeria Statistical Bulletin and Annual Reports and interpolated to quarterly data. The variables of interest were index of aggregate industrial production, manufacturing production, mining and quarrying production, electricity consumption, energy consumption, population growth, trade openness, financial deepening, and liberalization dummy variable. Unit root test results showed that although some of the variables were trend stationary they all became stationary after differencing once, I(1). The Engel – Granger test results showed the existence of a meaningful long-run relationship among the variables. The empirical results showed that the impact of economic liberalization policy on performance of the Nigerian manufacturing, mining and quarrying, and power subsectors and the aggregate industrial sector is mixed and statistically significant. Periods with economic liberalization policy, 1986Q3-2012Q4 performed differently from periods before economic liberalization policy. The study concluded that the policy change that took place in 1986Q3 and continuous government efforts to further open the economy to the rest of the world has significantly shaped the Nigerian industrial landscape but much is still needed to be done for Nigeria to benefit from the ongoing liberalization process. The study recommends that government should invest heavily on human capital development as a precursor to benefiting from the ongoing economic liberalization policy.

Keywords: Economic Liberalization, Industrial Sector, Nigeria, Performance

JEL Classification: F13, F41

RIASSUNTO

L'impatto della politica di liberalizzazione economica sulla performance del settore industriale in Nigeria

Questo studio esamina l'impatto sul settore industriale nigeriano della politica di liberalizzazione economica. Sono stati utilizzati dati annuali, forniti dal Bollettino statistico e dal Rapporto annuale della Banca Centrale nigeriana, poi incrociati con dati trimestrali. Le variabili prese in considerazione sono l'indice della produzione industriale aggregata, la produzione del settore manifatturiero, la produzione del settore minerario ed estrattivo, i consumi elettrici, i consumi energetici, la crescita demografica, l'apertura del commercio, la profondità finanziaria e la liberalizzazione. I test a radice unitaria hanno mostrato che sebbene alcune variabili fossero tendenzialmente stazionarie, tutte lo sono diventate dopo la differenziazione di I(1). I test di Engel e Granger hanno evidenziato l'esistenza di una significativa relazione di lungo periodo tra le variabili. I risultati empirici hanno mostrato che l'impatto della politica di liberalizzazione economica sull'andamento del

settore manifatturiero, minerario ed estrattivo, dei sotto-settori energetici e del settore industriale aggregato è variegato ma statisticamente significativo. Nei periodi di liberalizzazione economica, terzo trimestre 1986/quarto trimestre 2012, l'andamento dell'economia è stato diverso da quello realizzatosi prima di queste politiche. Lo studio conclude che i cambiamenti di politica economica che hanno avuto luogo nel terzo trimestre del 1986 e i continui sforzi del governo per aprire ulteriormente l'economia della Nigeria al resto del mondo hanno avuto una certa influenza sulla struttura del settore industriale, anche se occorre ancora fare molto affinché il paese tragga consistenti benefici dal processo di liberalizzazione in corso. L'indicazione emergente da questo studio è che risulta necessario investire ancora fortemente sullo sviluppo del capitale umano affinché si possa beneficiare delle politiche di liberalizzazione del paese.