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Econometric Analysis of Agricultural output and Economic Growth in Nigeria

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Abstract: Agricultural output measures the aggregate production of crops, fishes, livestock and timber except damages and losses in field and storage. Agricultural activities transcend the mere subsistence farming to industrial and large scale production of produce in these four broad spectrums of activities. IT analyzes the importance of the totality of agricultural output in the growth of Nigeria economy from 1983-2023. The theoretical framework of the study was based on the Rostow's and Balanced growth theory. The econometric analysis on the time series data obtained were Unit Root, Johansen cointegration and Parsimonious Error Correction Model to determine the stationarity, the existence of long run association among the variables, among others. Finding shows that a higher agricultural produce will bring about an increase in the country's Gross Domestic Product. In the same vein, it was revealed that increased fishery production will impact positively on the Nations GDP. The findings on the impact of Bank credit are not different as the study established a significant relationship between Bank credit on agricultural and national output. Furthermore, the Johansen cointegration test reveals the existence of long run relationship between the agriculture activities and economic growth. And that economic growth will adjust from the errors of the agriculture activities in the short run to equilibrium in the long run by 68 percent. It therefore recommended the need for re-orientation that will foster a positive perception towards agricultural engagements in place of blue chip jobs. It was also recommended the provision of infrastructural facilities to make agricultural engagements more attractive.

Keywords: Econometric analysis, Agricultural output, Economic Growth.

JEL: N50, Q10, 20, 23, 24

I. Introduction

The sole dependent of our economy in oil revenue is not only constraining, but has implications for the growth of other sectors thereby, limiting the overall advancement and the growth of the nation's economy. For instance, the over dependence on the oil economy worsened the rate of unemployment and adversely affected the trend of inflation. The place of agriculture in changing the social and economic framework of the Nigerian economy cannot be over emphasized. In a Labour Force Survey of the National Bureau of Statistics (NBS), the unemployment in Nigeria in 2023 rose from 4.2% in Q2 to 5% in Q3. This situation no doubt, is as a result of non-stimulation of other sectors to be able to create employment opportunity for the teeming population of the qualified unemployed Nigerians. Again, the technical nature of the oil sector makes it practically difficult to some measures of workers which otherwise could be employed in alternative sectors, such as agriculture. The agricultural sector, according to NBS, the biggest employer of labour accounting for 36% of Nigeria's labour force and 24% to GDP between 2013 to 2019.

Agriculture is the root of food supply and industrial raw materials. The place of agriculture in employment generation, poverty reduction and income distribution makes it imperative for huge investment in agriculture by government. The support of agriculture to the GDP in Q1 of 2020 was estimated at 22 ½ whereas crop production stood at 90% of the total agricultural engagements showcasing the sector as source of food supply and regenerative human engagement for economic sustainability.

Agricultural output refers to the aggregate production of agricultural activities within the four broad divisions of fishing, crop production, livestock and forestry. According to Oyaniran (2020) 87.6% of the agricultural sectors production lies in crop production alone, fishing, livestock and forestry accounts 12.4%. It is unnecessary therefore, to emphasis the importance of agriculture in sustaining the nation in food production.

1.1 Statement of Problem

The Nigerian government embarked on several agricultural plans aimed at increasing the economic output in crop, fishing, livestock and forestry. Notable amongst which were the following; agriculture promotion policy, Nigeria – Africa Trade and Investment Promotion, Economic Diversification Initiative and Economic and Export promotion incentives. Government also embarked on fertilizer and seedling initiatives whereby farmers are encouraged to obtain farm inputs at affordable prices. Financial support programmeswere introduced by government to assist farmer's access funds even at ceded interest rates. This is not to mention established agricultural research centres whose efforts ultimately were intended to boosting food production and export through researching for improved varieties and seedlings in order to enhance higher yield. Inspite of these initiatives there are recorded agricultural trade deficit which increased from N549.3b in 2018 to N689.76 in 2019. Again, between 2016-2019, the country's aggregate food import and other agricultural goods exceeded its eight hundred and three billion Naira (N803b) export to import of N3.35trn. Similarly, the overall agricultural contribution to the nation's GDP dropped to 1.2% in Q.2 of 2022 from 3.58%, 1.34% in Q3, -0.9% in Q1 of 2023 and 1.5% in Q2 of 2023 (Statista, 2023). This demonstrates the nations neglect for the agricultural sector, hence this study assess the impact of the country's agricultural output on the economic growth of Nigeria from 1983-2023.

The study is aimed at achieving the following objectives: To determine the impact of the sub-agricultural sectors of crop, fishing, livestock and forestry on the economic growth of Nigeria. And it assesses the impact of credit allocation on the agricultural output, while the remaining part of the work comprises of literature review, methodology, result and analysis, and conclusion.

II. Literature Review

Conceptual Clarification

Agricultural Output

The total value of production in crops, fishing, livestock and timber are described as agricultural output. This excludes damages resulting from storage and harvesting. Primary concern of agricultural activity is food production both for consumption and export and industrial raw materials acting as effective value chain for further production. Eweta, Olabanji and Oduntan (2016) opined that agriculture is the practice of farming which include soil cultivation for the production of crops and food, animal rearing both for local consumption and export. They averred that agricultural produce is the totality of crop, livestocking, fishing and forestry arising from agricultural activities other than losses and damages incurred in the field and storage.

Theoretical Review

The study is anchored on Rostow's (1967) growth theory and Nurkse (1953) balanced growth theory.

Rostow's Growth Theory

Rostow (1967), classified the economy into five stages of growth, which are; the traditional, pre-take off, takeoff, maturity and consumption stages. These stages are akin to known stages in agricultural activities or crop cycle. This is so as agriculture has the ability to promote the growth in the economy in successive stages of production processes upto the yield period and eventually, generate revenue for further economic growth. Indeed, the agricultural sector is a sine-qua-non for industrial development being a potent supplier of industrial inputs and raw materials. The first three stages of Rostow's theory identified with Nigeria being a developing economy and thus, most relevant. Interestingly, the take-off stage bothers on the rate of productive investment, this includes agriculture. As indicated in the theory, this stage influences the national income above ten percent. The theory could be described as a veritable approach to development and are based on historical experience.

Balanced Growth Theory

Nurkse (1953), believed in inclusive growth whereby, all sectors of the economy will grow simultaneously. Thus, will ensure effective supply of means of production. This theory support expanse agricultural activity that will trigger up the supply of raw materials to the industrial sector, hence engendering the growth of the economy.

Balance growth theory will enhance suitable resource allocation, proper coordination of means of production, inclusive of governance and development of the productive institutions. These are geared towards economic growth and productivity. The theorist identified specific advantages of balanced growth to include wide extent of market, better utilization of productive resources and stability of the economy amongst others. Even though the theory offers these benefits, some economists argue that it portends danger as it is capable of sparking up inflation. Be that as it may, there is veritable justification for balanced growth theory in assessing the effect of agricultural produce in economic advancement.

2.1 Empirical Literature

Empirical evidences on the subject of discourse are not limited to Ogunbadejo and Oladipo (2017), studied the effect of agricultural output volatility on economic growth in Nigeria; (1970-2013). Their study employedEgarch analysis which gave a negative coefficient between the variables employed and economic growth. It further reveal that, due attention was not being paid to agricultural thus, it benefits eluded the country and it recommended diversification of the economy in order to harness the benefits of agriculture.

Ekine and Onu (2018), investigated the relationship between the agricultural output and economic growth in Nigeria between 1981-2015. If employed the Ordinary Least Square, Co-integration and Augmented Dickey Fuller Unit root test to analyze the secondary data obtained from Central Bank of Nigeria. The result proved that livestock and fishery has positive relationship with the variables in the study. It recommended that government should strivethe promotion of agriculture in order to strengthen the economy.

Okonkwo, Nwosu, Okoroigwe and Kalu (2019), studied the place of government expenditure on agricultural growth in Nigeria. Their study was for the period 1981-2017 and used the secondary data which were subjected to econometric analysis. It deployed co-integration and Engle-Granger two-steps procedure to estimate the variables and the model of the study. Findings revealed a negative association between government expenditure on agriculture and economic growth which, summarily means that the growth potentials of the country through the agricultural produce have not be properly harnessed.Thus, recommended government's full participation in agricultural activities both in funding and policy implementation.

Abubakarand Ibrahim (2019), examined Nigerian agricultural industry as a support to economic growth. The study adopted Time series data on four sub-sectors of agriculture between 1981-2016. Johansoncointegration was used to determine the long run coefficient where all the variables interconnected except, forestry sub-sector. It subsequently found that livestocking, fishery and crop production have positive and significant coefficient with growth of the economy whereas, forestry was negative. The study recommended that policy takers shoulddoubleeffort to maintain the value chain for production of crop to be able to harness the potentials of the sector. It also advised the resuscitation of the forestry sub-sector of the agriculture in order to tap into its full potentials.

Etea and Obodoechi (2019), investigated agricultural contribution to the growth of domestic economy of Nigeria, Engaged in the study were periods between 1990-2017. The study explored the time series and subjected the data obtained to Cointegration, Vector Error Correction Model and variance decomposition test to establish the relationship between agriculture and the growth of the economy using the following indicators; namely, agricultural output, gross capital formation, exchange and interest rate. Findings revealed that value of agricultural output showed a positive but insignificant relationship with Gross Domestic Product (GDP), indicating that about a one percent increase in the worth of agricultural produce will bring about an unsubstantial increase in the real GDP of Nigeria. Thus, recommended increase in the budgetary allocation by government to the sector. It also recommended increase in credit allocation to agriculture to boost productivity.

III. Methodology

The study adopted quasi experimental research design being social science study and given the dynamics and the existing relationships between the variables, which could not be manipulated. The need to systematically generate and deal with the data also calls for this type of research. Again, data for the study are purely time series obtained fromCBNStatistical Bulletin of 2023. The study covers the period from 1983 to 2023, (for more detail about the data please see the appendix). As econometric analysis related research, stationarity test was carried out and the outcome reveals the application of the Johansoncointegration method of analysis. This aided the researcher to examine the short and long term dynamicsof the variables.

Variable Selected for the Study

The study utilized real gross domestic product (RGDPp) per capita as the dependent variable. The Independent variables selected for the study were crop agricultural produce, this measured the contribution of crop production to GDP whose contribution is expected to be positive ($a_1 > 0$). Livestocking output indicated by its contribution to GDP as ($a_2 > 0$). Fishery, measured by its contribution to production and growth in the GDP, denoted as ($a_4 > 0$). Bank credit to agriculture being control variable measures banks credit to agriculture and denoted as ($a_4 > 0$)

Model Specification

Following the work of …….. and theoretical framework, the model is specified as

RGDPP = f(CAP, LAP, FIAP, BCA) (1)

The econometric form is given as

$RGDPp = a_o + a_1 (CAP + a_2 LAP, a_3 FAP, a_4 FIAP, a_5 BCA + \mu$ (2)

Following Lotto (2002), we Log all variables to transform them in uniform digit for linearity purpose:

$RGDPp = a_o + a_1 logCAP + a_2 logLAP + a_3 LogFAP, + a_4 logFIAP, a_5 logBCA + \mu$ (3)

$a_1 > 0$; $a_2 > 0$, a3>0, $a_4 > o$

Where:

RGDPp	=	Real GDP per capita
CAP	=	Crop agricultural production
LAP	=	Livestock agriculture production
FAP	=	Forestry agricultural production
FIAP	=	Fishery agricultural production
BCA	=	Bank credit allocation to agriculture
a_o	=	constant
a_1-a_4	=	coefficient of explanatory variable
μ	=	error term

IV. Results and Analysis

Table 2: Unit Root / StationarityTest

Variables	ADF Stat. at 1st Diff	1% Critical value	5% Critical value	Order of integration	Remarks
RGDPPc	-7.129927	-3.632900	-2.948404	I(1)	S
BCA	-6.023389	-3.653730	-2.957110	I(1)	S
CAGP	-4884985	-3.670170	-2.963972	I(1)	S
LAGP	-6.821662	-3.632900	-2.948404	I(1)	S
FAGP	-3.813953	-3.661661	-2.960411	I(1)	S

Source: E-view 8.0

Note: S = stationary

The stationarity test results in table 2, shows that the variables were integrated in order one I(1) at 5% level of significance, admitting the time series data collected on the variables were stationary. This call for the

application of the Johansoncointegration or the error correction model to analyze the rconnection between agriculture produce and economics growth. Below is the Johansoncointegration test result.

Table 3: Johansen Cointegration Test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.714396	142.8150	103.8473	0.0000
At most 1 *	0.635785	93.94211	76.97277	0.0015
At most 2 *	0.476857	54.55164	54.07904	0.0453
At most 3	0.359959	29.28356	35.19275	0.1886
At most 4	0.202019	11.88084	20.26184	0.4595
At most 5	0.075929	3.079693	9.164546	0.5659

Source: E-views output, 2024

Table 3, reveals the existence of at most two cointegrating equations as rightly shown by the p-values less than 0.05 in the above table. That a long run equilibrium relationship exist between the explained and explanatory variables in the model of the study at a lag length of two at most.

Table 4 Parsimonious ECM Estimates on the Model

Dependent Variable: RGDPPC

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.714725	6.299625	-0.113455	0.9106
CAP	0.027481	0.010544	2.606316	0.0149
CAP(-3)	-0.039882	0.012395	-3.217444	0.0037
LAP	0.233195	0.187876	1.241216	0.2265
LAP(-2)	-0.029798	0.257693	-0.115635	0.9089
FAP	5.150641	1.640288	3.140084	0.0044
FAP(-1)	11.51853	3.065521	3.757446	0.0010
FIAP	0.749687	0.191793	3.908825	0.0007
FIAP(-2)	0.010534	1.035536	0.010173	0.9920
BCA	0.033253	0.013787	2.411909	0.0231
BCA(-3)	0.149376	0.160784	0.929046	0.3621
ECM(-1)	-0.683629	0.274253	-2.492696	0.0200

F-stat 607.99 (0.0000) DW Stat 2.5603 R^2 0.9164 R^2-adj 0.9047

Source: E-Views Output, 2024

From table 4, Adjusted R^2 is 0.904785 implying that about 90% of the variation in the dependent variable is as a result of the variations in the independent variables. The residual10% are attributable to variables not in the model. The F-statistic of 607.9861 therefore implies that the entire model is analytically significant at 5 percent (%) with a p-value less than 0.05.The result of DW-statistic of 2.5603 shows no lag correlation of the error term in ECM which infers that the estimates based on OLS is not spurious. The value ECM of -0.683 629 shows 68%

speed of adjustment to short run interaction. CAP, LAP, FAP, FlAP and BCA are rightly signed; hence an increase in performance of agricultural production brings about rise in real GDP per capita in Nigeria.

4.1 Discussions

It is here revealed that a 1% increase in crop production (CAP) leads to 2.74% increase in the development of the Nigerian economy, whereas a 1% increase in livestock production (LAP) creates about 23.3% increase in the growth of the economy. Forestry agricultural production (FAP) indicates that a 1% increase in its production leads to 515% increase in the development of the Nigerian economy.

We find that, a 1% rise in fishery production (FlAP) creates approximately, 75% expansion in economic growth of Nigerian. This implies that agricultural production is crucial for economic growth in Nigeria. In the same way, Bank credit to agriculture shows that a 1% increase to agriculture brings about 3.3% increases in the economy.

Since the agricultural production variables employed are statistically significant with real GDP per capita apart from livestock production. The insignificant variable could be attributed to Nigeria: insecurity position in certain parts of the country. This position supports the earlier studies of Akram (2011).

V. Conclusion

Agriculture is a critical sector for economic growth in Nigeria and in many developing economies. Nigeria to grow its economy and depends largely on exports to earn the much need foreign exchange need to pay much attention in agriculture to be able to reduce the volume of international trade imbalance resulting from over dependence on importation and monolithic oil economy. In so doing, it will reduce the high rate of employment and shore up food security while growing the economy. We therefore recommend:

i. The study recommends reorientation that will change the perception about agriculture as opposed to dirty and mere engagement in place of white collar jobs.
ii. Government should take steps to encourage agricultural activities by providing incentives that will lure the teeming unemployed youths into the sector.
iii. Attention should seriously be taken to provide infrastructure, especially in the rural areas and farm settlements to make engagements in the sector attractive.

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Appendix

Table 1: Trends of Agricultural Development Indicators and Economic Development Nigeria from 1983-2023

YEARS	RGDPc	BCA	CAP	LAP	FAP	FIAP
1983	0.72	0.94	16.35	5.19	1.27	0.99
1984	0.76836	1.05	21.5	6.62	1.38	0.87
1985	10.86508	1.31	25.07	7.16	1.47	0.54
1986	1.03424	1.83	25.97	7.39	11.57	0.77
1987	1.21806	2.43	39.66	8.37	T1 ,s	0.66
1988	1.7025	3.07	61.85	8.89	1.86	1.17
1989	1.9214	3.47	71.88	11.79	2.17	2.41
1990	2.22708	4.22	t86.93	14.15	2.35	3.21
1991	2.85408	5.01	101.65	15.58	2.44	13.58
1992	4.9478	6.98	153.38	23.03	2.99	4.72
1993	6.174	10.75	249.2	36.58	3.97	5.59
1994	5.12226	17.76	377.31	54.3	5.98	7.68
1995	7.24559	25.28	670.18	97.2	8.25	14.51
1996	8.12119	33.26	906.89	130.41	10.37	22.84
1997	7.83662	27.94	1026.29	145.03	12.55	27,59
1998	9.56593	27.18	1133.39	158.31	15.88	33.46
1999	35.77834	3L05	1204.7	64.37	19.31	38.59’
2000	35.43217	41.03	1270.63	172.19	24.4	41.10
2001	5 1.15658	55.85	1699.69	228.56	29.98	57.20
2002	73.42879	59.85	3875.46	271.03	36.23	68.81
2003	90.29328	62.10	4161.57	299.22	44.13	81.01
2004	106.9335	67.74	4419.06	360.8	56.39	99.00
2005	134.2644	48.56	5372.2	463.42	67.45	129.26
2006	129.4219	49.39	6723.22	560.25	80.2	149.64
2007	191.7649	149.58	7654.22	642.28	91.5	163.99
2008	185.3249	106.35	9039.63	758.84	108.1	193.75
2009	215.7561	135.70	10449.6	863.4	121.25	221.18
2010	256.2615	128.41	11683.9	979.56	135.72	249.71
2011	282.0256	255.21	12484.85	1115.6	153.05	284.33
2012	287.9215	316.36	14071.24	1251.93	170.16	322.67
2013	406.005	343.70	14862.32	1399.48	187.75	366.79
2014	442.3199	478.91	15812.57	1573.05	207.94	425.25
2015	512.227	449.31	171897	1748.03	222.83	476.14
2016	562.218	525.95	18883.08	1875.98	236.25	528.39
2017	607.56	528.24	21096.11	1974.45	257.21	624,79
2018	897.76	610.15	24207.8	2048.6	272.79	842.11
2019	975.98	772.38	26587.89	2091.08	298.85	1212.39
2020	1024.57	1049.68	33177.84	2121.97	284,79	165T91
2021	1273.42	1127.L2	36276.32	3278.74	342.67	1789.20
2022	1,148.99	1,088.4	34727.08	2,700.35	313.73	1723.56
2023	1,211.20	1,107.76	35,501.7	2,989.54	328.20	1,756.40

Source: CBN Statistical Bulletin, 2023