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Determinants of Structural Changes in Manufacturing Sector in Nigeria

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Abstract

This paper examines the determinants of structural changes in manufacturing sector's share in GDP between 1970 and 2016 through the ARDL approach. The result from the empirical model in this study suggests that oil price and financial availability are the key factors that influence dynamics of the manufacturing sector. Trade openness; per capita income and foreign direct investment have insignificant effect of the dynamics of the manufacturing sector's share of GDP. Oil was seen as a drag on the manufacturing sector as the rate of decline in the sector is associated with increase in oil exploration in Nigeria. It is, therefore, recommended that government should adopt good macroeconomic management, especially in terms of adequate financial support and infrastructure to facilitate an expansion of manufacturing output. Linkage should be formed between oil and manufacturing industries. Oil related manufacturing company should be encouraged in order to take the advantage of oil resources in the country.

Key words

Manufacturing sector, Nigeria, economy

JEL Codes: B22, L16

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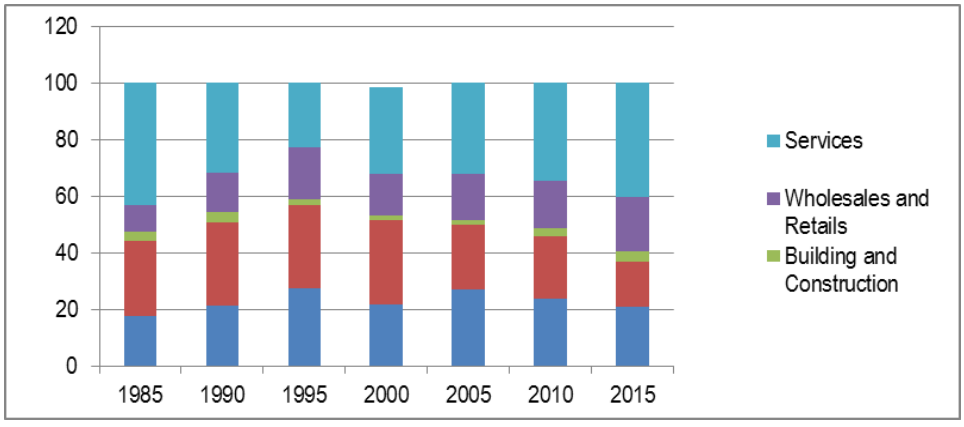
1. Introduction

Nigeria, although viewed as agrarian economy, might be moving toward industrial economy. Thus, the popular view of the Nigeria as an agrarian economy, an agricultural nation, is now inaccurate. Over the past 30 years the structure of the economy has been transformed. For instance, the Nigeria's agricultural sector now contributes only around 30% of total output (Figure 1), whereas, the industrial sector (oil and manufacturing) has become dominant in terms of output as shown in Table 1. Apart from the share of the agricultural sector which reduces from 1975, the contributions of building and construction declined during the mid-1980 and became insignificant between 1990 and 2000.



Source: Authors' based on CBN, 2017

Figure 1. Sectoral contributions to GDP

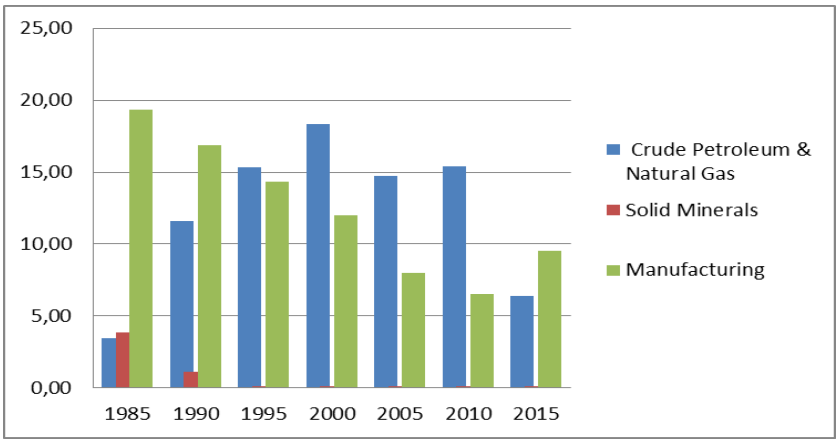
Table 1. Change in Share of Labour Force in Major Sectors, 1996–2009

Activities	1996-1999	1999-2005	2005-2009	1998-2009
Agriculture	-4.4	-3.6	+3.4	-5.6
Wholesale and Retail Trade	+1.1	-2.8	-0.4	-2.1
General Services	+1.0	+9.1	-9.0	+1.1

Transport and Communication	0.3	0.0	+0.6	+0.9
Manufacturing	+1.2	-2.0	+3.0	+2.2
Finance and Business Services	+0.3	-0.1	+1.9	+2.2

Source: Adeyinka *et al.* (2013)

The industrial sector (oil, solid minerals and manufacturing) experienced structural change. The manufacturing sector which dominated the industrial sector in the 60s was overshadowed by crude petroleum and natural gas sector from 1970s (Figure 2), while, the contributions of solid minerals to GDP became less than 1 percent as from 1990.



Source: Authors' based on CBN, 2017

Figure 2. Breakdown of Industrial sector's share in GDP

Investigations on the causes of structural change have been mostly theoretical. An example is Mordi *et al.* (2008), who described the changing structure of the Nigerian economy from 1960. Adeyinka *et al.* (2013) also documented the structural change in Nigeria's economy. They claim that structural change in the country accounts for approximately one-fifth of the total change in labor productivity in Nigeria between 1996 and 2009. They asserts that this structural change was due to the movement of labour out of the agricultural and wholesale and retail trade sectors into manufacturing, transportation and communications, business services, and general services. Thus, the objective of this paper is to empirically examine the determinants of structural changes in the industrial sector between 1970 and 2016.

2. Literature review

2.1. Concept of Structural Change

Structural change is often discussed in terms of the even more widely drawn 'primary', 'secondary' and 'tertiary' (service) sectors, although, sectors of an economy may be widely drawn to include groups of industries (e.g. the engineering industries) or narrowly drawn to identify parts of industries (e.g. fuel-injection equipment), depending on our purpose (Vollrath, 2009). Syrquin (1988) asserts that structural change is "the shifts in the sectoral composition of economic activity (industrialization) focusing initially on the allocation of employment and later on production and factor use in general; and changes in the location of economic activity (urbanization). Landesmann (2000) sees structural change in two ways: changes in compositional structures of output, employment, exports, etc.; and changes in behaviour, such as output-employment relationships or FDI import/export dynamic, etc. Chongvilaivan and Hur (2012) define structural change as the productivity effects of labor reallocation across diverse industries.

Theoretically, many growth theorists have stressed the importance of structural change in the process of socio-economic growth and development. Marx states that economies in their journey to development proceed from pure labour economy producing subsistence goods; to early capitalism based on handicraft technologies, and to manufacture based economy. List classified structural changes as movement from savage to pastoral agriculture to agricultural-manufacturing and to agricultural-manufacturing-commercial. In his opinion, "progress in agriculture could only occur under the stimulus of export demand or through the impact of domestic industrial development. Arthur Lewis theory primarily focuses on structural transformation of an economy through the process of labor transfer from the agricultural sector to the manufacturing sector. To him, growth of output and employment in the modern sector and the overall economy will be boosted when labour from the traditional, overpopulated rural subsistence sector characterized by zero marginal labor productivity moves to a high-productivity modern urban industrial sector with positive (greater than zero) marginal productivity (Todaro and Smith, 2003).

2.2. Determinants of Structural Change

Factors influencing structural change are numerous. According to Mousley, (2010), the pattern of demand for a country's products changes with variations in income or taste, affecting in turn both output and employment. If economic growth occurs and real incomes rise, then the demand for goods and service with high and positive income elasticity will tend to increase relative to those with low or even negative income elasticity (Kitsonand Mitchie, 1996).

Changes in the age structure of the population also affect the structural changes of the economy. For instance, higher working population will induce high demand in recreation, entertainment and education sector. Continuing rise in the numbers of people aged over 75, who will place increasingly heavy demands on the medical and care services (Ciccone and Papaioannou, 2009). Also, higher proportion of children will induce demand for products in the industries specializing in baby care products.The Supply side is also important in its influence on structural change by initiating new patterns of demand, output and employment, creating new products or by reducing the prices of existing products and raising quality. Technical progress makes possible entirely new goods and services, as well as new processes for producing existing goods and services (Anyanwu, 2001; Ogunleye and Ayeni, 2008). Changes in resource availability may also initiate structural change, as happened so dramatically with oil in 1973 and again in 1979. When the oil-producing and exporting countries (OPEC) restricted world output, oil-based products rose sharply in price, with direct consequences for substitutes (e.g. coal and gas) and complements (e.g. cars). In response to higher oil prices, not only did the demand for substitutes rise, and for complements fall, but decisions had also to be taken throughout the economy, by both producers and consumers, to use less energy. As a result there was a decline in output and employment in energy intensive industries, a prime example being steel (Jongwanich and Magtibay-Ramos, 2009). International competition is also responsible for change in the economic structure. Changing consumer tastes, the creation of new products and changing comparative costs result in the redistribution of economic activity around the world (Miller and Upadhyay, 2000; Aluko *et al.*, 2004).

3. Methodology of research

The model for this study was adapted from Jongwanich and Magtibay-Ramos (2009).The model was used to examine the determinants of structural changes in food exports. However, for this study, we focused on structure of manufacturing sector**.** Oil price is introduced into the model to capture the situation in Nigeria. The model is stated as:

$$MAN= \beta_0 + \beta_1 GDPP+ \beta_2 OPEN + \beta_3 FA + \beta_4 OP + \beta_5 GCF + \beta_6 FDI+ \mu \quad (1)$$

Where:

MAN= share of manufacturing sector in GDP; GDPP= per capita income; *OPEN* = trade openness;

FA = financial availability; *OP*= oil price; GCF= gross capital formation; *FDI* = foreign direct investment inflows.

3.1. Sources of Data

Secondary data are used for this study spanning 1970 to 2016. Per capita GDP, foreign direct investment, trade openness and gross capital formation were sourced from the World Bank indicators, financial availability, proxied by commercial banks' credit to the manufacturing sector, and share of manufacturing sector in GDP were sourced from the Central Bank statistical bulletin 2017. Oil price was sourced from various CBN annual reports.

4. Empirical Results

In this section, the determinants of structural changes in the manufacturing sector in Nigeria are empirically examined using the Autoregressive Distributed lag model (ARDL) over the period 1970 to 2016.

Table 2. Unit root tests

Variable	Augmented Dickey Fuller Test			Level of Integration
	Level	First difference	Critical value (5%)	
MAN	-0.657207	-3.749083	-2.936942	I(1)
GDPP	-0.275627	-6.064362	-3.520787	I(1)
OPEN	-2.681169	-4.901320	-3.523623	I(1)
FA	1.3979839	7.0369424*	2.941145	I(2)
OP	-1.601317	-5.907033	2.9281412	I(1)
GCF	2.840193	8.124400	-2.933157	I(1)
FDI	-3.636087		-3.520787	I(0)

Source: Authors' Computation

The ADF unit root tests results for the variables are reported in Table 2. In the results, all variables are integrated of order 1, that is, stationary at first difference based on Augmented Dickey Fuller test except for foreign direct investment and credit availability which are stationary at level and at order two respectively. These results, thereby, justify the use of ARDL method. Table 2 presents the unit root test of the time series variables used in this study. This was to ensure that the variables in our model are not I(2), that is, not stationary at second difference, so as to avoid spurious results.

4.1. Bounds tests for cointegration

The summary result of the bounds tests for cointegration is reported in Table 3.The calculated F-statistic is lower than the Pesaran's critical lower bound value of 2.27 and upper bound values of 3.28 at 5 per cent level of significance. This implies that the null hypothesis of no co-integration cannot be rejected and, thus, it is concluded that there is no co-integration relationship among the variables used in the model.

Table 3. Cointegration test

F-Bounds		**Null Hypothesis**		
Test Stiatistic	**Value**	**Signif**	**I(0)**	**I(1)**
F-Staistic	1.926762	10%	1.99	2.94
		5%	2.27	3.28
		2.50%	2.55	3.61
		1%	2.88	3.99
Actual Sample Size	46	Finite Sample	n=50	
		10%	2.17	3.22
		5%	2.55	3.70
		1.00%	3.42	4.88
		Finite Sample	n=45	
		10%	2.188	3.254
		5%	2.591	3.766
		1.00%	3.54	4.931

Source: Authors' Computation

4.2. Regression Result

The regression result for the model is presented in table 4:

Table 4. The Results of ARDL model

Dependent Variable: LOG(MAN)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.116354	3.510902	-0.033141	0.9737
LOG(MAN(-1))	1.057286	0.118184	8.946127	0.0000
LOG(GDPPC(-1))	0.012508	0.413489	0.030249	0.9760
LOG(OPEN(-1))	0.113809	0.070686	1.610057	0.1161
LOG(GCF(-1))	0.032972	0.062416	0.528262	0.6006
LOG(FA(-1))	-0.184288	0.102714	-1.794180	0.0812
LOG(FA(-2))	0.226678	0.085636	2.646995	0.0120
OP(-1)	-0.009956	0.004153	-2.397594	0.0218
FDI(-1)	0.026586	0.031231	0.851268	0.4002

R-squared	0.973400	Mean dependent var	10.22861
Adjusted R-squared	0.967489	S.D. dependent var	2.001385
S.E. of regression	0.360868	Akaike info criterion	0.976248
Sum squared resid	4.688127	Schwarz criterion	1.337580
Log likelihood	-12.96558	Hannan-Quinn criter.	1.110949
F-statistic	164.6714	Durbin-Watson stat	2.362440
Prob(F-statistic)	0.000000		

Source: Authors' Computation

The result of auto regressive distributed model is presented in Table 4. The lag length of each of the model is selected on basis of Akaike Info Criteria (AIC). The result shows that domestic per capita income has an insignificant impact on the performance of the manufacturing sector in Nigeria. This is reasonable given that there is low demand for local made

manufactured products as Nigerians have high preference for foreign made commodities. The result also shows that oil price has a significant negative effect on the manufacturing share in GDP. The statistically negative significance of oil price in the manufacturing sector share in GDP supports the hypothesis that existence of oil in the economy causes decline in the performance of the manufacturing sector (otherwise known as de-industralisation). The manufacturing sector has been neglected over the last three decades due to oil exploration and poor infrastructural facilities.

The result in the table also reports an insignificant relationship between trade openness and the manufacturing share of GDP. It shows that Local made products do not compete favourable in the international market. This might be due to high cost of production, which in-turn resulted from high infrastructure cost, regulatory cost and management cost. Foreign direct investment does not significantly impact on manufacturing sector's performance. However, credit availability has a significant positive effect on the performance of the manufacturing sector. This shows that with financial stability manufacturing activities will be boosted. The adjusted R-squared of the model is 97 percent, indicating the about 97 percent of the variations in manufacturing sector's performance is explained by variations in all the independent variables. The F-statistic value long-run model is also significant and implies that all the independents variables include in the model are jointly significant.

4.3. Normality Test

The normality test for the regression result is presented in Table 5.

Table 5: Normality Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

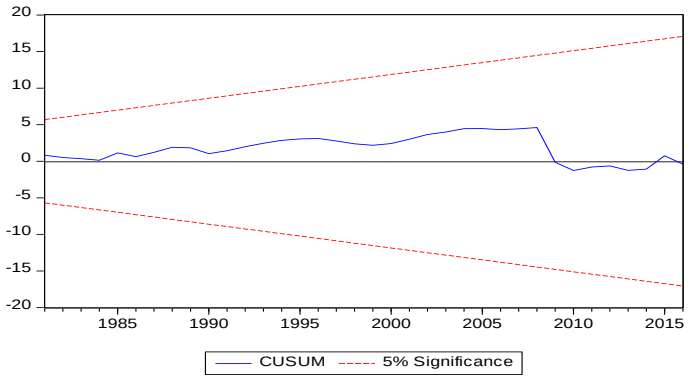
F-statistic	0.015846	Prob. F(1,35)	0.9005
Obs*R-squared	0.020365	Prob. Chi-Square(1)	0.8865

Source: Authors' Computation

The result of the normality test shows that the calculated F value (0.90) is well above the critical (0.0158). This simply implies that the model is not suffering from serial correlation.

4.4. Stability Test

The stability test is presented in Figure 3 and it shows that the model lies between the 5 per cent critical boundary. This simply means that the model is stable.



Source: Authors' computation

Figure 3. Stability Test

5. Conclusions

This paper examines the determinants of structural changes in manufacturing sector's share in GDP between 1970 and 2016 using ARDL approach. Over the past three decades, manufacturing sector's value added has shown greater dynamism compared to agricultural sector. The empirical model in this study suggests that oil price and financial availability are the key factors that influence dynamics of the manufacturing sector. Trade openness; per capital income and foreign direct investment have insignificant effect of the dynamics of the manufacturing sector. Oil has been a drag on the

manufacturing sector as the rate of decline in the sector is associated with increase in oil exploration in Nigeria. Hence, there is dire need for change in orientation toward the manufacturing sector. Good macroeconomic management, especially in terms of adequate financial support and infrastructure could facilitate an expansion of manufacturing output. Linkage should be formed between oil and manufacturing industries. Oil related manufacturing company should be encouraged in order to take the advantage of oil resources in the country.

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