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## Article

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*Reference:* Odeleye, Anthonia Taye/Olunkwa, Chidi N. (2019). Industrialization : panacea for economic growth. In: Academic journal of economic studies 5 (2), S. 45 - 51.

This Version is available at:

<http://hdl.handle.net/11159/3253>

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## Industrialization: Panacea for Economic Growth

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### Abstract

This paper examines the relationship between industrialization and economic growth in Nigeria between 1981 and 2015, by employing co-integration approach known as Autoregressive Distributed Lag Model (ARDL). The empirical results of the study confirm our expectations and indicate that a long run relationship exists between industrialization and economic growth in Nigeria. Equivocally, going by experiences of other emerging economies, especially; the Asian Tigers, Nigeria will in no time get out of her doldrums; if she tolls rigorously the path of industrialization, as panacea to economic growth.

### Key words

Industrialisation, panacea, economic growth, agrarian, poverty, unemployment

**JEL Codes:** O14, F12, F15

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Received: 28 March 2018

Revised: 10 April 2019

Accepted: 20 April 2019

## 1. Introduction

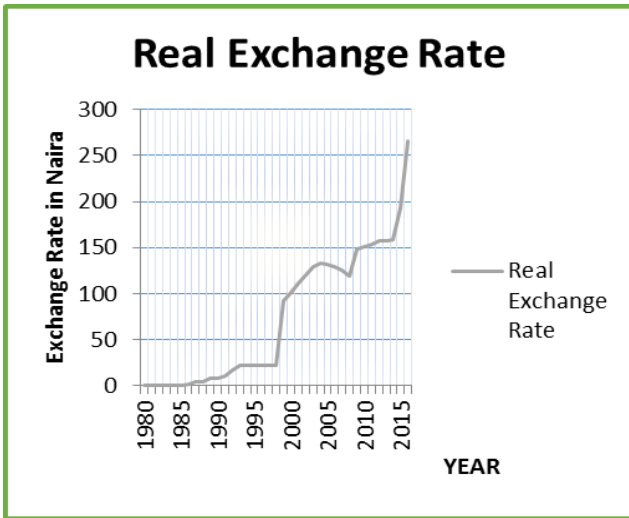
Developing countries in the world is predominantly an agrarian economy as to compare to western world which is systematically classified as been industrialized. The agrarian outlook of the developing countries like Nigeria has only enhanced growth, which has failed to impact employment. It has rather resulted to galloping unemployment rate, increase in poverty rate, high rate of inflation, and increase in other social vices, which have translated to economic backwardness. Going by theoretical transition from agriculture to industrialization, Nigeria has not measured to standard due to her undue attention given to oil sector at the expense of other sectors of her economy. However, government's (past and present) efforts to resuscitate and rejuvenate the economy through implementing policies that are industrial friendly, her dream of being a major economic hub in Africa still remain unabated. Thus, the question to the aforementioned challenges still boils down to what can be done by the government to invigorate and industrialise the nation so as to crack down unemployment and reduce poverty rate. Importantly, for any developing economy to get out poverty, unemployment, consistent fall in real GDP and dwindling foreign exchange rate, she has to justifiably look away from exporting primary agricultural products alone but channel more effort on revitalizing the industrial sector. The approach, if critically followed can as well explain the success of Asian miracle (Todaro and Smith, 2011).

Industrialization as an engine of growth according to Pollard (1990); and Von-Tunzelman (1995), should be seen as a single global process of structural changes which countries should follow to get industrialized. In the same vein, Adebisi (2004) and Uwen (2005), in their studies show that industrialization has a positive impact on growth. Regardless all the arrays of policies that conform to different dispensations in the Nigeria's economic growth, the contribution of the industrial sector to GDP, appears to be far below expectation. For instance, the share of the Nigeria industrial sector to GDP fell from 13.18% in 2000 to 11.9 percent in 2001, it further fell to 10.93 percent in 2004. The downward trend continues till date. On the other hand, the annual growth rate of the sector fell from 4.6% in 2001 to as low as 1.0% in 2003; indicating that the industrial sector in Nigeria has negative impact on economic growth (CBN, 2011).

### 1.1. Stylized Facts on Industrialisation and Nigeria's Economic Growth

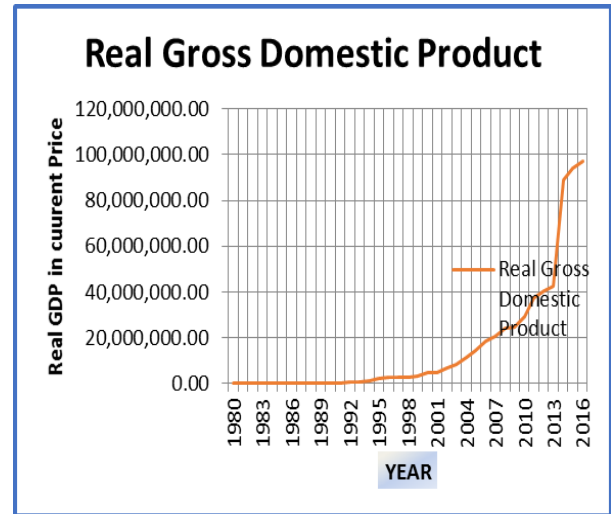
In figure 1, the exchange rate trend in Nigeria since 1980 has witnessed an upward surge until 1994, when was a slight decline of 0.32%. Figure 2 shows clearly that real GDP has also been on the rise since 1980 with a slight drop (0.66%) in 2012. However, since 1982 to 2016, the real GDP continued to grow very fast, although the growth did not translate to employment of labour, rather it has been on negative trend. In addition, looking at the exchange rate, before 1986, naira was strong, but after the deregulation of exchange rate in 1986, the naira rate to dollars began to lose its value. In spite of the continued increase in gross domestic product, naira is still weaker. This analysis implies that government has not been doing well in the area of processing and transforming adequate raw materials into finished goods, rather she majorly

exports unprocessed raw materials to other countries of the world. The passiveness of the industrial and manufacturing subsector is negatively affecting the strength of the naira.



Source: Authors' Computation, 2017

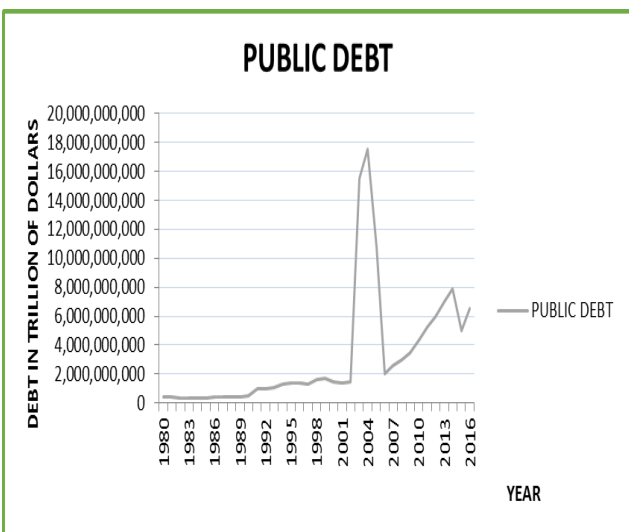
Figure 1. Real Exchange Rate



Source: Authors' Computation, 2017

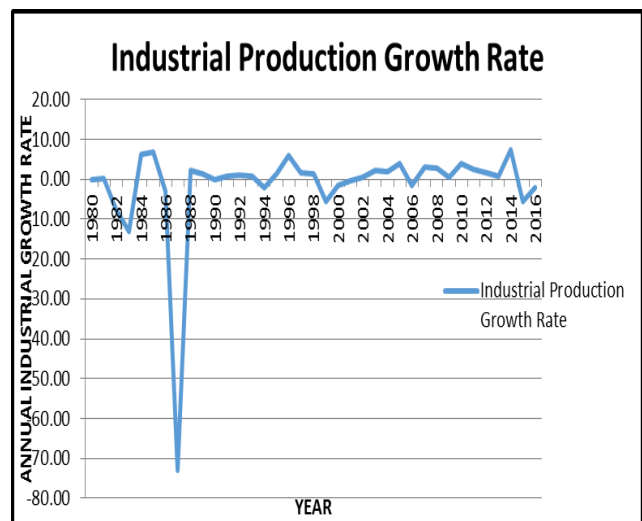
Figure 2. Real Gross Domestic Product

In figure 3, between 1981 and 1983 the public debt witnessed a slight drop of about 9.5 billion dollars (2.44%). Years 1985 to 1987 show a tremendous increase in the debt, which is between 3.6 billion to 4.5 billion dollars. Debt rate in 1988 and 1989 greatly decreased from 4.4 billion dollars to 4.2 billion dollars. Between 1990 and 1992, the public debt in Nigeria increased from 5.2 billion dollars to 9.7 billion dollars. This could be as a result of poor management of borrowed funds and the neglect of the non-oil sector of the economy, especially agricultural and manufacturing sectors. The government focused more on the oil sector without necessarily giving due attention to industrial sector. The negligence has grossly affected the growth of manufacturing output; resulting in increasing import of manufactured product from other countries of the world. Further, there was a consistently rising trend between 2000 and 2004, but in 2005, it dropped to about 6.8 billion dollars. More so, in 2005 after debt forgiveness, the debt rate significantly fell. The downward trend continued till 2010, but from 2011 to 2014, upward trend resurfaced till date. The persistent increase in public debt can be attributed to the increase in government recurrent expenditure, corruption and largely decline in world oil price.



Source: Authors' Computation, 2017

Figure 3. Nigeria's Public Debts



Source: Authors' Computation, 2017

Figure 4. Industrial Production Growth Rate in Nigeria

Figure 4 shows the industrial production growth rate from 1980 to 2016. The trend reveals that the annual percentage growth rate in the industrial sector especially in the manufacturing, mining and construction sector declined drastically from -7.6% to -13% in 1982 and 1983. However, in 1984 and 1985, it witnessed an increase although between 1986 and 1987; there was a drop in production of output. In addition, from 1988 till 1993, the sector witnessed a positive trend but insignificant. The same positive and insignificant trend was witnessed between 2002 and 2005, 2007 and 2014 respectively. Consequently, from 2015 till date there has been a consistent decline in the production growth rate of most industrial subsectors in Nigeria. The consistent drop is mainly due to increase in cost of raw materials, inadequate power supply, unfriendly trade & investment policies and corruption in Nigeria.

## 2. Literature review

There are several empirical studies on industrialization, electricity consumption and economic growth, and few others on the impact of foreign direct investment on industrial sector and growth. However, there is a dearth of studies on impact of industrialization on economic growth especially in Nigeria. Our study, therefore, focuses role of industrialization as a panacea to economic growth in Nigeria. The empirical evidence is divided into two strands: those beaming searchlight on the Nigerian economy and those focusing on other countries and regions.

In the study conducted by Obioma *et al* (2015), on theoretical relationship regarding industrialization and economic growth in Nigeria between 1980 and 2003, reveals that industrialization has a positive and significant impact on economic growth in Nigeria, although the results indicate a negative impact on the environment. Abiola and Egbuwalo (2010) conducted a study on the relationship between investment, industrial sector and economic growth in Nigeria, for the period of 1975 and 2007. Employing OLS model and co-integration test, its results show that investment on industrial sector has a positive and long-run relationship with economic growth in Nigeria.

Further, Sam and Udeage (2010) investigated the link between industrialization and financial sector on economic growth in Nigeria by employing a vector autoregressive (VAR) model. The results indicate that changes in domestic credit significantly impact growth and enhanced industrial output. More so, Abu and Achegbulu's (2011) study, on foreign direct investment in industries and economic growth in Nigeria between the 1986 and 2006, reveal that direct investment on domestic industries has a positive and significant effect on economic growth in Nigeria. Thus, based on the results of their analysis, the authors recommend, that government should intensify effort in creating enabling environment and support that could prompt foreign investors to invest voraciously in the industrial and service sectors of the economy. In line with the result of Abu and Achegbulu (2011), Okodua (2009) examined the sustainability of the foreign direct investment on industrial growth in Nigeria, by employing multivariate VAR, VECM and Johansen Co-integration test. The results of the author slightly different from that of Abu and Achegbulu (2011). The author's results reveal that long-run equilibrium exists between foreign direct investment and industrial growth in Nigeria.

In addition, Mojekwu and Samson (2012) investigated the relationship between gross capital formation in industries and economic growth in Nigeria, using ordinary least square model and Johansen co-integration test to examine the long-run effect. The result of the study shows that a positive long-run relationship exists between gross capital formation in industries and economic growth in Nigeria. Moreover, few studies conducted on other countries as it pertains to the subject matter are reviewed below. Katuria and Raj's (2009) study on the relationship between manufacturing and industrial growth in India for the period 1970 to 2012, reveal that growth in manufacturing and industrial subsectors in India positively and significantly enhanced growth. In the same vein, Adams and Bart's (2015) study on manufacturing sector and economic growth on Ethiopia for the period 1950-2005, shows that manufacturing sector has a positive impact on growth.

In light of the studies reviewed in this section, it is clear that there have been no uniformity on the possible effect of industrialization on economic growth, while some claim that direct investment in domestic industries has a positive and significant effect on economic growth in Nigeria (see studies like, Obioma *et al*, 2015; Abiola and Egbuwalo, 2010; Abu and Achegbulu, 2011; Mojekwu and Samson, 2012), others observed that industrialization has a negative impact on growth as it contributes to environmental pollution which reduces the output from the agricultural sector of the economy (Okodua, 2009). Since there is no consensus in the literature, this present study will expand the horizon by incorporating variables (public debts and exchange rate) which are not considered in previous studies to resolve the present inconsistencies. Also, the inclusion of the previously omitted variables will make it possible to determine the appropriate impact (positive or negative) of industrialization on economic growth. This is the gap this study aims to fill in the literature.

## 3 Theoretical Framework and Methods of Analysis

The theoretical underpinning of the study is based on Cole and Ohanian (2004) and Charie *et al* (2007), which adapted and extended the Solow neoclassical growth model. The authors' model takes into account two sector growth model that is

used extensively in the growth literature to study structural transformation. The model was further extended by Herrendorf *et al* (2013), it incorporates two sectors: agricultural (A) and non-agricultural (M). The Herrendorf *et al.* (2013) neoclassical growth model is specified as:

$$\sum_{t=0}^{\infty} \beta_t U(C_t^A, C_t^M)^{1-\rho} - 1/1 - \rho \tag{1}$$

The above equation can explicitly be written as:

$$U(C_t^A, C_t^M) = [\eta 1/\sigma (C_t^A - Y^A)_{\sigma}^{\sigma-1} + (1-\eta)_{\sigma}^1 (C_t^M)_{\sigma}^{\sigma-1}]_{\sigma-1}^{\sigma} \tag{2}$$

Where:

$C_t^A$  is per capita consumption of agricultural goods and  $C_t^M$  is per capita consumption of non-agricultural goods. The subsistence level of consumption of agricultural goods is denoted by  $Y^A \geq 0$ . Following equation (2), the output in the two sector is produced using the Cobb-Douglas technology:

$$Y_t^i = f_t^i(K_t^i, N_t^i) = X_t^i (K_t^i)^{\alpha_{k,i}} (N_t^i)^{\alpha_{N,i}} \tag{3}$$

Where:

$X_t^i, K_t^i$  and  $N_t^i$  are total factor productivity, capital stock and labour in sector  $i$ .

Denoting  $K_t^A$  and  $K_t^M$  as the capital stock in agriculture and manufacturing respectively, the feasibility condition for the inter-sectoral capital is given as:

$$K_t = K_t^A + K_t^M \tag{4}$$

Where:

$K_t$  is the total capital stock  $K_t^A$  and  $K_t^M$  are capital stock in agriculture and manufacturing. Incorporating government expenditure on manufacturing goods and output growth on manufacturing turn the equation to:

$$Y_t^M = K_t^A + K_t^M + G_t^M + \varepsilon_t \tag{5}$$

Where:

$Y_t^M$  is the output growth manufacturing proxied GDP,  $K_t^A$  is the capital stock in agriculture and  $K_t^M$  is the capital stock on manufacturing while  $G_t^M$  is government expenditure on manufacturing goods.

From equation (5), the model is modified to suit the study. The modified equation is specified as:

$$RGDP = f(MVA, IPGR, PUDEBT, EXCH) \tag{6}$$

Where:

RGDP is real gross domestic product, MVA is manufacturing value added, PUDEBT is public debt and EXCH is exchange rate, IPGR is industrial production growth rate.

Linearly, the model is given as follows:

$$RGDP_t = \alpha_0 + \alpha_1 MVA_t + \alpha_2 IPGR_t + PUDEBT_t + EXCH_t + U_t \tag{7}$$

### 3.1. Estimation Technique

The Autoregressive Distributive Lag (ARDL) bound testing model is the most suitable for this work since the long-run relationship between industrialization and economic growth in Nigeria is our focus. ARDL can be applied regardless of whether the underlying regressors are integrated of order one, zero or mutually co-integrated. In general, the technique

generally provides unbiased estimate of the long run model and valid t-statistic even in the presence of endogenous regressor (Pesaran *et al.*, 2001). The ARDL bound testing framework is expressed as follows:

$$\Delta RGDP_t = \alpha_0 + \sum_{i=1}^p \alpha_1 \Delta RGDP_{t-1} + \sum_{i=0}^p \alpha_2 \Delta MVA_{t-1} + \sum_{i=0}^p \alpha_3 \Delta IPGR_{t-1} + \sum_{i=0}^p \alpha_4 \Delta PUDEBT_{t-1} + \sum_{i=0}^p \alpha_5 \Delta EXCH_{t-1} + \alpha_6 \ln RGDP_{t-1} + \alpha_7 \ln MVA_{t-1} + \alpha_8 \ln IPGR_{t-1} + \alpha_9 \ln PUDEBT_{t-1} + \alpha_{10} \ln EXCH_{t-1} \tag{8}$$

### 3.2. Source of Data and Scope of study

Data for this study were sourced from the Central Bank of Nigeria Statistical Bulletin (2016) and World Development Indicators (2016) and the scope of data coverage for the study is from 1981 to 2015 base on the availability of the data for the period of study.

## 4. Empirical Results and Discussions

### 4.1. Stationarity Test

Table 1. Stationarity Test

Variables	Levels				First Difference			
	PP Test Stat.	1%	5%	Order of Integration	PP Test Stat.	1%	5%	Order of Integration
LRGDP	-0.15	-3.63	-2.95	I(0)	-5.56	-3.63	-2.95	I(1)
LMVA	-0.17	-3.63	-2.95	I(0)	-5.66	-3.63	-2.95	I(1)
IPGR	-5.80	-3.63	-2.95	I(0)	-7.28	-3.63	-2.95	I(1)
LPUDEBT	-0.78	-3.63	-2.95	I(0)	-7.64	-3.63	-2.95	I(1)
EXCH	-1.53	-3.63	-2.95	I(0)	-1.96	-3.63	-2.95	I(1)

Note: \* significant at 1%, \*\* significant at 5%, \*\*\* significant at 10%.

Source: Authors' Computation

The Phillip-Perron test result shows that log of Real Gross Domestic Product, log of manufacturing value added, log of public debt and exchange rate are not stationary at level at 1% and 5% significance respectively, except for industrial production growth rate which is stationary at 1% and 5% levels of significance, indicating that there is unit root. On the other hand, it is identified that log of Real Gross Domestic Product, log of manufacturing value added, industrial production growth rate, and log of public debt are all stationary at first difference at both 1% and 5% significance levels respectively, except for exchange rate which is not stationary at both 1% and 5% levels respectively. By implication, the series are mean reverting and convergent towards their long-run equilibrium. In this regard, the ARDL model is best suitable for this study, since it allows for order of integration (1) and (0).

### 4.2. Wald Test

The Wald test is used to test for long-run relationship among variables by comparing the results with Pesaran (2001) bound test table.

Table 2. Wald Test

Test Statistic	Value	Df	Probability
F-statistic	4.726770	(6,23)	0.0358
Chi-square	12.91606	6	0.0444
Null Hypothesis: C(1)=0, C(2)=0, C(3)=0, C(4)=0, C(5)=0, C(6)=0			

Source: Authors' Computation, 2017

The hypothesis is tested by the means of the F-Statistic. Since the F-Statistic is greater than I(0) and I(1) output in the Pesaran Bound Test table, we reject the null hypothesis and accept alternative and therefore conclude that the estimated variables are co-integrated in the long-run. This implies that there exists an equilibrium long-run relationship between industrialization and economic growth in Nigeria.

## 4.3. Auto-Regressive Distributive Lag (ARDL) Results

Table 3. ARDL Results (Dependent Variable: LRGDP)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LMVA(-1)	0.26	0.12	-3.17	0.004
LPUDEBT(-1)	-0.89	0.04	-2.40	0.023
D(LRGDP(-1))	1.11	0.06	1.54	0.035
D(IPGR(-1))	-0.01	0.02	0.66	0.516
D(REXCH(-1))	0.37	0.03	0.17	0.054
C	10.93	1.20	2.21	0.036
@TREND	0.02	0.03	2.95	0.001
R-square	0.721			
Adjusted R-squared	0.54			
F-statistic	1.82			
Prob.(F-statistic)	0.123	Durbin-Watson stat 2.04		

**Source:** Authors' Computation, 2017

Table 3 above indicates that the co-efficient of the constant is 10.93, which implies that when all independent variables are held constant, the value of real Gross Domestic Product is 10.80. The analysis further shows that a unit change in log Manufacturing Value Added increases real gross domestic product by 26%, implying that Manufacturing Value Added positively and significantly impact real GDP, meaning that manufacturing value added has more to contribute to real GDP in Nigeria in the long-run, but does not have any effect on real GDP in the short-run. This result conforms to apriori expectation because an increased manufacturing is expected to increase growth, reduce unemployment, generate revenue and create an unprecedented foreign investment.

Conversely, a unit change in the log public debt decreases real gross domestic product by 89%, indicating that public debt negatively but significantly impact on real GDP in the long-run. The implication is that increase in government expenditure significantly instigates growth (positive) but the long-run effect is that government will have to spend more in servicing outstanding debt which eventually will affect economic growth. In the same vein, industrial production growth rate negatively and insignificant affect real gross domestic product in the short-run. Implying that a unit change in industrial production growth rate will reduce real gross domestic product by 1.0%.

In addition, a unit changes in real exchange rate increases real gross domestic product by 37%. This implies that real exchange rate in the short-run positively and significantly impact growth, but in the long-run it does not. The R-squared (co-efficient of determination) show that 72.1% of the total variation in real GDP can be explained by the explanatory variables which implies that the model is a good fit. Also, the Durbin-Watson statistic of 2.04 shows that there is absence of serial autocorrelation that there is independence of observation in the error term. The F-statistic of 1.2 with a probability value of 0.123 indicates that data used in the estimation fitted well into the equation, hence the model is adequate in explaining the role of industrialization on economic growth in Nigeria.

## 5. Conclusions

This paper examines the long run relationship between industrialization and economic growth in Nigeria between 1981 and 2015 with the application of the co-integration approach known as Autoregressive Distributed Lag Model (ARDL). The theoretical underpinning of the study is the extended Solow neoclassical growth model (Cole and Ohanian, 2004; Charie *et al.*, 2007; Herrendorf *et al.* (2013). The model takes into account two sector growth approaches that is used extensively in the growth literature to study structural transformation. Our study expands knowledge as it incorporates variables (public debts and exchange rate) in the estimated model; however, they are excluded in past studies. The rationale for that is due to the fact that these two variables are germane to macroeconomic growth in Nigeria's economy. The empirical results of the study confirm our expectations and indicate that a long run relationship exists between industrialization and economic growth. Equivocally, going by experiences of other emerging economies, especially; the Asian Tigers, Nigeria will in no time get out of her doldrums; if she tolls rigorously the path of industrialization (panacea to economic growth).

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