

Impact of Macroeconomic Policy on Agricultural Growth in Nigeria

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Abstract: *The impact of macroeconomic policy on agricultural growth in Nigeria was estimated using time-series data and econometric analysis. Our results show that Gross Domestic Product (GDP), Credit Loan to Agriculture (CLA) and exchange rates are significant with positive influences. Income elasticity of agricultural growth was low at 0.939 percent indicating the income inelastic nature of agricultural commodities.*

There is a positive relationship between the dependent variable (Agricultural Output) and the independent variable (GDP). On the other hand, money supply has an inverse relationship (negative influence) on agricultural production which is contrary to expectations. The interest rate is positive but insignificant which can be explained by the restrictive monetary policies. Equally, a restrictive monetary policy can cause farm incomes to fall.

Keywords: *Income Elasticity, Inverse, Monetary Policy*

I. Introduction

The agricultural industry is extremely vulnerable to risk and uncertainty. Farmers and agribusiness operators closely monitor changing weather patterns, farm programmes, prices, sales, etc. to reduce their exposure to risk and uncertainty. However, many farmers and agribusiness operators are less familiar with one of the major risk variables that can significantly affect their business operations' profitability – this is government policy. Macroeconomic policy changes often dramatically impact the agricultural economy. Although policymakers try to design policies to improve the national economy, these policies often have unintended and harmful effects on the agricultural economy, hence, farmers agribusiness operators and policymakers must understand the policy process and the impact that changing macroeconomic policies can have on agriculture. This knowledge will put them in a better position to react strategically to actual or anticipated changes in the macro economy.

Macroeconomics refers to the study of a nation's overall economic performance. The federal government tries to influence the performance of the national economy through various policies such as changing the level of taxation, government spending, or the supply of money available in the economy. Changing macroeconomic policies affect national income, prices, interest rates and exchange rates all of which influence the agricultural economy.

Nigeria is a vast agricultural country, endowed with substantial natural resources which include 68 million hectares of arable land, fresh water resources covering about 12.6 million hectares, 960 kilometres (km) of coastline and an ecological diversity which enables the country to produce a wide variety of crops and livestock, forestry and fisheries products (Buren, 1998). The country is divided into seven agro-ecological zones, that is, semi-arid, found only in the northern region; the savannah, found in the northern and middle region; a small highland area found in the middle and southern region; a larger transition environment of savannah derived from the forest overlapping the southern and middle regions; mangroves in the Niger-Delta; freshwater swamps in the Niger-Delta; and Low-land rain forest in the south. The agro-ecological setting and technology base, in principle, determine the production systems. Two major production systems dominate these zones:

- i. the traditional production system, which is found in all parts of the country and consists of land holdings with a variety of food crops intended for consumption purposes mainly, and
- ii. the improved irrigation production system which comprises the improved small scale irrigation using low-lying or water logged areas for crop and livestock production as well as large-scale mechanized and/or commercial irrigation farming systems.

Available statistics show that agriculture is the most important Nigerian economic sector in terms of its contribution to the GDP, after oil. The sector contributes about 41% of the country's GDP, employs about 65% of the total population and provides employment to about 80% of the rural population. The statistics equally show that agriculture is the major source of food and meat production. It is estimated that some 25 million hectares are cultivated each year by smallholders for food production hence the sector plays an important role in rural livelihoods. It is estimated that it accounts for about 70% of rural households' total incomes (Ogen, 2004).

In other words, majority of Nigerian households obtain a large share of their income from farm activities. They are involved in peasant and medium scale farming. Women are more engaged in food processing and livestock's rearing. Thus, there is direct linkage between agriculture and rural development in Nigeria which brought about the creation of the Federal Ministry of Agriculture and Rural Development (FMARD). The FMARD is responsible for the development, review and implementation of policies for agricultural development dealing with crops, livestock, fisheries, and forestry. The objective of the ministry is to improve agricultural production and, in turn, enhance national food security and alleviate rural poverty. It provides technical support, production infrastructure, and supplies inputs to promote adoption of productivity enhancing techniques. The Federal Department of Rural Development (FDRD) has additional responsibility of formulating policies and strategies for integrated rural development. Its mandate is to accelerate the transformation of the nation's rural life and landscape in a coordinated and sustainable manner with a view to eradicate rural poverty, expand rural economic opportunities, enhance food security and integrate rural dwellers into the mainstream of national development.

Agriculture has been defined as the production of food and livestock, and the purposeful tending of plants and animals, (Ahmed, 1993). He stated further that agriculture is the mainstay of many economies and it is fundamental to the socio-economic development of a nation because it is a major element and factor in national development. In the same view, Okolo (2004) described agricultural sector as the most important sector of the Nigerian economy which holds a lot of potentials for the future economic development of the nation as it had done in the past. Notwithstanding the enviable position of the oil sector in the Nigerian economy over the past three decades, the agricultural sector is arguably the most important sector of the economy. Agriculture's contribution to the GDP has remained stable at between 30 and 42 percent, and employs 65 per cent, of the labour force in Nigeria (Emeka 2007).

Generally, the agriculture sector contributes to the development of an economy in four major ways-product contribution, factor contribution, market contribution and foreign exchange contribution (Kuznetz 1961; Mackie 1964; Abayomi 1997; Abdullahi 2002; World Bank 2007). The objective of this study therefore is to analyze the contribution of agricultural sector to the development of Nigeria economy between 1970 and year 2010 using an econometric technique.

STATEMENT OF THE PROBLEM

Literature has reported that in spite of Nigeria's rich agricultural resource endowment, there has been a gradual decline in agriculture's contributions to the nation's economy (Manyong et al., 2005). In the 1960s, agriculture accounted for 65-70% of total exports; it fell to about 40% in the 1970s, and crashed to less than 2% in the late 1990s. The decline in the agricultural sector was largely due to rise in crude oil revenue in the early 1970s. Less than 50% of the Nigeria's cultivable agricultural land is under cultivation. Even then, smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields, cultivate most of this land. The smallholder farmers are constrained by many problems including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, and inadequate research and extension services. The inability to capture the financial services requirements of farmers and agribusiness owners who constitute about 70 percent of the population is inclusive (Lawal, 2011).

Low agricultural output has a negative effect on the Nigerian economy as a whole. Several factors have been identified to enhance or retard growth in the agricultural sector. These factors include education (Huffman 1949; Pudasaini 1983; Aheam et al. 1998; Weir 1999), infrastructure (Querioz and Gaultam 1992; Gopinath and Roe 1997; Yee et al. 2000 and Venk Atachalam 2003) and inflation (Johnson 1980; Bullard and Keating 1995; Andres and Hernando 1997; Gokal and Hanif 2004).

II. OBJECTIVE OF THE STUDY

The main objective of this study is to examine the impact of macroeconomic variables on agricultural output on the Nigerian economy and to analyze the contribution of agricultural sector to the development of Nigeria economy between 1970 and year 2010 using an econometric technique.

III. Materials And Methodology

Secondary source of data was used in the study, taking GDP as proxy and time-series data from 1970 to 2010. The purpose of choosing this period is to empirically test the significance or the extent to which agricultural sector contributes to the economic growth despite several years of Government neglect and the renewal of effort towards stabilizing the sector, since 1986 to date. The data was obtained from the Central Bank of Nigeria (CBN) statistical bulletin, 2010 edition. The method of data analysis is the Ordinary Least Square (OLS) multiple regression method. We made use of Eviews 7.0, econometric software.

The Keynesian IS-LM function serves as a platform on which the empirical model used is formulated. This is given below.

$$\text{AGRIC}_t = \beta_0 + \beta_1 M_2 + \beta_2 IR + \beta_3 \text{Inf} + \beta_4 \text{CLA} + \beta_5 \text{ER} + \beta_6 \text{GDP} + \varepsilon_t \quad \dots \dots \dots (1)$$

Where;

AGRIC_t refers to total agriculture production; M₂ is money supply; IR is interest rate; InF is inflation rate; ER is exchange rate; GDP is gross domestic production; CLA is credit loan to agriculture; ε_t is the Error term. A-priori expectations are determined by the principles of economic theory and refer to sign and size of the parameters of economic relationship.

Then: $\delta \text{AGRIC} / \delta M_2 > 0$; $\delta \text{AGRIC} / \delta \text{IR} < 0$; $\delta \text{AGRIC} / \delta \text{Inf} < 0$; $\delta \text{AGRIC} / \delta \text{ER} < 0$; $\delta \text{AGRIC} / \delta \text{CLA} > 0$. $\delta \text{AGRIC} / \delta \text{GDP} > 0$

$$\text{GDP}_{t=} \beta_0 + \beta_1 M_2 + \beta_2 \text{IR} + \beta_3 \text{Inf} + \beta_4 \text{CLA} + \beta_5 \text{ER} + \beta_6 \text{AGRIC} + \epsilon_t \dots\dots\dots (2)$$

Data on the selected economic and financial indicator in Nigeria were sourced from secondary sources such as the review of the Central Bank of Nigeria (CBN), statistical bulletin, Federal Department of Fisheries (FDF), and Bureau of Statistics. The data covered the period of 1960 to 2010.

IV. Result And Discussions

The results presented in Table 1, Table 2 and Table 3 below reveal that there is a positive relationship between the dependent variable (Agricultural Output) and the independent variables [GDP log, Commercial Loan to Farmers (CLF) log, Interest Rate (IR) and Exchange Rate (ER)].

TABLE 1

Dependent Variable: LOG (AGRIC)				
Method: Least Squares				
Date: 02/12/14 Time: 08:56				
Sample (adjusted): 1961 2010				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.446363	0.210987	2.115599	0.0402
LOG (MS)	-0.17426	0.041883	-4.16064	0.0001
LOG (GDP)	0.938974	0.040387	23.24925	0
LOG (CLA)	0.110519	0.026095	4.235213	0.0001
INT	0.003822	0.004482	0.852834	0.3985
EXH	0.00578	0.001038	5.569922	0
ECM (-1)	0.762177	0.106858	7.132596	0
F-Static	1785.069	D W	1.9825	
R ²	0.996001	Mean dependent var		10.14704

TABLE 2

Dependent Variable: LOG (GDP)				
Method: Least Squares				
Date: 02/12/14 Time: 08:58				
Sample (adjusted): 1961 2010				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.16816	0.225787	2.115599	0.4605
LOG (MS)	0.223253	0.037761	5.912248	0
LOG (AGRIC)	0.986513	0.042432	23.24925	0
LOG (CLA)	-0.09861	0.028066	-3.51359	0.0011
INT	-0.00448	0.004582	-0.97667	0.3342
EXH	-0.00704	0.000892	-7.88981	0
ECM (-1)	-0.77585	0.110417	-7.02653	0
R-SQUARED	0.996129	MEAN DEPENDENT VAR		11.15059
ADJUSTED R-SQUARED	0.995589	S.D. DEPENDENT VAR		2.045855
S.E. OF REGRESSION	0.135871	AKAIKE INFO CRITERION		-1.02505
SUM SQUARED RESID	0.793818	SCHWARZ CRITERION		-0.75736
LOG LIKELIHOOD	32.62616	HANNAN-QUINN CRITER.		-0.92311
F-STATISTIC	1844.41	DURBIN-WATSON STAT		1.887951

TABLE 3

	LOG (AGRIC)	CORRELATION			INT	EXH
		LOG (GDP)	LOG (MS)	LOG (CLA)		
LOG (AGRIC)	1	0.991199	0.946041	0.959126	0.792302	0.672737
LOG (GDP)	0.991199	1	0.93224	0.941708	0.773315	0.620249
LOG (MS)	0.946041	0.93224	1	0.967876	0.778185	0.831351
LOG (CLA)	0.959126	0.941708	0.967876	1	0.811967	0.746233
INT	0.792302	0.773315	0.778185	0.811967	1	0.535699
EXH	0.672737	0.620249	0.831351	0.746233	0.535699	1

On the other hand, Money Supply (MS) has negative influence on Agricultural Output (AO). Income is an important determinant of agricultural output. A one percent increase in income increases agricultural output by about 0.939 percent. The low income elasticity of agriculture growth supports the conventional logic about the income inelastic nature of agricultural commodities.

Commercial loan to farmers shows that farmer access to domestic credit has a positive relationship with agricultural commodities contributing 0.11 percent to every one percent increase in agricultural output. The ER result suggests that a rise in exchange rate (depreciation) increases the demand for agricultural commodities by 0.00578 percent. The IR, which is the cost of capital for loanable funds, has a positive relationship with agricultural output contributing 0.003822 percent to every one percent increase in agricultural output.

Contrary to our expectation, money supply has an inverse relationship with agricultural output: an increase in money supply led to a decrease in agricultural output indicating a possible diversion of monies meant for agriculture to other uses. The result obtained from the model shows that the overall coefficient of determination, R, shows that 99.60 percent of growth rate of agricultural commodities is explained by the variables in equation.

From the hypothesis testing, it is revealed that all the variables are statistically significant at 95 % confidence level of agricultural output although the interest rate observed negative and significant. Contrary to opinion, interest rates were observed to be insignificant of model. The 'F-statistics' shows the overall or aggregate significance of the model. The 'F-calculated' is greater than the F-tabulated, the null-hypothesis (Ho) is rejected while the alternative (Hi) hypothesis is accepted. That is, the overall significance of the model is accepted.

V. Conclusion

The estimated model shows that GDP, Commercial Loan to Agriculture (CLA), IR and ER have positive influences. On the other hand MS has negative influence. Among strongest influences are GDP, CLA and MS. The insignificant relationship between interest rate and agricultural output could be explained by the restrictive monetary policies which will harm the agricultural sector because higher interest rates will result in higher cost of production, lower demand for agricultural inputs, and a reduction in export demand. Therefore, a prolonged restrictive monetary policy stance by the CBN usually causes farm income to fall and increases cash flow instability.

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ACRONYMS AND ABBREVIATIONS

AO	-	AGRICULTURAL OUTPUT
CBN	-	CENTRAL BANK OF NIGERIA
CLA	-	COMMERCIAL LOAN TO AGRICULTURE
CLF	-	CREDIT LOAN TO FARMERS
ER	-	EXCHANGE RATE
FDF	-	FEDERAL DEPARTMENT OF FISHERIES
FDRD	-	FEDERAL DEPARTMENT OF RURAL DEVELOPMENT
FMARD	-	FEDERAL MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT
GDP	-	GROSS DOMESTIC PRODUCT

IR	-	INTEREST RATE
KM	-	KILOMETRE
MS	-	MONEY SUPPLY
MS	-	MONEY SUPPLY
OLS	-	ORDINARY LEAST SQUARE

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