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AN EMPIRICAL ANALYSIS OF THE CONTRIBUTIONS OF THE AGRICULTURAL SECTOR TO INDUSTRIAL SECTOR IN NIGERIA

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Abstract

This study examines the contribution of the agricultural sector to the industrial sector in Nigeria, using annual time series data from 1990- 2019. The study specifies industrial output as a function of total labour force, crop production, and forestry production and inflation rate. The Auto Regressive Distributed Lag (ARDL) and Granger Causality Analysis were used for estimating the parameters of the model. The result of the Auto regressive distributed lagged model reveals that crop production (LCPRD) is positive and significantly related to industrial output in the short run(p(t)=0.0041 but insignificant in the long run (p(t)= 0.9944). The relationship between forestry production (LFPRD) and industrial output is positive in the short run(p(t)=0.0162 and long run LFPRD is statistically significant to industrial output in the short run but insignificant in the long run p(t)=- 0.2650. Inflation rate is found to be negative and significantly related to industrial output in the short run. But in the long run inflation rate is statistically insignificant to industrial output p(t)= 0.0895. Labour force (LTLF) is positively related to industrial output but statistically insignificant at 5 per cent in the current in the short run. At lag 2 and 3 labour force is significant. In the long run there is a negative and insignificant relationship between labour force and industrial output in Nigeria. The result of the Granger Causality Analysis reveals that there is a unidirectional causality which runs from crop production, labour force and forestry production to industrial output in Nigeria. The study recommends that government should encourage the production of more agricultural products that could be used as raw materials by industries in order to achieve balanced growth between agricultural and industrial sectors of Nigeria economy.

Keywords:

Inflation rate, Industrial output and Labour force.

Introduction

Nigeria is a developing nation which needs a revolution and re-engagement of agriculture for the development of agro-based industries for diversification and sustainability. Agricultural development alone, if not accompanied by industrial development can give but temporal relief to the varied problems of under development (Eze, 2016). Generally market contribution and foreign exchange earnings. The factor contribution here refers to provision of raw materials

which are transformed from one stage to another and this is the integral part of industrial sector. The role of the agricultural sector to industrial growth cannot be over emphasized. This necessitated the colonial masters "the British" to construct railway tracks from the far Northern part of the country, passing through the middle region to Eastern and down to Southern region, terminating at the Atlantic Ocean. This is to convey agricultural goods like groundnut, cotton, palm fruit, cocoa rubber, etc to their countries simply to boost their industrial

The discovery of crude oil in Nigeria and its flourishing returns in international trade, led to serious neglect of the agricultural and industrial sectors (Egboluonu and Nwokoro, 2016). This has resulted to increased importation of consumer goods and subsequently, affected the GDP of the country. Based on the continuous fluctuating prices of oil in international market and the present economic situation of the country, there is need for diversification of the nation's resource base via agriculture. The negligence of the agricultural and industrial sectors if not addressed, Nigeria is bound to face more economic hardship in the nearest future. Figures from the Central Bank of Nigeria Statistical Bulletin (2019) shows that despite relative increase in the Agricultural output from 110,37 to 177.65 between 2012 to 2019, the industrial value added declined from 13028.05 to 12418.92. Findings from few existing studies on the impact of agricultural output on industrial output are still shrouded in controversy (See, Hey 2009; Chebbi 2010). Only few studies that attempted to established the relationship between agricultural output and industrial output are available in Nigeria (Eze, 2016, Egbulonu & Nwokoro, 2016). While these studies laid emphasis on overall agricultural output on industrial output, the present study hypothesizes that looking at the various components of agricultural output on industrial output would yield better result, hence the need for this study.

Objectives of the Study

The overall objective of the study is to evaluate the impact of agricultural output on industrial output. Specifically, the study intends to do the following:

i. examine the impact of crop production on industrial output in Nigeria
ii. examine the impact of forestry on industrial output in Nigeria
iii. estimate the causality relationship between agricultural output and industrial output.

Literature Review

Eze (2016) examined the long-run impact of agricultural output to the growth of industrial sector in Nigeria. Multiple regressions were used, employing the vector error correction model (VECM) technique, with the paired wise Granger casualty test to confirm if there is any feedback effect among the series used. The dependent variable is the industrial output while the explanation variables are agricultural output, exchange rate, price of manufacturing output. The time series data span from 1970 to 2014. The result of the regression analysis shows that (i) there exist a significant but negative long run relationship between agricultural output and the growth of industrial sector in Nigeria (ii) There is no feedback effect between agricultural output and industrial sector in Nigeria.

Hey (2009) examined the link between agricultural output and industrial output, using auto-regressive distributive lag model on Pakistan economy. He found a bi-directional relationship between agriculture and industrial output in Pakistan and that agricultural sector adjusted more quickly to disequilibrium from short-run too long run than industrial sector.

Chebbi (2010) examined the relationship between agricultural output and manufacturing, transport, tourism, telecommunication, manufacturing and service sectors in Tunisia. The study used Johansen co-integration and found service sectors in Tunisia. The study used Johansen co-integration and found long-run linkage between agriculture and other sectors in Tunisia.

Egbulonu and Nwokoro (2016) examined the effect of agriculture and industrial outputs in Nigerian economic development, using the ordinary least square regression. The dependent variable is the GDP while the explanatory variables are the industrial output, agricultural output, interest rate, foreign exchange rate and inflation. The findings indicate that agriculture and industrial output contribute positively to Nigerian economic growth

Adenomon, Osagie, Oyejola and Agboola (2013) examined the impact of agriculture and industrialization on GDP in Nigeria. The data employed was between 1960 to 2011, extracted from CBN statistical bulletin. The vector auto-regression revealed that agriculture contributed 68% TO GDP while industry contributed 32% to GDP in Nigeria. Also, result from structural vector Autoregression (VAR) reveals that agriculture and industry contribute to structural innovation of GDP in Nigeria but agriculture contributes more Katircioglu (2004) examined the relationship between GDP and agricultural sector, service output growth and industrial sector. He used the co-integration and causality test and found a directional causality from GDP growth to agricultural sector growth.

Methodology

This research work adopted *Ex-Post Facto* research design using time series data between 1990 to 2019. The estimation technique is the Auto regressive distributed lag model (ARDL) while the Granger causality test was further employed to check the direction of causality among the variables.

Theoretical framework

This study, which seeks to examine the contributions of the agricultural sector to the industrial sector output, adopted the Lewis theory of development (1954). This is based on the strong views of this theory that the increase of the industrial sector output depends heavily on the agricultural sector and suggest that for the industrial sector to advance, it will have to include agriculture in particular. The theory assumes that agricultural sector has surplus labour, which yields zero marginal return but when such labour is being transferred to industrial sector, the marginal return increases and leads economic growth. Based on Lewis theory, Industrial output is a function of Agriculture.

$$IDO = F(AGR) \qquad 3.1$$

Model Specification

This built a multiple regression model and make use of econometrics procedure in estimating the contributions of agricultural sector to industrial development. Following the model as adopted by Eze (2016), who also adopted the Lewis model, where some variables that influences industrial output as Agricultural output (AGO), Exchange Rate (EXR) and Prices of manufacturing output (PMAN) were used. The functional form of the model for this study is specified as follows;

$IDO = f(TLF, CPRD, FPRD, INFL)$ 3.2

The econometric form of the model is specified as:

$IDO_t = \beta_0 + \beta_1 TLF_t + \beta_2 CPRD_t + \beta_3 FPRD_t + \beta_4 INF_t + \mu_t$ 3.3

The variables were logged to ensure uniformity of data. The log form of the econometric model is

$LogIDO_t = \beta_0 + \beta_1 logTLF_t + \beta_2 logCPRD_t + \beta_3 logFPRD_t + \beta_4 logINF_t + \mu_t$ 3.4

Where:

Log IDO = log of Industrial Output

f = functional relationship

Log TLF = log of total labour force

Log CPRD = log of Crop production

Log FPRD = log of forestry production

Log INF = log of Inflation rate

β_0= Constant

β_1, β_2, β_3, and β_4 are the relative slope coefficient

μ_t = stochastic or error term

t= the period

The *apriori* expectations are: $\beta 1 > 0, \beta 2 > 0, \beta 3 > 0, \beta 4 < 0,$

Result Presentation

Autoregressive Distributed Lagged Model result

Table 4.1 Result of the ARDLshortrun and Long Run Form

ARDL Cointegrating And Long Run Form				
Original dep. variable: LIDO				
Selected Model: ARDL(3, 4, 4, 4, 4)				
Date: 10/28/21 Time: 11:47				
Sample: 1990 2019				
Included observations: 26				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIDO(-1))	1.059924	0.073222	14.475502	0.0047
D(LIDO(-2))	0.631254	0.084478	7.472362	0.0174
D(LCPRD)	0.296641	0.018970	15.637680	0.0041
D(LCPRD(-1))	0.000826	0.020355	0.040576	0.9713
D(LCPRD(-2))	0.161067	0.027499	5.857120	0.0279
D(LCPRD(-3))	0.170801	0.027028	6.319495	0.0241
D(LFPRD)	1.150606	0.148193	7.764240	0.0162
D(LFPRD(-1))	0.361072	0.133532	2.704004	0.1139
D(LFPRD(-2))	0.314911	0.111529	2.823589	0.1059
D(LFPRD(-3))	0.327083	0.105000	3.115068	0.0894
D(INFL)	0.004866	0.000561	8.671987	0.0130
D(INFL(-1))	-0.004564	0.000501	-9.106208	0.0118
D(INFL(-2))	-0.001640	0.000427	-3.840077	0.0616
D(INFL(-3))	-0.002129	0.000344	-6.196290	0.0251
D(LTLF)	0.176247	0.225354	0.782087	0.5161
D(LTLF(-1))	0.109624	0.305035	0.359381	0.7537
D(LTLF(-2))	-1.383570	0.272803	-5.071675	0.0367
D(LTLF(-3))	1.527389	0.256660	5.951018	0.0271

CointEq(-1)	-1.400682	0.084040	-16.666854	0.0036
Cointeq = LIDO - (0.0021*LCPRD + 0.3267*LFPRD + 0.0072*INFL -0.6264				
*LTLF + 18.6833)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCPRD	0.002058	0.260549	0.007898	0.9944
LFPRD	0.326668	0.213077	1.533102	0.2650
INFL	0.007161	0.002299	3.114581	0.0895
LTLF	-0.626355	0.821989	-0.762000	0.5257
C	18.683317	13.426240	1.391552	0.2986

Source: *Author's computation from E-view 9.0*

Table 4.1 above presents the result of the short and long run estimates run estimates of the ARDL model. The lagged value of industrial output (LIDO) was positive and statistically significant (P(t) = 0.0047, 0.0174) both the first and second year.

The log of crop production is positive and significant related to industrial output both in the short and long run. The sign of the coefficient of crop production does meet a priori expectation in the short run. One unit increase in crop production both in the short and long run. The sign of the coefficient of crop production does meet a priori expectation in the short run. One unit increase in crop production leads to 0.29 and 0.002 percent increase in industrial output in the short and long run respectively. However, this outcome is statistically significant since the probability of the t-statistic (P(t) = 0.0041) is less than 0.05 in the short run. This implies that crop production has significant positive relationship with industrial output in the short run.

The relationship between forestry production (*LFPRD*) and industrial output is positive and statistically significant in the short run (P(t) = 0.0162) at 5 per cent.

The sign of the coefficient of forestry production does met a priori expectation in the short and long run. However, in the long run, forestry production has a positive and insignificant impact on industrial output, P(t) = 0.2650. one unit increase in forestry production leads to 1.15 and 0.32 per cent increase in industrial output in the short and long run respectively. This implies that forestry production has significant impact on industrial output in the short run.
Labour force, (LTLF) is positively related to industrial output, but statistically insignificant at 5 per cent in the short run. But, in the long run, there is a negative and insignificant relationship between labour force and industrial output in Nigeria. This outcome of the labour force did not met economic expectation, since labour is expected to impact positively on agricultural output directly, which will have ripple effect on industrial output.

The result of the short run model shows that the error correction term (cointegration term) is negatively signed and statistically significant as is expected by economic theory. The ECM as computed is -1.400682. This implies that the speed at which the industrial sector is restored back to equilibrium after a shock is 14 per cent which is very low. This outcome is statistically significant with the *p.value* of 0.0036.s

Granger Causality Test Result

Table 4.2: Result of Granger Causality test

Pairwise Granger Causality Tests			
Date: 10/28/21 Time: 12:04			
Sample: 1990 2019			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LCPRD does not Granger Cause LIDO	28	5.12234	0.0145
LIDO does not Granger Cause LCPRD		0.91778	0.4135
LFPRD does not Granger Cause LIDO	28	2.87192	0.0770
LIDO does not Granger Cause LFPRD		0.29034	0.7507
LTLF does not Granger Cause LIDO	28	4.09347	0.0301
LIDO does not Granger Cause LTLF		1.92717	0.1683
INFL does not Granger Cause LIDO	28	0.74120	0.4876
LIDO does not Granger Cause INFL		3.22334	0.0583
LFPRD does not Granger Cause LCPRD	28	12.8359	0.0002
LCPRD does not Granger Cause LFPRD		0.07075	0.9319

Source: *Author's computation .E view 9.0*

In Table 4.2 above, the estimated causality results shows that a unidirectional causality runs from crop production, labour force, and forestry production to industrial output in Nigeria. In other words, agricultural outputs granger causes growth in industrial output in Nigeria within the period under study. This implies that the causality runs from LCPRD to LIDO and not from LIDO to LCPRD. The same is applicable to LTLF and LIDO and FPRD and LIDO.

Recommendations

1. Government should encourage the production of more agricultural products that could be used as raw materials by industries in order to achieve balanced growth between agricultural and industrial sectors of Nigerian economy.
2. Nigeria government should increase budgetary allocation to the agricultural sector and ensure effective utilization of the funds/budgets that translates into improved and increased output annually.
3. Finally, government should create secured and enabling environment for commercial farming which will encourage both local and foreign investors to invest in agriculture in the country. There should be workable and lasting solution towards resolution of crisis between farmers and herders in Nigeria.

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