Impact of the Agricultural Sector on the Economic Growth of Nigeria 1984-2015

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Abstract
This study was designed to investigate empirically, the impact of agricultural sector on economic growth of Nigeria. This study employed the ordinary least square technique to examine the relationship between the Real Gross Domestic Products (RGDP), Agricultural output (AGOUT), Deposit Money Bank Loans to Agriculture (DMBLA), inflation rate (INFLR) and interest rate on agricultural credit (INFRA) in Nigeria from 1984-2015. The estimated result shows that agricultural output and inflation rate did not significantly impact real gross domestic product while Interest rate on agricultural credit and deposit money bank loans to agriculture have significant impact on real gross domestic product. This study therefore recommends that the government should urgently engage proactive measure to boost agriculture, as well as overhaul the education curricula, to place more emphasis and interest on self-employment in agriculture. They should strive to provide suitable rural infrastructures and propose and implement agricultural friendly government policies. The government should encourage the financial sector to set aside funds for agricultural financing as well as encourage flexibility in accessing loans to enhancing agricultural production. Further research should be carried out on other ways of using agriculture to reduce unemployment in Nigeria.

***Keywords**: Agricultural output, Inflation, Agricultural credit, interest rate*

Introduction

Agricultural sector in the Nigerian context embraces all the subsectors of primary industry, which includes farming, fishing and forestry. The agricultural sector in Nigeria is the oldest and largest sector in the economy. Before the advent of the colonialists, rural Nigeria had complex organizations, these social organization were predominantly peasant communities, producing a variety needs of the family in terms of food with small supplies for exchange with other communities (Anyanwu, 2009).

The coming of the colonial masters brought improvement in the agricultural sector. Agriculture was scientific oriented. The colonialists introduced a monetary economy among peasant communities by providing incentives for local farmers to produce more crops for sale and eventful export to Western Europe.

Nigerian communities produced different types of crops and this was the reflection of their different environments and ecology. However, over the years, the agricultural sector was the mainstay of the Nigerian economy, not unit the discovery of crude oil in commercial quantity in 1956 at Oloibiri in the Niger Delta Area by Shell Petroleum Development Company (Goodwilson, 2003).

The need to develop the agricultural sector alongside the industrial sector has been recognized by successive governments of the country. This is a realization that the single minded pursuit of industrialization has rather been counter-productive. For instance, there has been declining food production and the attendant rising food stuff price and food import bills, which in turn imply increasing external dependence apart from the problem of declining food production. The output of agricultural raw material is also declining and therefore unable to provide the necessary agricultural raw materials to the industrial sector and as export.
This roughly indicates the extent to which the agricultural sector absorbs the labour force in the country. However, a World Bank report (2010) state that the agricultural sector employed 31% of total labour force in Nigeria.

The role of agriculture in developing countries in which we rightly belong, when we realize that over 2 of about 3 billion people living in the rural areas of the third world in the early 1990s grind out a meager and often inadequate existence in agricultural pursuit (Todaro 2009). The agricultural sector in national development is increasingly becoming more important; as we are all aware, this sector has remained the bedrock of Nigeria's economic stability, inspite of many decades of neglect.
The agricultural sector has remained significant and has significant potentials. We acknowledge that without a sustained development of this veritable sector, Nigeria's growth and development aspiration will continue to be a mirage. Therefore, it is important to look at the impact of agricultural sector on the economic growth of Nigeria.

Statement of the Problem
The Agricultural sector which was the mainstay of the Nigerian economy had suffered some setback since the discovery of crude oil in commercial quantity in 1956 at Oloibiri in the Niger Delta Area of Nigeria. Low productivity as a result of neglect from the government, lack of interest on the part of Nigerian youths, poor implementation of policy, high level of corruption and other factors. Therefore, it is not ideal for any country to depend on one sector and neglect another because; it will cause a big fall or backwardness in growth and development of the entire economy.

Objective/Purpose of the Study
- ❖ To identify the impact of the agricultural sector on the Nigerian economy.
- ❖ To examine the impact of loans by deposit money banks to the agricultural sector.
- ❖ To analyze the impact of government spending on the agricultural sector.

Meaning of Agriculture
Agriculture deals with the cultivation of land (Crop farming), fishery, livestock farming, forestry and wild-life conservation, for the purpose of satisfying human wants. It goes further to include the processing of farm products and the preservation, storage and marketing of these produce. So, agriculture could be defined as the production and the preparation of plants and animal product for man's use. Webster New World Dictionary defines agriculture as a science and art of farming, work or business of cultivating the soil, producing crops and raising live stock for the benefit of man and his environment.

Still on the meaning of agriculture, Eboh (2005), in his paper presented at the 4th National Economic Summit Group on Agriculture, held between 9th to 10th November, 2005 agriculture as referring to the productive and commercial enterprise involved in providing inputs and services to the farm sector, Input sector, aid the processing, marketing and storage of farm produce (the product sector). A more modern perspective includes an interlinked

system of production, processing and commercialization of farming originated products like crops, lives stock and forestry. In other words, Agriculture business is structured and composed of the input sub-sector enterprises producing and/or supplying feed, fertilizer, farm machine and equipment, transportation, farm energy, seed credit, insurance, leasing and etc; **The Farm sub sector-enterprise** producing crops, livestock, forestry, fisheries and the **product** sub sector-enterprises involved in processing, storage and marketing (wholesale and retailing) of farm related products. Agriculture business for a developing country like Nigeria deserves a special attention due to its highly complex, unique and significant nature and potentials for meeting the Millennium Development Goals (MDGs).

Literature Review

Agricultural Productivity

Agricultural products are usually measured by weight or volume. An immediate question arises as to how best to combine different agricultural products since summing over weight or volumes is not very meaningful. One approach when dealing with crops is to convert them to a common physical unit, such as wheat units (Adelakun, 2011) more commonly, aggregate output in agriculture is measured in monetary unit as the sum of the value of all production in the agricultural sector minus the value of intermediate input originating within the agricultural sector. Both cash and non-cash (barter trade and self-consumption) transaction of final product should be included; this is referred to as "final output" and differs from agricultural GDP by not subtracting the value of non-agricultural input. In other words, final output is the amount of agricultural output available for the rest of the economy, while agricultural GDP measures the net contribution of agriculture to the GDP of a country.

Agricultural Export Product

Agricultural product constitutes the bulk of Nigeria's non-oil exports. Agricultural products are those products that come from the raising of crops and/or animals. While some agricultural commodities such as corn or beef are direct products of the earth, others like high fructose corn syrup are derived from them. The agricultural products of Nigeria can be divided into two main groups, food crops, produced for some consumption, and export product produced for exportation (Encyclopedia of the Nations, 2015) Examples of Nigeria's export products are: cocoa bean, corn (maize) rubber beans, sesame, cashew nuts, cassava, ground nuts, Arabic gum, Kolanut, Mellon, palm oil, palm kernels, yam etc. the leading non-oil foreign exchange earner for Nigeria is cocoa while rubber is the second largest non-oil foreign exchange earner.

Federal Government Expenditure

Specifically, government expenditure refers to the level of government spending in an economy and it is one of the major instruments of macroeconomic management. Government expenditure refers to all government spending which includes both recurrent and capital expenditures carried out with the sole objective of improving the performance of the economy. When federal government expenditure is properly guided, and tailored towards the achievement of development, it has the singular purpose of getting the nation close to the shore of development. Ilegbinosa, et al, (2012), explains that if government expenditure increases, it will positively affect non-oil export. This means that through the multiplier effect, funds can be made available to the agricultural sector, there by leading to its expansion-hence growth. This will generate foreign earning capacity of the sector and help diversify the productive base of the economy.

Urban Industrial Impact Model

The urban-industrial impact model was formulated by Von Thunen in Germany, to explain geographical variations in the intensity of farming systems and in the productivity of labour in an industrializing society. It sees agricultural productivity as a function of urban and industrial stimuli. The model is based on the rationale that input and product markets are more effective in areas of rapid urban-industrial development. The model drew on the Ricardian theory of rent and Johann Von Thuenen's demonstration effect concerning the influence of urban market on Agriculture.

In the 1950s, interest in the urban-industrial impact model reflected a concern with the failure of agricultural resource development and price policies adopted in the 1930s, to remove the persistent regional disparities in agricultural productivity and in rural incomes. The rationale for this model was developed in terms of more effective factors and product markets in areas of rapid urban-industrial development. Industrial development, stimulated agricultural development by expanding the demand for farm products; by supplying the industrial inputs needed to improve Agricultural productivity; and by drawing away surplus labour from agriculture. The empirical tests of the model have repeatedly confirmed the importance of a strong non-farm labour market as a stimulus to higher labour productivity in Agriculture.
The policy implications of the model appear to be most relevant to the less developed regions of the highly industrialized countries or lagging regions of the more rapidly growing developing countries, But, in poor countries, where urban areas develop merely out of rural-urban migration that is not backed by improved employment or industrial growth in the urban areas, it is not likely that urbanization will have the kind of impact posited by the model. Agricultural development policies based on the urban-industrial impact model appear to be particularly inappropriate in those countries where the 'pathological' growth of urban centres is a result of population pressures in rural areas running ahead of employment growth in urban areas.

The Endogenous Growth Theory

In Adesuyi and Odeloye (2013) endogenous growth economists believe that improvement in productivity can be linked directly to a faster pace of innovation and extra investment in human capital. They stress the need for government and private sector institutions which successfully nurture innovation and provide the right incentives for individual and business to be inventive. There is also a central role or the accumulation of knowledge as a determinant of growth. Supporters of endogenous growth theory believe that there are positive externalities to be exploited from the development of a high value added knowledge economy which is able to develop and maintain a competitive advantage in fast-growth industries within the global economy.

The main points of the endogenous growth theory are; the rate of technological progress should not be taken as a constant in growth models, government policies can permanently raise a country's growth rate if they lead to more intensive competition in the market and to stimulate product and process innovation. There are increased returns to scale from new capital investments; the assumption of the law of diminishing returns is questionable. Endogenous growth theorist are strong believers in the potential for economies of scale (or increasing returns to scale) to be experienced in nearly every industry and market. Private sector investment in research and development is a key source of technical progress. The protection of private property right and patents is essential in providing appropriate and effective incentives for business and entrepreneurs to engage in research and development. Investment in human capital (including the quantity and quality of education and training

made available to the workforce is an essential ingredient of long term growth.

According to Anyanwu (2009) applying ordinary least squares technique, studied the determinants of aggregate agricultural productivity among small holder farmers in Rivers State, Nigeria. Cross-sectional data generated from 288 food crop farmers randomly selected from 5 out of the 23 local government areas were used. Results of the analysis showed that farm land, labour input, planting material, age of the farmers, farming experience, and level of education are the main significant determinant of aggregate agriculture productivity in the state.

Akinniran, (2013) examined the effect of exchange rate on agricultural growth in Nigeria, its trend, movement and effects on agriculture. Over the years with time, series of data of 11years sourced from Central Bank of Nigeria was used. The data collected were analyzed using graphical analysis, unit root test and ordinary least regression analysis from the findings it had proved that agricultural growth, GDP, inflation, export value, export, human capital, crude oil, capital, labour and foreign direct investment are bound together when agricultural growth is made the dependent variable. It was revealed that the effect of crude oil price have an inverse relationship on agricultural growth and are not significant at all known level of significance. It also revealed that co-efficient of regression associated with inflation, export, human capital, price of crude oil and capital have negative impact on agricultural growth while export value, labour and foreign direct investment has positive impact on agricultural growth. The study recommends that local agricultural growth should be encouraged in order to reduce importation of goods and produce as well as high reliance on oil sector.

Yusuf (2014) carried out empirical investigation on The Role of Agriculture in Economic Growth and Development: Nigerian Perspective with objective of discovering the importance of Agriculture in the economic growth in Nigeria. The study employed Restricted Error Correction Model in a multivariate study. It was revealed that the sector has been neglected since the 90's and its contributions to the GDP have been dwindling. The study recommended that the provision of the transformation agenda should be rigorously pursued without any subjugation.

Ebere and Osundina (2014) examined the impact of government expenditure on Agriculture and on the economic growth of in Nigeria over the years with time series data of 33 years sourced from the Central Bank of Nigeria was used. Ordinary Least Square (OLS) technique of data analysis was used in evaluating the secondary data. GDP was used as a proxy to economic growth, while agricultural output and government expenditure on agriculture were used as indicators of government expenditure on agriculture. From the findings, agricultural output, government expenditure and GDP are positively related. It was found that a significant relationship exists between government expenditure in the Agricultural sector and the economic growth in Nigeria. The findings also revealed that the sector still encounter some problems like inadequate finance, poor infrastructure, and others. Therefore, the study recommended that it is imperative for the country to develop its agricultural sector through sufficient government spending, in order to set-up its economic growth.

Salako et al (2015), empirically explored the agricultural, economic growth and development nexus in Nigeria. The objective of the study is to examine the place of Agriculture in the economic growth and development of Nigeria. The quantitative technique is employed in a multivariate model VAR model with emphasis on the Variance Decomposition Analysis with the aid of E view 7. The study revealed that the sector has been neglected and the whole

attention is paid on crude oil which has caused dwindling of Agricultural Sector contributions to Economic growth. The study concludes that Agriculture is a live-wire of the economy. A set of policy directions were offered to unlock the sector to be economically functional, capable of catalyzing the industrialization need of the nation and contribute meaningfully to the development objective of the nation.

Oluwafemi Z. O. Adedokun M. Ogunleye, A.A. (2015) work on "Empirical Analysis of the Contribution of Agricultural Sector to Nigerian Gross Domestic Product: Implications for Economic Development: focused on the study of the Nigerian economy and agricultural contributions. Generally, he descriptive statistics shown that Nigerian economy had grown over the period of 32 years and this is obvious in the wider gap between the minimum and maximum values of the GDP and agricultural output respectively.

The unit root test results show that the GDP and Agric. Output variables are stationary at a level, while inflation is stationary at first difference. The coefficient of R2 was about 0.96 and the coefficient of agricultural output was found positive and statistically significant at 1% level. The coefficient of ECM (u-1) was significant at 1% level and this implies that GDP co-integrated with agricultural output and inflation.

Kamil S. Sevin U. and Festus V. B. (2017) empirically examined the impact of the agricultural sector on the economic growth of Nigeria, using time series data from 1981 to 2013. Findings revealed that real gross domestic product; agricultural output and oil rents have a long-run equilibrium relationship. Vector error correction model result shows that, the speed of adjustment of the variables towards their long run equilibrium path was low, though agricultural output had a positive impact on economic growth. It was recommended that, the government and policy makers should embark on diversification and enhance more allocation in terms of budgeting to the agricultural sector.

Olajide et al. (2012) analyzed the relationship between Agricultural resource and economic growth in Nigeria using the Ordinary Least Square Regression Method. The results reveal a positive cause and effect relationship between Gross Domestic Product (GDP) and agricultural output in Nigeria. Agricultural sector is estimated to contribute 34.4 percent variation in Gross domestic product (GDP) between 1970 and 2010 in Nigeria. The Agricultural sector suffered neglect during the hey-days of the oil boom in the 1970s. In order to improve agriculture, government should see that special incentives are given to farmers, provide adequate funding, and also provide infrastructural facilities such as good roads, pipe borne water and electricity.

This research is unique in its way. Since every scholar has his own view concerning the agricultural sector in Nigeria; the study, however, examined the impact of the agricultural sector on economic growth under the time series framework, using the Ordinary Square Technique (OLS). The paper examined the existence of the long run relationship between the agricultural sector and economic growth using the co-integration test by extension. We will evaluate the possible reasons for the neglect of this sector beyond the oil boom in the 1970s and the impediment to the growth of the sector in Nigeria.

Methodology

This section therefore describes the method of the research work. For the purpose of this study, the ex-post factor research design is used. And the data are secondary data from 1984 - 2015, which we sourced from Central Bank of Nigeria (CBN) the Nigerian Stock Exchange

(NSE) Statistical bulletins and relevant journals

Method of Data Analysis

The ordinary least square technique (OLS) was used in the regression analysis

Model Specification

The specification is being guided by existing theory or empirical evidence from previous studies. The model is specified as follows:

RGDP = F(AGOUT, INTRA, DMBLA, INFLR)

$RGDP = a_o + a_1 AGOUT + a_2 INTRA + a_3 DMBLA + a_4 INFLR + \varepsilon t$

Where:

RGDP=Real gross domestic product (proxy for Economic growth)

AGOUT = Agricultural Output

INTRA= Interest Rate on Agricultural Credit

DMBLA = Deposit Money Bank Loans on Agriculture

INFLR = Inflation Rate

U_t = Error term at time

A priori Expectation= $a_1>0$, $a_2<0$, $a_3>0$, $a_3>0$,

Data Presentation, Analysis and Discussion of Findings Preview

Data Presentation

Table 1: Data on Real Gross Domestic Product (RGDP), Agricultural Output (AGOUT), Deposit Money Bank Loans to Agriculture (DMBLA), Inflation Rate (INFLR) and Interest Rate on Agriculture Credit (INTRA) in Nigeria from 1984 to 2015.

YEAR	RGDP	AGOUT	INTRA	DMBLA	INFLR
1984	59622.5	6838	10	1052.1	39.6
1985	67908.6	7402	12.5	1316.2	5.5
1986	69146.99	6813	9.25	1810.3	5.4
1987	105222.8	6034	10.5	2427.1	10.2
1988	139085.3	6503	17.5	3066.7	34.5
1989	216797.5	84428	16.5	3470.5	50.5
1990	267550	122074	26.8	4221.4	7.4
1991	312139.7	85284	25.5	5012.9	12.7
1992	532613.8	80979	20	6978.9	44.8
1993	683869.8	96784	29.8	10753.6	57.2
1994	899863.2	106676	18.3	17757.7	57
1995	1933212	102760	21	25278.7	7.8
1996	2702719	113498	20	33264.1	29.3
1997	2801973	119487	19.7	27934.3	8.5
1998	2708431	124674	13.5	27180.7	10
1999	3194015	129607	18.3	31045.7	6.6
2000	4582127	132699	24.9	41028.8	6.9
2001	4725086	121886	20.7	55846.1	18
2002	6912381	138754	19.2	30849.7	13.7
2003	8487032	143707	18	62102.8	14
2004	11411067	149513	17.3	67738.6	15
2005	14572239	155935	16.9	48561.5	17.8
2006	18564595	162249	15.1	49193.4	8.3
2007	20657318	170815	15.4	140378.9	10.2
2008	24296329	127875	15.2	134814.6	11.3
2009	24794239	182661	15	114206.6	17.9
2010	33984754	190133	14.9	135761.3	16.4
2011	37543655	203410	17.4	180262.8	15
2012	40544100	216209	16.3	205537.5	12.8
2013	51243701	231464	15.4	272388.4	16.9
2014	57328110	267321	17.6	310721.6	18.7
2015	61890381	285931	17.8	332109.5	22

Source: Central Bank of Nigeria (CBN) Statistical Bulletin (2015).

Data Analysis

Estimated Regression Line:

RGDP=2415468+37.556AGOUT–349601.3INTRA+166.580DMBLA + 13733.07INFLR

Discussion of Results

The study examined the relationship between Agriculture and economic growth in Nigeria from 1984 to 2015. The data was analyzed using the Ordinary Least Square Regression Technique.

UNIT ROOT TEST:
Result of ADF Unit Root Test

VARIABLES	ADF STATISTICS	CRITICAL VALUE (5%)	ORDER OF INTEGRATION
RGDP	5.445397	-2.967767	I (0)
AGOUT	-5.717523	-2.963972	I (1)
INTRA	-3.310181	-2.960411	I (0)
DMBLA	5.526629	-2.981038	I (0)
INFLR	-3.908554	-2.960411	I (0)

The table above shows the results of the unit root test. The decision rule state that if the augmented dickey fuller statistics is > than the critical value at 5% then there is no unit root in the data, but its stationary. The result shows that RGDP, INTRA, DMBLA, and INFLR were stationary at level while only AGOUT was stationary at 1st difference, hence the data stationary.

CO INTEGRATION TEST

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.603977	77.68123	69.81889	0.0103
At most 1 *	0.485047	49.89272	47.85613	0.0318
At most 2 *	0.380890	29.98231	29.79707	0.0476
At most 3 *	0.238894	15.59813	15.49471	0.0483
At most 4 *	0.218824	7.408642	3.841466	0.0065

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Above is the co-integration test. The decision rule states that, the trace statistics must be greater than its critical value at 5%. The result shows that all the variables were co-integrated, and this means that there is a long-run equilibrium relationship between the dependent and independent variables from the model.

The coefficient of agricultural output is 37.556. This indicates that, agricultural output has a positive relationship with real Gross Domestic Product. A one unit increase in agricultural output will increase real gross domestic product by 37.556 units within the period covered by the study. This result is in line with the a priori expectation.

The t-test conducted was done at 5% level of significance. The t-calculated was compared with the t-tabulated. From the t-tables, the t-tabulated value is 2.060. It was found that the agricultural output has no significant impact on real gross domestic product. This can be

attributed to quote expenses on the agric. sector projects, such as provision of subsidized fertilizers, high breed crops and livestock, etc., are, in fact, not spent on the projects. Also even when these monies are spent, given the spate of corruption in Nigeria, it will not be out of place to assert that the projects do not benefit the target groups, for as Omanukwue (2005) reported; a large proportion of the funds allocated to Agriculture do not go directly to farmers. In essence, the schemes are often hijacked; the poorest farmers remain poor, with little or no improvement in their economic fortunes.

The adjusted coefficient of the Adjusted R-squared revealed that 97% of variations in real Gross Domestic Product were explained by agricultural output, interest rate on Agriculture, deposit money bank loans to Agriculture and inflation rate. Thus, the remaining 3% variations in real Gross Domestic Product were explained by factors not included in the model. 97% signifies a good fit for the model.
The test for autocorrelation was conducted using Durbin-Watson statistics. The Durbin Watson value of 1.619 is closer to two than zero which shows that there is no autocorrelation in the model.

The multicollinearity test showed that variance in the inflation factors values of FDI {1.118}, BOP {1.073}, and EXR {1.132} are less than 10 implying that, there is no multicollinearity among the explanatory variables.

Heteroscedasticity test is carried out using White's general heteroscedasticity test {with cross terms}. The test asymptotically follows a chi-square distribution with degree of freedom equal to the number of regressors {excluding the constant term}. The auxiliary model can be stated thus:
$Ut = \beta_0 + \beta_1$ AGOUT $+ \beta_2$ INTRA $+ \beta_3$ DMBLA $+ \beta_4$INFLR $+ \beta_5$AGOUT^2 $+\beta_6$ INTRA^2 $+ \beta_7$ DMBLA^2 $+ \beta_8$ INFLR^2 $+ \beta_9$ AGOUT INTRA $+ \beta_{10}$ AGOUT DMBLA $+ \beta_{11}$ AGOUT INFLR $+ \beta_{12}$ INTRA DMBLA $+ \beta_{13}$ INTRA INFLR $+ \beta_{14}$ DMBLA INFLR + Vi.
Where Vi = pure noise error.
This model is run and an auxiliary R^2 from it is obtained.
The hypothesis to the test is stated thus;
H0: There is no heteroscedasticity
H1: There is a heteroscedasticity

Decision Rule
Reject the null hypothesis if X^2cal > X^2tab at 5% level of significance. If otherwise, accept the null hypothesis. From the obtained results, X^2cal = 15.86867 > X^2 0.05 {14} = 23.68. We therefore accept the alternative hypothesis of heteroscedasticity and conclude that, there is no heteroscedasticity.

Conclusion
In this paper, we have ascertained the effect of Agriculture on Nigerian economy. It was obvious that many Nigerians are into one form of agricultural activity or another but operating at subsistence level. Consequently, the sector has not been able to impact significantly on the wealth of the Nigerian economy. Mass production of agricultural output, although capital intensive is yet to gain ground in Nigeria and this is supposed to help put food on the table of the masses, reduce poverty and encourage export. This must be addressed. Besides, the inability to revive the rural areas where a large proportion of the people live has not helped matters and so many youths who are supposed to delve into Agriculture in the rural areas prefer living in slums in the urban areas, thereby defacing the

urban areas and raising social vices in such areas. All these anomalies can be addressed if adequate political will is radically employed to change the status quo.

Recommendations

- Agricultural friendly government policies and policy orientation must be put in place. These policies should be channeled towards blocking the leakages in agricultural output in the economy so as to have inclusive growth in the sector. Such policies should include building storage facilities like Silos, to achieve all year round availability of agricultural products at stable rate etc.
- Suitable rural infrastructural development should be made priority by the government. This basic infrastructure will help the local farmer that wants to commercialize his yields, to be able to access potential buyers, and markets where they can be sold.

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APPENDIX

Null Hypothesis: AGOUT has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.258852	0.9198
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGOUT)
Method: Least Squares
Date: 07/04/17 Time: 06:42
Sample (adjusted): 1986 2015
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGOUT(-1)	-0.017769	0.068647	-0.258852	0.7977
D(AGOUT(-1))	-0.064318	0.198949	-0.323286	0.7490
C	12086.23	9379.042	1.288642	0.2085

R-squared	0.008540	Mean dependent var	9284.300
Adjusted R-squared	-0.064902	S.D. dependent var	22416.10
S.E. of regression	23132.09	Akaike info criterion	23.03047
Sum squared resid	1.44E+10	Schwarz criterion	23.17059
Log likelihood	-342.4570	Hannan-Quinn criter.	23.07529
F-statistic	0.116277	Durbin-Watson stat	2.030096
Prob(F-statistic)	0.890672		

Null Hypothesis: D(AGOUT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.717523	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGOUT,2)
Method: Least Squares
Date: 07/04/17 Time: 06:43
Sample (adjusted): 1986 2015
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AGOUT(-1))	-1.078027	0.188548	-5.717523	0.0000
C	9961.790	4463.438	2.231865	0.0338

R-squared	0.538640	Mean dependent var	601.5333
Adjusted R-squared	0.522162	S.D. dependent var	32901.51
S.E. of regression	22743.43	Akaike info criterion	22.96628
Sum squared resid	1.45E+10	Schwarz criterion	23.05969
Log likelihood	-342.4942	Hannan-Quinn criter.	22.99616
F-statistic	32.69007	Durbin-Watson stat	2.039547
Prob(F-statistic)	0.000004		

Dependent Variable: RGDP
Method: Least Squares
Date: 07/04/17 Time: 06:55
Sample: 1984 2015
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2415469.	2476248.	0.975455	0.3380
AGOUT	37.55573	18.58751	2.020482	0.0534
INTRA	-349601.3	155927.7	-2.242073	0.0334
DMBLA	166.5804	14.07863	11.83215	0.0000
INFLR	13733.07	40941.47	0.335432	0.7399

R-squared	0.972974	Mean dependent var	13694728
Adjusted R-squared	0.968971	S.D. dependent var	18377831
S.E. of regression	3237283.	Akaike info criterion	32.96097
Sum squared resid	2.83E+14	Schwarz criterion	33.18999
Log likelihood	-522.3755	Hannan-Quinn criter.	33.03688
F-statistic	243.0135	Durbin-Watson stat	1.601610
Prob(F-statistic)	0.000000		

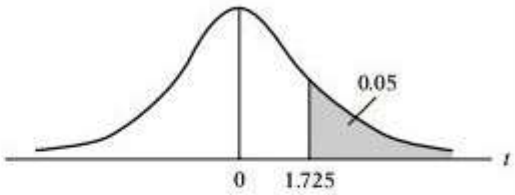
.2 PERCENTAGE POINTS OF THE *t* DISTRIBUTION

Example

$\Pr(t > 2.086) = 0.025$

$\Pr(t > 1.725) = 0.05$ for df = 20

$\Pr(|t| > 1.725) = 0.10$



df \ Pr	0.25 0.50	0.10 0.20	0.05 0.10	0.025 0.05	0.01 0.02	0.005 0.010	0.001 0.002
1	1.000	3.078	6.314	12.706	31.821	63.657	318.31
2	0.816	1.886	2.920	4.303	6.965	9.925	22.327
3	0.765	1.638	2.353	3.182	4.541	5.841	10.214
4	0.741	1.533	2.132	2.776	3.747	4.604	7.173
5	0.727	1.476	2.015	2.571	3.365	4.032	5.893
6	0.718	1.440	1.943	2.447	3.143	3.707	5.208
7	0.711	1.415	1.895	2.365	2.998	3.499	4.785
8	0.706	1.397	1.860	2.306	2.896	3.355	4.501
9	0.703	1.383	1.833	2.262	2.821	3.250	4.297
10	0.700	1.372	1.812	2.228	2.764	3.169	4.144
11	0.697	1.363	1.796	2.201	2.718	3.106	4.025
12	0.695	1.356	1.782	2.179	2.681	3.055	3.930
13	0.694	1.350	1.771	2.160	2.650	3.012	3.852
14	0.692	1.345	1.761	2.145	2.624	2.977	3.787
15	0.691	1.341	1.753	2.131	2.602	2.947	3.733
16	0.690	1.337	1.746	2.120	2.583	2.921	3.686
17	0.689	1.333	1.740	2.110	2.567	2.898	3.646
18	0.688	1.330	1.734	2.101	2.552	2.878	3.610
19	0.688	1.328	1.729	2.093	2.539	2.861	3.579
20	0.687	1.325	1.725	2.086	2.528	2.845	3.552
21	0.686	1.323	1.721	2.080	2.518	2.831	3.527
22	0.686	1.321	1.717	2.074	2.508	2.819	3.505
23	0.685	1.319	1.714	2.069	2.500	2.807	3.485
24	0.685	1.318	1.711	2.064	2.492	2.797	3.467
25	0.684	1.316	1.708	2.060	2.485	2.787	3.450
26	0.684	1.315	1.706	2.056	2.479	2.779	3.435
27	0.684	1.314	1.703	2.052	2.473	2.771	3.421
28	0.683	1.313	1.701	2.048	2.467	2.763	3.408
29	0.683	1.311	1.699	2.045	2.462	2.756	3.396
30	0.683	1.310	1.697	2.042	2.457	2.750	3.385
40	0.681	1.303	1.684	2.021	2.423	2.704	3.307
60	0.679	1.296	1.671	2.000	2.390	2.660	3.232
120	0.677	1.289	1.658	1.980	2.358	2.617	3.160
∞	0.674	1.282	1.645	1.960	2.326	2.576	3.090

Note: The smaller probability shown at the head of each column is the area in one tail; the larger probability is the area in both tails.

Source: From E. S. Pearson and H. O. Hartley, eds., *Biometrika Tables for Statisticians*, vol. 1, 3d ed., table 12, Cambridge University Press, New York, 1966. Reproduced by permission of the editors and trustees of *Biometrika*.

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