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# INFLATION, MANUFACTURING OUTPUT AND ECONOMIC GROWTH; NIGERIA EXPERIENCE (1980-2018)

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***ABSTRACT***

*The study's purpose was to examine the relationship among of inflation, manufacturing sector and economic growth in Nigeria over the period 1980 to 2017 using econometrics analysis (Ordinary Least Square (OLS)). The study performed several pre-test and post-test: such as unit root, co-integration, etc. and it was confirmed that the spurious relationship and serial correlation do not exist among the adopted variables for this study. The ECT was correctly signed and the result showed that there is insignificant inverse relationship between inflation and GDP in one hand and insignificant direct relationship between manufacturing output and economic growth in another. The Enger Granger Causality test indicated that no causal relationship existed between inflation and economic growth or economic growth to inflation. However, causal relationship existed between manufacturing out and economic growth. This implies that as manufacturing productivity increases, it tends to increase economic growth in Nigeria in the years under study. The paper recommended that inflationary rate must be monitored and curtailed to a single digit so that growth can be sustained, diversification of the economy to enhance the performance of the manufacturing sector activities in Nigeria.*

***Keywords****: Manufacturing, inflation, economic growth*

## 1. INTRODUCTION

Achieving macroeconomic variables stability and creating enabling business environment that are capable of enhancing consistent output growth and development had been the major focus of most government all over the world. These may be because macroeconomic variables such as inflation and manufacturing sector activities seem to play pivoted role in stimulating economic growth in both developing and developed economies of the world.

There are four major types of inflation. These are: the demand-pull, the cost-push, the mark-up and the structural types. Demand-pull Inflation is a result of excess

demand over supply. In the case of cost push inflation it existed due to imperfect competition both in the product and labour market while mark-up inflation occurs when business men mark-up prices of their goods over and above the rise in the costs of raw material and labour directly involved in the production of the commodities. The structural inflation mostly occurred as result of basic structural factors which create supply shortages and deficient government revenue.

Many economists have argued that the major type of inflation in developing countries is the structural type. These is because developing economies are suffer from supply rigidities, deficit spending, low savings ratio and also prone to heavy importation of many commodities, hence, they tend to import inflation. Hence, the need to keep the price levels at a target rate as a means of achieving desired economic outcomes (Ogunmuyiwa & Francis, 2010) Inflation not monitored could lead to economic recession which is characterized by low growth rate, high unemployment, low revenue growth (Akinbobola & Ojeyinka, 2017).

Although, inflation is not a new phenomenon and not out rightly bad, however, if an economy experiences high inflationary rate then it may be detrimental to her economic growth. This is because studies have shown that high inflationary rate may lead to reduction of purchasing power of economic agents, increases discouragement of real investment, encourages balance of payment disequilibrium, promotes unemployment to mention but a few (Grimes 1991; Brauit, 1995; Barro, 1995; Sarel, 1996).

While manufacturing sector activities play a catalytic role and has many dynamic benefits crucial for economic transformation (Loto, 2012). In advanced economies, the manufacturing sector is the leading sector in many respects. The sector is an avenue for increasing productivity in relation to import replacement and export expansion, creating foreign exchange earning capacity, rising employment and per capita income, it creates investment capital at a faster rate than any other sector of the economy while promoting wider and more effective linkages among different sectors and indulge or give free rein in either the creation of new commodities or in value addition (Ogwuma, 1995; Adebayo, 2011).

Furthermore, manufacturing sector promotes growth sector in developed countries (Dickson, 2010), it is also serve as finished goods for sale to customers or as intermediate goods used in the production process. The sector is involved in the process of adding value to raw materials by turning them into products (Mbelede, 2012), creates employment which helps to boost agriculture and diversify the economy on the process of helping the nation to increase its foreign exchange earnings (Charles, 2012).

Nigeria as a developing economy experienced different types of inflation and different period of manufacturing sector performance. For instance, prior to the advent of Structural Adjustment Programme (next SAP) in 1985, the inflationary rate was 3.22%. It rose to 6.25% in 1986 and it rose further to 11.76%, 34.21%and 49.0% in 1987, 1988 and 1989 respectively. In 1990, it fell to 7.89%. Then rose steadily to 12.19% in 1991 and peaked at 72.72% in 1995 respectively. However, by 2007 it fell to 5.40% and in 2010, it rose to 13.72% and fell to 12.20% in 2012, and further fell to

8.70% in 2013, fell to 8.0% in 2014, increased to 15.7% in 2016, peaked at 16.5% in 2017 and fell to 12.1% in 2018. The increased noticed in 2016 and 2017 was a result of 'spending our way out' of economic recession policy initiated by the government. It has also been revealed in some quarters that a close relationship exists between inflation and diminishing growth rate across a variety of inflation ranges. The growth rate declined more steeply as inflation approaches 25-30 per cent (Ogwuma, 1986).

This view had stimulated the bases for several studies in this field in Nigeria. For instance, Ishola (2012), Gado (2012), Enerst (2013), Imourghele and Ismaila (2014) etc. had examined the relationship between manufacturing sector activities and economic growth in Nigeria. However, many of these studies suffer some setbacks such as; omitting vital variable such as; inflation (which is key in measuring manufacturing performance in an economy). For instance, Ishola, 2012; Gado, 2012; Enerst, 2013 and Eze, Onyekachi and Ogiji, 2013 did not incorporate inflation as a variable in their studies. Ishola (2012) examines the government expenditure in the manufacturing sector and economic growth in Nigeria but inflation as a variable was omitted. The study implores unit root and co-integration test. Gado (2012) investigated the transformation of Nigeria's industrial sector. His study spanning through 20years, that is from 1990 to 2010 only considered the effect of Foreign Direct Investment (FDI) and Electricity Power on the industrial sector. He failed to incorporate inflation as a control variable. Loto (2012) focuses on the effect of global economic downturn on the manufacturing sector performance in Nigeria; he made use of two years data before the meltdown and two years after. The data were pooled for these two periods.

For Eze, Onyekachi and Ogiji (2013) their study focuses on the impact of fiscal policy on the manufacturing sector without resorting to incorporate inflation as well. Although, Imoughele and Ismaila (2014), Mojekwu and Iwuji (2012), and Charles (2012) incorporated inflation into their studies but some of the studies were either deficient nature of methodology adopted, their scope or their inclusion need further verification. From the reviewed literature, most of the focus of the studies do not involved the nexus between economic growth, manufacturing and inflation which this study intend to do.

The study intended to contribute to existing literature on the nexus among inflation, manufacturing output and economic growth in Nigeria. Therefore, this study tends to examine the relationship among inflation, manufacturing sector and economic growth. This research work covered the periods between 1981 and 2016. The choice of this period is significant as it includes the period of economic recession, pre and post Structural Adjustment Programmes (SAP).

## 2. METHODOLOGY

**Sources of Data and Data Collection:** Data for the study was collected from secondary source. Besides, all data was collected on annual bases. The data was obtained mainly from Central Bank of Nigeria (CBN) publication, 2017. Data used for the study were real gross domestic product, inflation, interest rate and manufacturing output. The data span from 1980 to 2017. The choice of this period is significant as it includes the period of economic recession, pre and post structural adjustment programme (SAP).

**Data Estimation Techniques:** The study made use of Unit root test to test for the stationarity of the time series data, unit root test for residual of the model, Breusch-Godfrey test for test of residual serial correlation and test of normality. While the cointegration, ECM and Wald test was performed to establish the existence of long-run relationship of the model. Finally, Granger causality test is used to establish the direction of causality of the variables of interest.

**Model Specification:** This study adopted The Solow growth model, which is also known as Solow-Swan or Neoclassical or Exogenous growth model. The model has been widely used as a theoretical framework for understanding the growth patterns of different economy. Solow model allows for substitution between capital and labour. Hence, it assumes that there are diminishing returns to the use of these factor inputs. The aggregate production function

$$Y = f(K, L) \quad (1)$$

It assumed characterized by constant return to scale. In special case known as The Cobb-Douglas production function

$$Y = K^{\alpha}(AL)^{1-\alpha} \qquad 0 < \alpha < 1 \quad (2)$$

at any time 't'.

$$Y_{(t)} = K_{(t)}{}^{\alpha}(A_{(t)}L_{(t)})^{1-\alpha} \quad (3)$$

Where **Y** is output, **K** is capital stock, **L** is labour stock, α is elasticity of output with respect to capital, 1- α which can also be represented with β is the elasticity of output with respect to labour, A is technological progress and the share of capital in total output. L and A are assumed to grow exogenously at rates of n and g respectively. Defining output and stock of capital per unit of effective labour as y=Y/AL and k=K/AL, respectively.

Because of constant returns to scale mathematically as

$$\gamma Y = f(\gamma K, \gamma L) \quad (4)$$

$\gamma$ is some positive amount or positive real number, where $\gamma$ is set to $\frac{1}{L}$ so that;

$$\frac{Y}{L} = f(\frac{K}{L}, 1) \quad \text{or} \quad y = f(k) \quad (5)$$

Lower case variables are expressed in per worker terms in these equations. This allows dealing with just one argument in the production functions. Such that the Cobb-Douglas production function becomes

$$y_t = Ak_t{}^{\alpha} \quad (6)$$

Solow assumed that the production function exhibits constant returns to scale In the long run, as the economy accumulates more and more capital, the growth rate of capital approaches zero and the economy's growth rate is determined by technical progress and the growth in labour force. However, in the short run, an economy that accumulates capital faster will enjoy a higher level of output. According to the neoclassical growth theory, output growth result from one or three factors which are increases in labour quantity through population growth and education, increases in capital through saving and investment and improvement in technology (Todaro and Smith, 2008). However, Mankiw, Romer and Weil (1992), stated that equation 2 can be re-modified to accommodate variables of interest, hence, the Cobb-Douglas production function is specified as follows:

$$y_t = f\left(\left(Al_t\right)^{\beta} {k_t}^{\alpha}, {man_t}^{\alpha}, {edu_t}^{\alpha}, {eh_t}^{\alpha}, exc_t, inf_t, intr_t\right) \quad (7)$$

Linearizing the equation above

$$y_t = lnA + \beta lnl_t + \alpha lnk_t + \alpha lnman_t + \alpha lnedu_t + \alpha lneh_t + exc_t + inf_t + intr_t + u_t \quad (8)$$

Taking $lnA$ to be equal to $a_o$, then equation 8 can be written as

$$y_t = a_o + \beta 1 lnl_t + \alpha_2 lnk_t + \alpha_3 lnman_t + \alpha_4 lnedu_t + \alpha_5 lneh_t + \theta_6 exc_t + \theta_7 inf_t + \theta_8 intr_t + u_t$$

Where;

Y = real gross domestic product
L= secondary school enrolment
K=loan to manufacturing sector
Man= manufacturing output
Edu= expenditure on education
Eh= expenditure on health
Exc=exchange rate
Inf=inflation
Intr=interest rate

$$GDP = \beta_0 + \beta_1 inf + \beta_2 man + \beta_3 intr + \beta_4 exc + \mu_t \quad (4)$$

**A priori expectation:** $\beta_1 > 0, \quad \alpha_2 > 0, \alpha_3 > 0, \ \alpha_4 >, \alpha_5 > 0, \theta_6 < 0, \theta_7 < 0, \theta_8 < 0$

The study performed a unit root test using the Augmented Dickey Fuller model (ADF) below

$\boldsymbol{\Delta}$Yt =$\boldsymbol{\beta}$ + zYt + ai +et (5)

Equation 5 is ADF equation with intercept without trend

## 3. DATA INTERPRETATION AND ANALYSIS

**Unit Root Test Using ADF at Level:** Information on the unit root test using ADF at level is presented in table 1 below.

**Table 1:** Unit Root Using ADF at Level.

| VARIABLES | ADF TEST STAT.@LEVEL | 5% C.V | S/NS | ADF TEST STAT.@1ST DIFF | 5% C.V | S/NS |
|---|---|---|---|---|---|---|
| RGDP | /18.67971/ | /2.943427/ | S | | | |
| INFL | /2.891455/ | /2.943427/ | NS | /5.685288/ | /2.945842/ | S |
| MAN | /2.956289/ | /2.943427/ | S | | | |
| INTR | /5.893876/ | /2.943427/ | S | | | |
| EXC | /0.539303/ | /2.943427/ | NS | /6.553740/ | /2.945842/ | S |
| K | /3.012619/ | /2.971853/ | S | | | |
| EH | /1.507120/ | /2.971853/ | NS | /4.357527/ | /2.945842/ | S |
| EDU | /10.604741/ | /12.957110/ | NS | /4.264701/ | /2.957110/ | |
| L | /1.426619/ | /2.943427/ | NS | /4.965279/ | /2.945842/ | S |

**Source: Researcher's Computation, 2018. (Note: NS-Not significant S – Significant)**