

The Impact of Productivity, Employment, Sales Volume With and Without Completely Knocked Down in Automotive Industry on Economic Growth in Nigeria: 1987-2019

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Abstract

This study investigated the impact of Productivity, Employment Creation, Sales Volume and CKD in Automotive Industry in Nigeria using time series data for 1987 to 2019. Unit root test was conducted, the result showed mixed order of integration i.e I(0) and I(1) which informs the use of Autoregressive Distributed Lag Model (ARDL) technique of analysis. The findings and conclusion from the study revealed that employment, productivity, sales volume and completely knocked down in automotive industry are all positive and significant. These immensely contribute to the economic growth in Nigeria. This attests to the fact that Government needs to allow only the importation of CKD and ban SKD to increase productivity thereby generating increase in employment. This invariably increases standard of living and boosting sales volume with reduction in average unit cost. The multiplier effects will also boost productivities of allied industries' products and services such as iron and steel, rubber, plastics, electrical equipment, road construction, transportation, urban and rural development. So, government needs to be serious to establish Vehicle Finance Scheme where no one needs to put down 100% cash to own a vehicle. Government should therefore encourage importation of Completely Knocked Down rather than Semi Knocked Down.

Keywords: Economic Growth (RGDP), Productivity (OUT), Employment Creation (EMP), Sales Volume (SAV), Completely Knocked Down (CKD), Semi knocked Down (SKD) and Automotive Industry

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1.0 Introduction

Economic growth in Nigeria has experienced the phases of trade circle such as prosperity and depression. Despite the availability and expenditure, colossal amount of foreign exchange derived mainly from its oil and gas resources, economic growth has been weak especially from 2016 up to date and the incidences of poverty and unemployment have increased. The primary aim of any developing nation like Nigeria is to improve the standard of living of its citizenry and promote economic growth and development of the country. Due to vicious circle of poverty, the scarcity of resources, high unemployment rate and the law of comparative advantage, countries depend on each other to foster economic growth and achieve sustainable economic development. Economic growth in any country is a fundamental requisite to economic development. However, in Nigeria growth continuously dominates the government policies in order to achieve her developmental objectives. Essentially, economic growth is associated with policies aimed at transforming and restructuring the real economic sectors. Nevertheless, the lack of enough domestic resources, savings and investment to support the investors is a major factor that affects economic development in the country so negatively, because of the gap between savings and investment (Oyelaran, 1997). This and other factors had drastically reduced the performances of automotive industry in this country, this has made many Nigerians continue to ask whether there could ever be a Nigerian car brand.

It was this same question that urged Innoson to pursue his motor manufacturing dream. In October 2010, Innoson Vehicle Manufacturing (IVM) unveiled his multi-billion-naira Car Assembly Factory, located in his hometown of Nnewi in South Eastern Nigeria. While his success is welcome, it has raised questions and doubts, as well as scorn. Many people wonder about IVM's longevity. Innoson's IVM motors were set up with the assistance of Chinese expatriates. At its inauguration in 2010, IVM already had in its product line SUVs, mini and long buses, heavy-duty vehicles, patrol vans and pick-up vans, easily establishing itself as a versatile automobile company capable of meeting a wide range of product demands. (Akiagwe, 2010).

However, the impact of automotive industry can never be over emphasized as it serves as catalyst for other manufacturing activities such as iron and steel, rubber, plastics, electrical equipment, road construction, transportation, urban and rural development. Hence, in lieu of the above, this study seeks to examine the impact of automotive industry on economic growth in Nigeria. Hence, this paper is structured into five sections. Section 1 presents the introduction to the paper, section 2 is the literature review, while section 3 presents the methodology used in the paper. Section 4 presents results and interpretations, while section 5 concludes the paper.

2.0 Review of Related Literature

For the productivity and economic growth, Liu & Wu (2019) examined the transmission mechanism between tourism productivity and economic growth using Spain as an empirical setting. The study employed Bayesian dynamic stochastic general equilibrium model for the first time in the tourism literature by relaxing and integrating the assumption of diminishing return of capital into a new growth theory. The results revealed the impact of tourism productivity on economic growth and illustrate the spill-over effects between tourism and other sectors caused by the externalities of physical and human capital and public services. The simulation results further disclose that when the productivity of the overall economy improves, inbound tourism demand expands more than domestic tourism demand, whereas when the productivity of the tourism sector improves, domestic tourism consumption increases more than inbound tourism consumption. Nakamura, Kaihatsu & Yagi (2019) examined the relationship between productivity improvement and economic growth, lessons from Japan. The study identified two reasons behind the productivity slowdown in Japan which include, technology and ideas accumulated by research and development and management resources such as capital and labor are not utilized efficiently, these resources are not efficiently reallocated across corporations. It was deduced from the study that to improve Japan's productivity in the medium to long-term, it is desirable to encourage the flexible reallocation of management resources such as capital and labor by changing working process at the corporate level following changes in the socio-economic environment and the advent of new technologies, as well as by improving efficiency in the labor and capital markets.

Lee & McKibbin (2018) explored the historical experience of productivity growth in the Asian economies over recent decades, with a focus on the service sector. Based on this historical experience, their study evaluates the impact of more rapid growth in labor productivity in the service sector in Asia using an empirical general equilibrium model that allows for goods and capital movements across sectors and economies, and consumption and investment dynamics. The study revealed that faster productivity growth in the service sector in Asia contributes to sustained and balanced growth of Asian economies, but the dynamic adjustment is different across economies. In particular, during the adjustment to higher services productivity growth, there is a significant expansion of the durable manufacturing sector that is required to provide the capital stock that accompanies higher economic growth. Also, Auzina-Emsina (2014) analyzed the impact of changes in labour productivity and its effect on the nation's global competitiveness. The research focused on the European Union countries that experienced the most severe crisis and afterward the most rapid recovery in the post-crisis period (as Latvia, Lithuania, and Estonia). The research findings showed that there are weak or no relations between productivity increase and economic growth in the pre-crisis period and the first phase of the post-crisis period; however, the increase of productivity during the crisis is a significant driver of the economy after some time.

Lam & Shiu (2010) studied the relationships between economic growth, telecommunications development, and productivity growth of the telecommunications sector in different countries and regions of the world. Particularly, the study assessed the impact of mobile telecommunications on economic growth and telecommunications productivity employing panel data granger causality. The results indicate that there is a bidirectional relationship between real gross domestic product (GDP) and telecommunications development (as measured by teledensity) for European and high-income countries. However, when the impact of mobile telecommunications development on economic growth is measured separately, the bi-directional relationship is no longer restricted to European and high-income countries. The study also finds that countries in the upper-middle-income group have achieved a higher average total factor productivity (TFP) growth than other countries. Countries with competition and privatization in telecommunications have achieved a higher TFP growth than those without competition and privatization. The diffusion of mobile telecommunications services is found to be a significant factor that has improved the TFP growth of the telecommunications sector in Central and Eastern Europe (CEE). Similarly, Cao & Birchenall (2013) examined the role of agricultural productivity as a determinant of China's post-reform economic growth and sectoral reallocation. The study employed microeconomic farm-level data, and treating labor as a highly differentiated input, they find that the labor input in agriculture decreased by 5% annually and agricultural TFP grew by 6.5%. also, using a calibrated two-sector general equilibrium model, they find that agricultural TFP growth: (i) accounts for the majority of output and employment reallocation toward non-agriculture; (ii) contributes (at least) as much to aggregate and sectoral economic growth as non-agricultural TFP growth; and (iii) influences economic growth primarily by reallocating workers to the non-agricultural sector, where rapid physical and human capital accumulation are currently taking place.

Shahiduzzaman & Alam (2014) investigated the role of investment in information technology (IT) on economic output and productivity in Australia over about four decades. Employing aggregate production function framework, where IT capital is considered as a separate input of production along with non-IT capital and labour. The empirical results from the study indicate the evidence of robust technical progress in the Australian economy in the 1990s. IT capital had a significant impact on output, labour productivity, and the technical progress in the 1990s. In recent years, however, the contribution of IT capital on output and labour productivity has slowed down. Regaining IT capital productivity, therefore, remains a key challenge for Australia, especially in the context of

greater IT investment in the future. While Gerdin (2002) analyzed the patterns of productivity and economic growth in the aggregated Kenyan agriculture between 1964 and 1996. In the 1964–1973 period, the average output growth exceeded 4% but stagnated to an average of 1.2% during 1988–1996. Over the whole period, capital was the most important contributor to output growth. Mean growth rates of intermediate inputs subsequently decreased and were negative in 1988–1996. Labour was the least significant source of growth. The mean total factor productivity growth was less than 0.4% and decreased over time. The contribution of productivity growth to output growth increased from 10.2% in 1964–1973 to 26.8% in 1988–1996.

On the other hand, employment generation and economic growth related literature include; Nasr-Allah, Gasparatos, Karanja, Dompok, Murphy, Rossignoli & Charo-Karisa (2020) assessed employment generation along the different stages of the aquaculture value chain in the main governorates that are responsible for about 80% of the Egyptian aquaculture production. In particular, it analyzed data from surveys in hatcheries (N=40), feed mills (N=14), fish farms (N=234), and fish trading and retailing (N=182) as a proxy of employment generation patterns for the entire sector. The study showed that aquaculture generates 19.56 Full-Time Equivalent (FTE) jobs per 100t of produced fish along the entire value chain. However, most of these jobs are generated for males over 30 years of age, with few jobs for females or younger people. Most jobs for females are currently generated at the retailing stage. Boosting employment generation across the entire value chain, especially for females and the youth, can contribute to the attainment of multiple Sustainable Development Goals (SDGs) such as SDG 8 and SDG 5.

Kim, İlkaran & Kaya (2019) examined public investment in care services in Turkey as a way of promoting employment & gender-inclusive growth. The study employed a macro-micro simulation model to examine the aggregate and gender employment impact of increasing public expenditures on ECEC services, an underdeveloped sector in Turkey versus physical infrastructure and construction, a common target of stimulatory spending. The methodological approach combines input-output analysis on aggregate employment effects with a statistical microsimulation approach to assess distributional outcomes. The results show that an expansion of ECEC services creates not only significantly more jobs but also does so in a more gender-equitable and fiscally sustainable way than a construction boom. Likewise, Bohlmann, Horridge, Inglesi-Lotz, Roos & Stander (2019) examined the long-run regional economic effects within South Africa of changing the electricity generation mix towards less coal. The study employed a regional Computable General Equilibrium (CGE) model of South Africa and the overall result stemmed from all scenarios suggest that the effect of a transition to an energy supply mix with a smaller share of coal generation is sensitive to other economic and policy conditions, in particular, the reaction of the global coal market and hence, South Africa's coal exports. Under conditions in which surplus coal resulting from lower domestic demand cannot be readily exported, the economies of coal-producing regions in South Africa such as the Mpumalanga province are the most severely affected. The subsequent migration of semi-skilled labour from that province to others within the country requires appropriate and timeous planning by energy policymakers and urban planners.

Liu, Park, Yi & Feiock (2020) empirically evaluates the employment impact of Florida county recycling programs from 2000 through 2011, applying a fixed-effects regression model. The results indicate that a one percentage point increase in the county recycling rate leads to a 0.4% job growth in the overall solid waste and recycling industry. However, the impact of recycling programs on green jobs is not uniform across the recycling subsectors: the effect is concentrated in the recycling processing sector while the solid waste collection sector and scrap materials businesses are unlikely to be influenced by the county's recycling performance.

Bennett, Anyanwu & Kalu-Alexanda (2015) investigated the effect of industrial development on Nigeria's economic growth 1973 - 2013. They employed PC Give 8.00 version statistical package to analyze the secondary data that was collected from the National statistical bulletin. The results revealed that the influence of industrial output on economic growth is not statistically significant though the sign obtained from its *à priori* expectation is positively related to (economic growth) GDP but does not hold strong enough. Savings has a positive relationship and also a significant impact on the economy. Inflation has a negative relationship while net foreign direct investment is positively significant on the impact of economic growth. R-squared shows a 76% increase in GDP. Based on the findings, it is therefore recommended that the government and its agencies should ensure political stability and also the implementation of strategic policies that will create fair playing grounds for foreign investors which will also improve the establishment of industries especially the manufacturing industries to encourage industrialization of Nigeria.

Also, Afolabi & Laseinde (2019) examined the impact of manufacturing sector output on economic growth in Nigeria from 1981 to 2016. The study employed secondary data sourced from the Central Bank of Nigeria statistical bulletin for Autoregressive Distributed Lag (ARDL) model and the Granger causality techniques on RGDP, manufacturing capacity utilization (MCU), manufacturing output (LMO), government investment expenditure (GINVEXP), money supply (LM2) and interest rate (INR). Evidence of long-run and short-run relationships among the variables was established. The results showed that MCU has a positive influence on RGDP while LMO also affects RGDP positively. It also showed that GINVEXP has negative effects on RGDP whereas LM2 influenced RGDP positively. Moreover, the result indicated a unidirectional causality between RGDP and

MCU, LMO, and LM2. Based on the above, the study suggests the government should intensify efforts to promote socio-economic infrastructural, macroeconomic and institutional framework in Nigeria to provide a favourable environment for external and domestic institutions interactions; so harnessed mobilized funds effectively towards the productive manufacturing sector.

Opoku & Yan (2018) examined the impact of industrialization on economic growth in Africa by employing data for the period 1980–2014 from 37 African countries and the generalized method of moments method, the results showed two main interesting outcomes even though industrialization is very much on the low in the region. First, their results affirm the hypothesis that industrialization is an important booster of economic growth. Second, trade openness further augments the effect of industrialization on economic growth. They also employed alternative measures of industrialization and perform sub-regional/sampling analyses and the results are shown to be robust across. Similarly, Ossadzifo (2018) analyzed the impact of the manufacturing sector on economic growth through the role of human capital. His data covered Sub-Saharan African (SSA) countries from 1990 to 2015 and used fixed-effects, random-effects, and Hausman-Taylor estimators taking into account the unobservable characteristics of countries by including fixed effects or random effects in the model. The results show that the manufacturing sector through its value-added has a positive impact on economic growth in SSA countries. Also, the interacting models show that the quality of human capital is an accelerator of the role of the manufacturing sector. The coefficient of the catch-up term is negative and significant in all models indicating that countries with a larger productivity gap relative to China are developing faster than countries closer to China.

Singh (2017) analyzed the growth pattern and economic impact of the automobile industry on the Indian economy. The research study was conducted based on primary as well as secondary sources of data and information published by several governmental and private institutions namely SIAM (Society of Indian Automobile Manufacturers), DIPP (Department of Industrial Policy and Promotion), IBEF (India Brand Equity Foundation), BCG (The Boston Consulting Groups), Ernst & Young, etc. Data were analyzed using a statistical tool like average, Percentage, CAGR (Compound Annual Growth Rate), AAGR (Average Annual Growth Rate), correlation, trend analysis line and bar graph, etc. All variables Exports, FDI, Employment from the automobile industry have a positive impact on the growth of the economy. As a major employment and export generator, GDP contributor, FDI earner, the automobile industry is instrumental in shaping the country's economy.

Also, Saberi (2018) analyzed the role of the automobile industry in the economy of developed countries. The work reflects the extremely high role of the automotive industry in GDP growth and employment generation, the ability of the automotive industry to form a taxable base and revenues of the state budget, As well as the role of the automobile industry in the development of auxiliary industries and the stimulation of scientific and technological progress. Using explorative and descriptive analysis, the study found that the automotive industry contributes to the expansion of the taxable base and revenues of the state budget, develops auxiliary branches, influences scientific and technical progress, testifies to the level of solvent demand and the standard of living of the population of the country and much more. Thus, the effective functioning and development of the automotive industry are important not only economic but also social significance for any country.

Pehlivanoglu & Riyanti (2018) considered sales in the automobile industry as one of the two main objectives of this study. He examined the macroeconomic effect of six variables on automobile sales in the top four automobile production countries. These variables are real GDP, GDP per capita, automobile production, inflation, gasoline price, and exchange rate; and the countries selected are China, USA, Japan, and Germany that has the first four highest automobile production countries in the world. The findings show that real GDP, car production, gasoline price have a positive impact on car sales while the change in GDP per capita, inflation, and exchange rate causes the opposite. Some variables in this research based on findings is inconsistent with the previous findings done by other researchers. While for those top countries GDP per capita and gasoline price have different effects on automobile sales. The reason for that situation is because GDP per capita that reflects fluctuation of income per people of those countries have no significant effect on the number of automobile sales. Given the dearth of literature on the subject matter, this study seeks to fill the gap by providing empirical evidence on the impact of automobile activities on economic growth in Nigeria.

3.0 Method of the Study

3.1 Model Specification

This study adapted a model from Tian, Zhao and Xunmin (2014) who carried out study on “Vehicle Ownership Analysis based on GDP Per Capital in China”. The model is modified by including some variables such as Industrial Output (OUT), Employment (EMP), Sales Volume (SAV), Completely Knocked Down (CKD) in automotive industry in Nigeria. With Real Gross Domestic Product (RGDP) as the dependent variable, Exchange Rate (EXCR), Interest Rate (INTR) and Inflation Rate (INFR) also form part of the explanatory variables. The model is therefore presented as thus;

$$RGDP = f(OUT, EMP, SAV, CKD, EXCR, INTR \& INFR) \dots \dots \dots 1$$

Equation 1 can be transformed into an econometrics model as thus;

$$RGDP_t = \alpha_0 + \alpha_1 OUT_t + \alpha_2 EMP_t + \alpha_3 SAV_t + \alpha_4 CKD_t + \alpha_5 EXCR_t + \alpha_6 INTR_t + \alpha_7 INFR_t + \mu_t \dots \dots \dots 2$$

Where; *RGDP* is Real Gross Domestic Product; *OUT* is the Industrial Output from Automotive Industry; *EMP* is Employment Generation in the Industrial Output from Automotive Industry; *SAV* is the Sales Volume from Automotive Industry; *CKDs* is Completely Knock Down; *EXCR* is Exchange Rate; *INTR* is Interest Rate; *INFR* is Inflation Rate and μ is the Error Term. Based on the theoretical framework and results from the empirical review, it is expected that $\alpha_1, \alpha_2, \alpha_3$ and $\alpha_4 > 0$, α_5 and $\alpha_6 < 0$, while $\alpha_7 > or < 0$.

3.2 Estimation Techniques

3.2.1 ARDL Model

ARDL model enables the study to test for Co-integration among the variables in the model through the help of Bound Test. This is done in order to ascertain the level of long run relationship among the variables in the model. The Autoregressive Distributed Lag (ARDL) version of the model is formulated as follows:

$$RGDP_t = a_0 + \sum_{i=1}^a (\partial_0 RGDP_{t-1}) + \sum_{i=0}^b \partial_1 OUT_{t-1} + \sum_{i=0}^b \partial_2 EMP_{t-1} + \sum_{i=0}^b \partial_3 SAV_{t-1} + \sum_{i=0}^b \partial_4 CKDs_{t-1} + \sum_{i=0}^c \partial_5 EXCR_{t-1} + \sum_{i=0}^d \partial_6 INTR_{t-1} + \sum_{i=0}^e \partial_7 INFR_{t-1} + \partial_8 \Delta RGDP_{t-1} + \partial_9 \Delta OUT_{t-1} + \partial_{10} \Delta EMP_{t-1} + \partial_{11} \Delta SAV_{t-1} + \partial_{12} \Delta CKDs_{t-1} + \partial_{13} \Delta EXCR_{t-1} + \partial_{14} \Delta INTR_{t-1} + \partial_{15} \Delta INFR_{t-1} + U_t \dots \dots \dots 3$$

3.2.2 Error Correction Model (ECM)

If the series are further co-integrated, then it will be most efficiently represented by an error correction method, which is used to tie short run behaviour of the variables to its long-run values. Engel and Granger (1987) stipulated that the ECM will correct disequilibrium error and is of the form:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 U_{t-1} + \varepsilon_t \dots \dots \dots 4$$

Where: Δ denotes the first difference,

U_t is the one period lag value of the residual from the regression equation; α the empirical estimate of the equilibrium term and ε is the error term. The unrestricted ECM model was used from which we obtain efficient lag-length necessary for estimation for ARDL model thus:

$$RGDP_t = a_0 + \sum_{i=1}^a (\partial_0 RGDP_{t-1}) + \sum_{i=0}^b \partial_1 OUT_{t-1} + \sum_{i=0}^b \partial_2 EMP_{t-1} + \sum_{i=0}^b \partial_3 SAV_{t-1} + \sum_{i=0}^b \partial_4 CKDs_{t-1} + \sum_{i=0}^c \partial_5 EXCR_{t-1} + \sum_{i=0}^d \partial_6 INTR_{t-1} + \sum_{i=0}^e \partial_7 INFR_{t-1} + ECM_{t-1} + U_t \dots \dots \dots 5$$

4.0 Results and Discussion

Table 4.1: Summary Statistics

	LGDP	LEMP	LSAV	PDT	LCKD	EXCR	INTR	INFR
Mean	9.255442	6.563740	8.090857	10.31891	7.637736	343.9815	18.98030	19.87273
Median	9.495637	6.986566	8.550048	9.420000	8.259976	402.2500	17.98000	12.22000
Maximum	11.94227	7.718685	9.496045	27.73000	9.444701	787.9800	29.80000	72.84000
Minimum	5.519215	5.159055	6.126869	0.500000	4.488636	16.35000	13.54000	4.070000
Std. Dev.	1.992781	0.818502	1.064374	7.482671	1.455966	240.2236	3.426449	18.33461
Skewness	-0.397143	-0.777884	-0.727133	0.561452	-0.646291	-0.075235	1.503383	1.602969
Kurtosis	1.895639	1.997312	2.177585	2.479348	1.881940	1.572391	5.117151	4.200904
Jarque-Bera	2.544442	4.710473	3.837976	2.106489	4.016138	2.833475	18.59408	16.11528
Probability	0.280209	0.094871	0.146755	0.348804	0.134248	0.242504	0.000092	0.000317
Sum	305.4296	216.6034	266.9983	340.5240	252.0453	11351.39	626.3500	655.8000
Sum Sq. Dev.	127.0776	21.43827	36.25255	1791.692	67.83476	1846636.	375.6977	10757.06
Observations	33	33	33	33	33	33	33	33

Source: Authors' Computation Using Eviews

Table 4.1 shows the descriptive statistics of LGDP, LEMP, PDT, LSAV, EXCR, INTR, INFR, and LCKD. It can be shown that the variables contained 33 observations with EXCR having the highest mean value followed by INFR, INTR, PDT, LGDP, LSAV, LCKD, and LEMP respectively. The table also revealed that LGDP, LEMP, LSAV, EXCR, and LCKD are negatively skewed to the left. The LGDP, LEMP, PDT, LSAV, and EXCR are platykurtic as the value of their kurtosis is less than three, while LCKD, INFR, and INTR are mesokurtic as the value of their kurtosis are greater than three. The probability of the Jarque-Bera shows that LRGDP, PDT, LSAV, and EXCR were normally distributed and others were not. The skewness results for INTR rate and INFR show they are highly skewed as their values are greater than one (1), while LEMP, LSAV, PDT, and LCKD are moderately skewed, given that their skewness values fall between -1 and -0.5 or 0.5 and 1. For LGDP and EXCR, they are symmetrically distributed as their values lie between -0.5 and 0.5.

4.2. Unit Root Test

Table 4.2: Unit Root Test

Variables	ADF Stat	Critical value 1%	Critical value 5%	Critical value 10%	Order of Integration
LGDP	-3.902595	-3.653730	-2.957110	-2.617434	I (0)
Δ PDT	-5.495325	-3.661661	-2.960411	-2.619160	I (1)
Δ LEMP	-4.568079	-3.661661	-2.960411	-2.619160	I (1)
Δ LSAV	-5.741492	-3.661661	-2.960411	-2.619160	I (1)
Δ LCKD	-6.195426	-3.661661	-2.960411	-2.619160	I (1)
Δ EXCR	-5.491989	-3.661661	-2.960411	-2.619160	I (1)
INTR	-4.174370	-3.653730	-2.957110	-2.617434	I (0)
INFR	-3.318211	-3.661661	-2.960411	-2.619160	I (0)

From Table 4.2, the result of the ADF test on all the variables such as LGDP, PDT, LEMP, LSAV, LCKD, EXCR, INTR, and INFR. The test was carried out with an intercept. The result revealed that the variables PDT, LEMP, LSAV, LCKD, EXCR, are stationary after first difference, but LGDP, INTR, and INFR, became stationary at level, meaning that they are integrated of order zero; I(0) except PDT, LEMP, LSAV, LCKD, EXCR that became stationary after first difference i.e they are integrated of order one; I(1). However, this result, therefore, suggests the application of ARDL technique of analysis as it is a mixture of variables with stationarity properties of I(0) and I(1). Hence, we can proceed to examine perhaps there is existence of long-run relationship among the variables of interest through F-bounds cointegration test.

4.3 F-Bounds Cointegration Test for ARDL Model

Table 4.3: F-Bounds Cointegration Test

Number of Regressors	Value of statistic K=7
Computed F-statistic	7.383786
5% Critical value Lower Bound Value	2.17
Upper Bound Value	3.21

Source: Authors' Computation Using Eviews software, version 11, 2020.

The ARDL Bounds test for cointegration results between the target variable and the dependent variables are presented in Table 4.3. The Computed F-statistic is 7.383786, which is above the upper bound asymptotic value at a 5% level of significance. This result suggests the rejection of the null hypothesis that there is no co-integrating relationship among the variables of interest. It, therefore, implies that LGDP is co-integrated with all the explicative variables in the specified model.

4.4 Lag Selection Criteria

Figure 1: Akaike Information Criteria

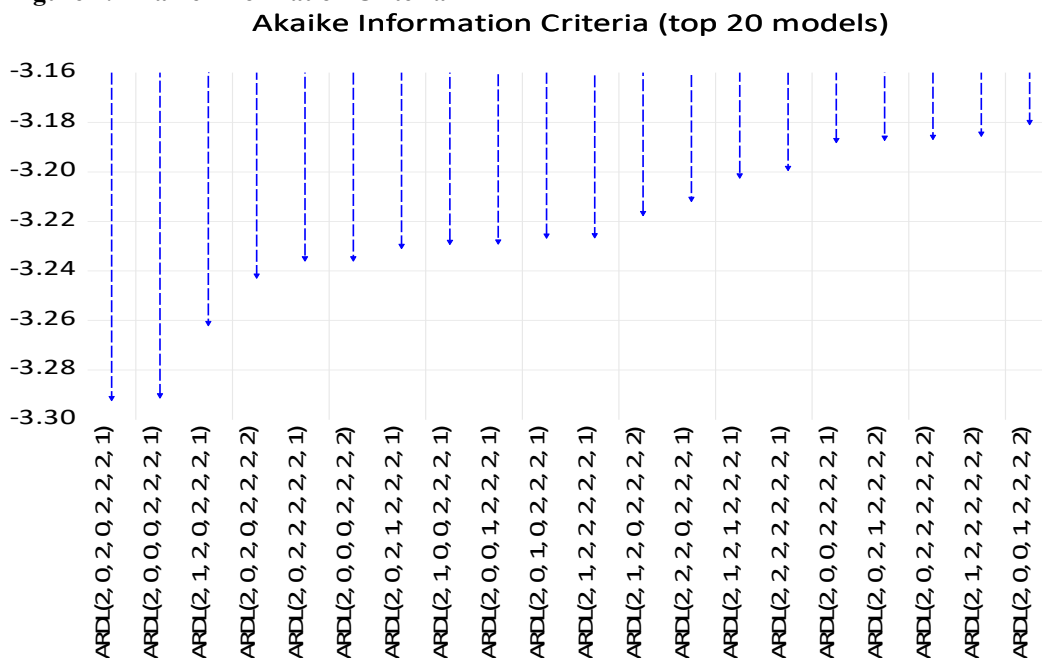


Figure 1 shows the top 20 possible models and the lag structures for the study. Having considered the number of observations which is greater than 30 as shown in the descriptive analysis in table 4.1, The AIC information criteria becomes a suitable technique for determining our lag structure for this study, this is in line with the position of Pesaran & Shin (1998) that AIC performs better in large samples (i.e more than 30 observations) than SIC. Therefore, AIC suggests ARDL (2, 0, 2, 0, 2, 2, 2, 1) as the optimal lag (maximum AIC value and adjusted R-squared).

Therefore, we can move on to estimation of the long-run and the error correction ARDL model.

4.5 Estimated Long-run and Short-run Coefficients of ARDL (2, 0, 2, 0, 2, 2, 2, 1)

Estimated Long Run Coefficients Using the ARDL Approach ARDL (2, 0, 2, 0, 2, 2, 2, 1) Selected based on Akaike info criterion (AIC)				
The dependent variable is LGDP				
Regressor	Coefficient	Std. Error	t-Statistic	Prob.*
LGDP(-1)	0.639971	0.204813	3.124661	0.0088***
LGDP(-2)	0.474587	0.211600	2.242845	0.0446**
LEMP	0.315102	0.076787	4.103573	0.0015***
PDT	0.007239	0.002660	2.721802	0.0185**
PDT(-1)	0.002460	0.003245	0.758135	0.4630
PDT(-2)	-0.003574	0.002768	-1.291302	0.2209
LSAV	0.151256	0.032582	4.642340	0.0027***
LCKD	0.071669	0.019812	3.617453	0.0045***
LCKD(-1)	0.038871	0.024801	1.567311	0.1430
LCKD(-2)	0.053373	0.027529	1.938781	0.0764*
EXCR	3.69E-05	0.000111	0.333495	0.7445
EXCR(-1)	8.13E-05	0.000112	0.723240	0.4834
EXCR(-2)	-0.000298	0.000104	-2.873653	0.0140**
INTR	0.013551	0.003650	3.712919	0.0030***
INTR(-1)	0.014307	0.004323	3.309156	0.0062***
INTR(-2)	0.006470	0.003020	2.142518	0.0534*
INFR	0.005779	0.000795	7.266485	0.0000***
INFR(-1)	0.002837	0.001367	2.075437	0.0601*
C	-2.671094	0.481196	-5.550950	0.0001***
Estimated Short-run Coefficients of ARDL Model and ECM				
D(LGDP(-1))	-0.474587	0.141983	-3.342563	0.0059***
D(PDT)	0.007239	0.001477	4.902204	0.0004***
D(PDT(-1))	0.003574	0.001607	2.224300	0.0461**
D(LCKD)	-0.012233	0.013220	-0.925309	0.3730
D(LCKD(-1))	0.053373	0.013971	3.820214	0.0024***
D(EXCR)	3.69E-05	6.19E-05	0.596326	0.5620
D(EXCR(-1))	0.000298	6.35E-05	4.689143	0.0005***
D(INTR)	0.013551	0.001745	7.763520	0.0000***
D(INTR(-1))	-0.006470	0.001931	-3.351162	0.0058***
D(INFR)	0.005779	0.000476	12.13104	0.0000***
CointEq(-1)*	-0.114558	0.010885	-10.52410	0.0000***
R Squared	0.999800			
Adjusted R-Squared	0.999501			
S.E. of Regression	0.040639			
F-statistic (Prob.)	3339.057 (0.0000)			
Diagnostic Tests				
Test Statistics	LM Version			
A. Serial Correlation	X^2_{auto}	=	2.280455(0.1528)	
B. Functional Form (Ramsey Reset)	X^2_{RESET}	=	2.952557 (0.1137)	
C. Normality	X^2_{Norm}	=	0.219893 (0.895882)	
D. Heteroscedasticity	X^2_{Het}	=	0.771328 (0.6996)	

Source: Authors' Computation Using Eviews software, version 11, 2020.

Note: ***, ** and * indicate significance at 1% , 5% and 10% level of significances. Figures in parenthesis are probability values. A is Breusch-Godfrey Serial Correlation LM Test, B is Ramsey's RESET test, C is Normality Test, D is Heteroscedasticity test

Figure 2 (A): Normality Test

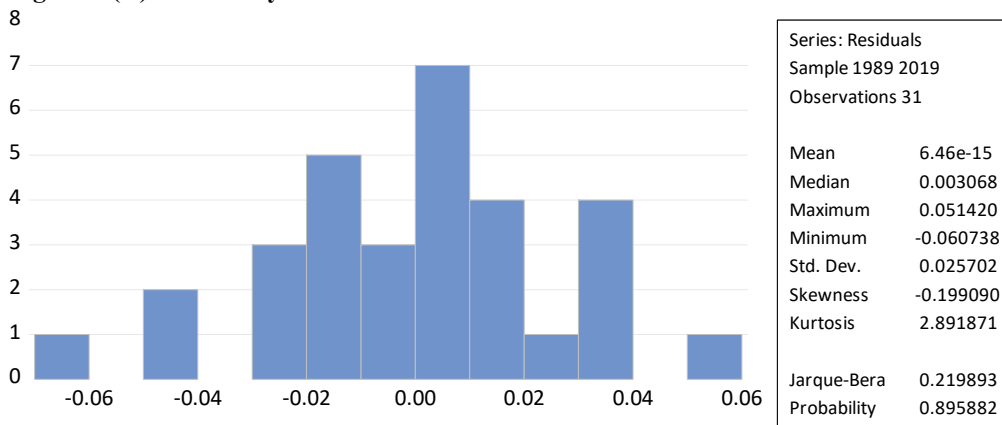


Figure 3 (B): CUSUM Test

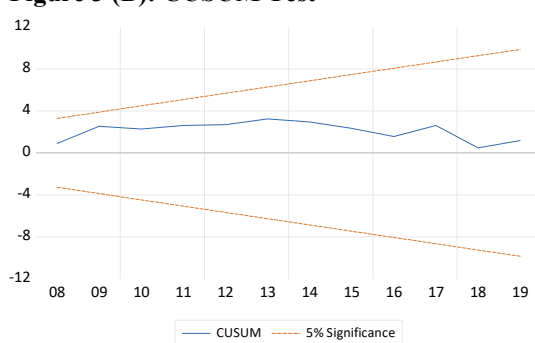
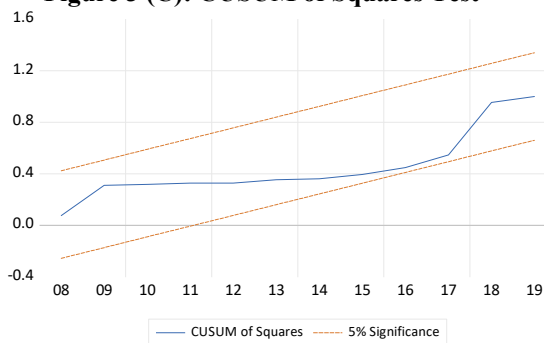


Figure 3 (C): CUSUM of Squares Test



4.6 Interpretation of Result

The estimated long-run ARDL model result explains the impact relationship between each of the explanatory (i.e independent variables) and the regressand (i.e dependent variables). As a dynamic model, the one period and two-period lags of LGDP are significant and have positive impact on its current value. A percentage increase in LGDP(-1) and LGDP(-2) leads to 0.639971% and 0.474587% change in LGDP. For the policy variables, the contemporaneous values of a log of employment and productivity also influence the target variable positively and they are statistically significant. A percentage increase in LEMP leads to 0.315102% change in the value of LGDP, while a unit increase in Productivity (PDT) brings about 0.007239 units change in the value of regressand. The specified lag values of Productivity are not statistically significant in explaining the target variable. The log of Sales volume and log of Complete Knocked Down also exert instantaneous impacts on the log of GDP; a percentage increase in LSAV leads to 0.151256% change in LGDP, and a Percentage increase in LCKD brings about 0.071669% change in LGDP, while the specified lag values of LCKD are statistically insignificant in determining the explained variable. In terms of the control variables; Exchange rate, Interest rate, and Inflation rate; the contemporaneous value of Exchange rate is insignificant in explaining the target variable, but its two-period lag value is statistically significant and negatively influences the target variable, while Interest rate and Inflation rate have instantaneous effects on the target variable and their lag values are also significant in determining the target variable. More clearly, a unit increase in EXCR (-1) brings about -0.000298% change in LGDP, a unit increase in INTR, INTR (-1), INFR and INFR (-1) brings about 0.013551%, 0.014307%, 0.005779% and 0.002837% change respectively in LGDP.

In the short run, one period lag of LGDP is inversely related to the current value; a percentage increase in D (LGDP (-1)) leads to a -0.474587% change in LGDP. A unit increase in D(PDT) and D (PDT (-1)) lead to 0.007239% and 0.003574% change in LGDP respectively. The contemporaneous value of LCKD in the short run is insignificant in explaining the target variable, but a percentage rise in its one-period lag i.e D(LCKD (-1)) leads to 0.053373% rise in LGDP and this effect is statistically significant. For the control variables in the short run, D(EXCR (-1)), D(INTR), D (INTR (-1)), D(INFR), a unit increase in each leads to 0.000298%, 0.013551%, -0.006470% and 0.005779% change respectively in the value of the target variable. Also in the short run, the statistically significant value of ECT (-1) coefficient is -0.114558, this implies the speed of adjustment or reversion of the variables of interest back to the equilibrium point in the short term is 11%, the negative status of the coefficient also confirms the suitability of this model for economic analysis and policy formulation.

Furthermore, the values of the R-squared (0.999800) and adjusted R-squared (0.999501) show that in the two cases, 99% of variation in the target variable is explained by the independent variables, while the F-statistic(prob.)

3339.057(0.0000) shows that the model has a good fit as the explicative variables are jointly significant in determining the behavior of the regressand at 1% level.

Also, the outcome of this result was examined by conducting some diagnostic tests such as; Breusch-Godfrey Serial Correlation LM Test, Ramsey's RESET test, Normality Test, and Heteroscedasticity test. The result of these tests is presented in Table 4.5 shows that the model passes all the diagnostic tests. The diagnostic tests applied to the model point out that there is no evidence of serial correlation, heteroscedasticity, and the RESET test shows the model is not a misspecified ARDL model. The stability of the regression coefficients was tested using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUM of Squares) of the recursive residual test for structural stability. The plots of the CUSUM and CUSUM of Square showed that the regression equation seems stable given that the test statistics lines do not fall outside the bounds at the 5% level of significance.

5.0 Conclusion and Recommendation

In summary, the policy variables; employment, productivity, sales volume and completely knocked down are all positive and significant contributing factors to the growth of the Nigerian economy and their impacts are either of the contemporaneous values and/or lag values as stated in the result. The control variables also show a positive and significant impact on the target variable except exchange rate that is only significant in its two-period lag and impacts the economic growth negatively. A similar result is obtainable in the dynamic short-run estimation, and the speed of adjustment of the variables from departure to the position of agreement in the short run is 11%.

Based on the above result and the need to boost productivity, employment and sales volume in automotive industry, government has to allow only importation of CKD and ban SKD. Activities that will generate increase in productivities, employment and sales volume lie on government policy support for CKD. With CKD, increasing activities will create increasing employment which will increase standard of living thereby boosting sales volume and eventually increasing productivity. The multiplier effect leads to increase in allied industries such as iron and steel, rubber, plastics, electrical equipment, road construction, transportation, urban and rural development. Furthermore, employment of mechanic artisans will increase through the increase in repair workshops. The country again will achieve foreign exchange conservation, favourable balance of payment, technological transfers, etc. So, government needs to be committed to establishing Vehicle Finance Scheme through the National Automotive Design and Development Council (NADDC), an agency of government saddled with the responsibility of revamping the Automotive Sector in Nigeria. The essence is to boost sales where no one needs to put down 100% cash to own a vehicle. It is therefore recommended that government should encourage importation of Completely Knocked Down (CKD) rather than Semi Knocked Down (SKD), support the industry by funding Auto Finance Scheme to enable financial institutions give credit facilities to potential vehicle buyers at single digit rate, discourage importation of used vehicles (called Tokunbos), ensure higher level of local contents, all these will boost productivity, employment rate, sales volume and CKD in the Automotive Industry. The rate of crimes must also be reduced if not eradicated. Once all these are done, the Automotive Industry will boost economic growth in Nigeria.

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