Journal of Sustainable Development in Africa (Volume 14, No.5, 2012)
ISSN: 1520-5509
Clarion University of Pennsylvania, Clarion, Pennsylvania

ASSESSMENT OF THE GROWTH OF MAIZE PRODUCTION IN THE PRE-SAP, SAP AND POST- SAP PERIODS IN NIGERIA: LESSONS FOR SUSTAINABLE RURAL ECONOMY

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ABSTRACT

This research was designed to provide empirical information on the growth rates of maize production in three sub-periods in Nigeria namely pre-Structural Adjustment Programme(SAP) period, Structural Adjustment Programme(SAP) period and post-Structural Adjustment Programme(SAP) period using time series data on maize production and its implication for sustainable development of rural economy. A growth rate model was used to estimate the growth rates of maize in the three sub-periods. The results showed the compound rates of growth of maize production are – 0.001 %, 0.059% and 0.014% for the pre-SAP, SAP and post-SAP periods respectively. The higher compound growth rate of maize production in the SAP period implies that the policy reform in the period was more effective in ensuring increased growth of maize production over that of other periods in Nigeria. It is therefore, recommended that in the drive to ensure sustainability of rural economy in Nigeria, lessons from past reforms should be put into consideration in drawing future reforms for the development of rural economy of Nigeria.

Keywords: Maize, Growth rate, Structural adjustment, programme, Sustainable

INTRODUCTION

Maize (Zea mays L.) also called corn, is one of the most crucial and strategic cereal crops in Africa and the developing world in general (FARA, 2009). Maize is a stable food crop for most sub-Saharan Africans of which Nigeria is inclusive with per capital kg/year of 40 (FAOSTAT, 2003). Together with rice and wheat, maize provides at least 30% of the food calories to more than 4.5 billion people in 94 developing countries (von Braun *et al.,* 2010). They include 900 million poor consumers for whom maize is the preferred staple, 120 -140 million poor farm families and about one-third of all malnourished children. About 67% of the total maize production in the developing world comes from low and lower middle income countries; hence, maize plays an important role in the livelihoods of millions of poor farmers (FAOSTAT, 2010). Therefore, the sustainable development of a larger proportion of rural poor is linked to maize production; being a staple and a crop. Maize is one of the important grains in Nigeria, not only on the basis of the number of farmers that engaged in its cultivation, but also in its economic value (Olaniyi and Adewale, 2012) and this points to the significant role of maize production to sustainable development of rural economy, food security and poverty reduction especially in areas of Nigeria. Despite the economic importance of maize to the teeming populace in Nigeria, it has not been produced to meet food and industrial needs of the country and this could be attributed to low productivity from maize farms or that farmers have not adopted improved technologies for maize production (Onu *et al.,* 2010).The demand for maize sometimes outstrips supply as a result of the various domestic uses (Akande, 1994). Additionally,

other factors like price fluctuation, diseases and pests, poor storage facilities have been associated with low maize production in the country (Ojo, 2003). In Nigeria, efforts to improve and sustain maize technologies have met with some success, as improved maize varieties are now grown in most areas of Northern Nigeria and in appreciable quantity across other agro ecological zones of Southern Nigeria (Olaniyi and Manyong, 2007). In a bid to increase food production in Nigeria over the years, several policy reforms have been put in place by successive governments and one of such policy reforms in time past is the Structural Adjustment Programme(SAP) introduced in July 1986. The SAP aimed at facilitating economic growth as a means of jump-starting the economy towards sustainable economic growth and development. The objectives of the programme included reconstructing and diversifying the productive base of the economy, by reducing the dependence on oil and imports, laying a basis for sustaining non-inflationary growth, making substantial progress towards fiscal and balance of payment viability, improving efficiency of the private sector's contribution to economic growth, through liberalized trade and privatization of public sector enterprises, devaluing the naira and reducing government deficits and these translated into specific policy measures in the agricultural sector such as abolition of commodity boards, privatization and commercialization of agricultural and agro-industrial enterprises(Mesike *et al.*, 2008), the removal of all government subsidies on food and other agricultural products, promotion of the production and export of non-traditional agricultural products, import restrictive measures on food and other locally produced agriculturally based raw materials, increase of the budgetary allocation to the system of agricultural development projects as a major instrument for agricultural development(Kajisa *et al.*, 1997). The overall objective of implementing structural adjustment in the agricultural sector was to increase agricultural production and export of agricultural products and because of the relative importance of agriculture to the economy, this was supposed to contribute to improvement in the growth of the economy. The policy reforms in existence prior to the introduction of SAP and after the SAP period differs and therefore, the growth in agricultural production is expected to vary in the Pre-SAP, SAP and Post-SAP periods in Nigeria. In view of the foregoing, this study was designed to provide empirical information on the growth rates of maize production in Nigeria in the Pre-SAP, SAP and Post-SAP periods which would be relevant for policy formulation and implementation towards ensuring sustainability of rural economy in Nigeria.

MATERIALS AND METHODS

Description of the study area

The study area is Nigeria. 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 million hectares, 960 kilometers of coastline and an ecological diversity which enables the country to produce a wide variety of crops and livestock, forestry and fisheries products(Arokoyo, 2012). Nigeria has a total area of 923,800 sq km and occupies about 14% of land area in West Africa. The country lies between 4^{o}N and 14^{o}N, and between 3^{o}E and 15^{o}E. Nigeria is located within the tropics and therefore experiences high temperatures throughout the year. The mean for the country is 27^{o}C. Average maximum temperatures vary from 32^{o}C along the coast to 41^{o}C in the far north, while mean minimum figures range from 21^{o}C in the coast to under 13^{o}C inthe north. The climate of the country varies from a very wet coastal area with annual rainfall greater than 3,500 mm to the Sahel region in the north western and north eastern parts, with annual rain fall less than 600mm.

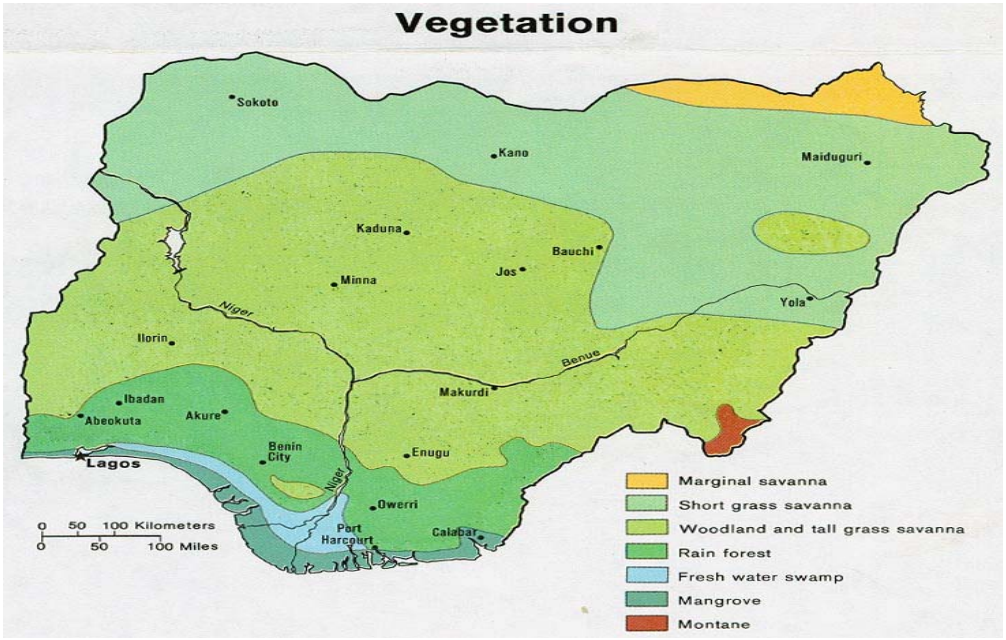

Figure 1: Map of Nigeria

Description of data

This study made use of secondary data which were principally elicited from the statistical bulletins and annual reports of the Central Bank of Nigeria (CBN). The secondary data used for analysis was on maize output in Nigeria extending from pre-structural adjustment programme period(1970 to 1985), structural adjustment programme period (1986 to 1994) and post-structural adjustment programme period (1995 to 2011) and therefore, data on three sub-periods were utilized in this study.

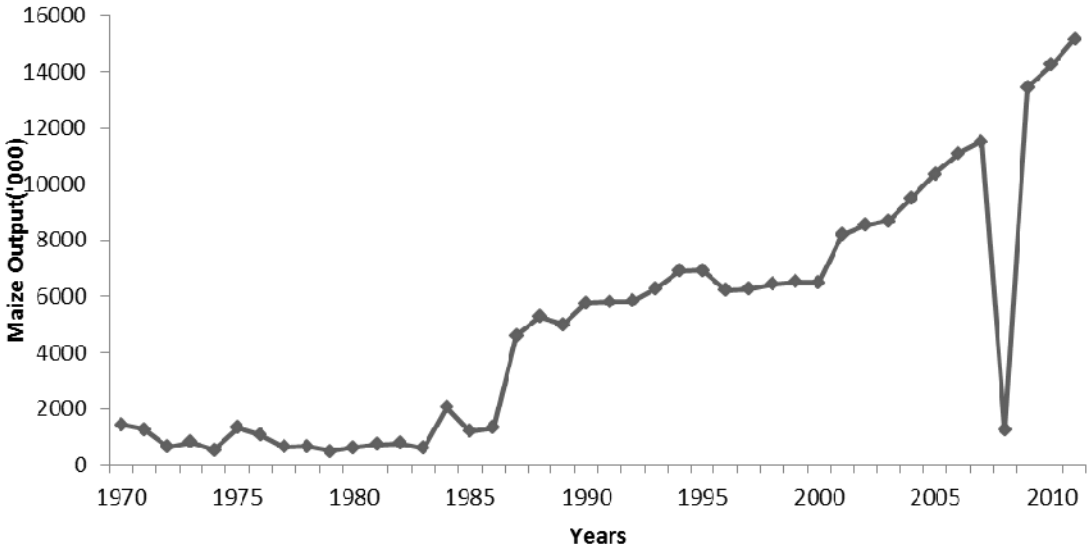

Figure 2: Maize Production Trend in Nigeria (1970 – 2011).

CONCEPTUAL FRAMEWORK

The model employed in this study for the estimation of growth trend in maize output in Nigeria is the growth rate model adopted from (Gujarat, 2003). This model is a semi log model whose regressand is in logarithm form and the regressor is time variable which can take values from one, two, three to infinity. For descriptive purposes, the growth rate model is called a log-lin model and the slope coefficient of the model measures the constant proportional or relative change in the regressand for a given absolute change in the value of the regressor. This model has been used by Khalid and Burhan(2006).

Model Specification

The compound interest formula is adopted for developing the model and is expressed as:

$$Y_t = Y_0(1 + r)^t \quad \ldots\ldots (1)$$

Where:

Y_t = Output of Maize('000 tonnes)

Y_0 = Initial Value of Maize Output('000 tonnes)

r = Compound rate of growth of Maize output over time

t = Time trend (1970 to 1985, 1986 to 1994 and 1995 to 2011)

Taking the natural logarithm of equation (1), equation (2) was derived as:

$$lnY_t = lnY_0 + tln(1 + r) \quad \ldots\ldots (2)$$

Where:

$b_0 = lnY_0$

$b_1 = ln(1 + r)$

Equation (2) is rewritten as:

$$lnY_t = b_0 + b_1 t \quad \ldots\ldots (3)$$

Adding disturbance term to equation (3), the explicit form of the model employed was derived as:

$$lnY_t = b_0 + b_1 t + u_t \quad \ldots\ldots (4)$$

Where:

Y_t = Output of Maize ('000 tonnes)

t = Time trend (1970 to 1985, 1986 to 1994 and 1995 to 2011)

b_0 = constant term

b_1 = Coefficient of time variable

u_t = Random term

After the estimation of equation (1), the compound rate of growth was computed as follows:

$$r = (e^{b_1} - 1) \quad \ldots\ldots (5)$$

Where:

r = compound rate of growth

b_1= estimated coefficient from equation (1)

RESULTS AND DISCUSSION

The result in table 1 shows that time variable was positive and significant in influencing output of maize at 5% significant level in the SAP period and also positive but insignificant in the pre-SAP and post-SAP periods.

Table 1: Estimated Regression of Growth Rate of Maize Production in Nigeria.

Variable	Coefficient	Standard Error	t - value
PRE – SAP PERIOD			
Constant (b_0)	5.449	20.152	0.270
Time (b_1)	-0.001	0.010	-0.125
R square	0.001		
SAP PERIOD			
Constant (b_0)	-109.449	23.864	-0.999
Time (b_1)	0.057**	0.012	1.162
R square	0.52		
POST – SAP PERIOD			
Constant (b_0)	-23.839	0.020	2.777
Time (b_1)	0.014	40.739	2.680
R square	0.080		

NB: ** P < 0.05

In the estimated growth rate model, the slope coefficients of -0.001, 0.057 and 0.014 for pre-SAP period, SAP period and post-SAP periods respectively measures relative change in output of maize for a given change in the value of time trend. By multiplying the relative change in maize output for pre-SAP period, SAP period and post-SAP periods respectively by hundred, we obtained the percentage change or the growth rate in maize output for an absolute change in time.

Pre-SAP period

Growth rate = relative change $\times 100$

Growth rate = -0.001×100

Growth rate = $-0.1\ \%$

SAP Period

Growth rate = relative change $\times 100$

Growth rate = 0.057×100

Growth rate = $5.7\ \%$

Post-SAP Period

Growth rate = relative change $\times 100$

Growth rate = 0.014×100

Growth rate = $1.4\ \%$

The growth rates of – 0.1%, 5.7% and 1.4 % for pre-SAP period, SAP period and post-SAP periods respectively implies that over the period, 1970 – 1985, 1986 – 1994 and 1995 – 2007, the output of maize in Nigeria increased at the rate of – 0.1%, 5.7% and 1.4 % per annum. However the growth rate worked out are an instantaneous (at a point in time) rate of growth and not the compound (over period of time) rate of growth. Compound growth rates (r) were estimated from the instantaneous rates of growth, in that – 0.1%, 5.7% and 1.4 % are instantaneous growth rates:

$ln\ (1 + r) = b_1$ (As discussed in model specification).

$ln\ (1 + r) = b_1$

$r = Antiln\ b_1 - 1$

r = $(e^{b_1} - 1)$

Pre-SAP period

r = $(e^{-0.001} - 1)$

Compound rate of growth(r) = - 0.001 %

SAP Period

r = $(e^{0.057} \quad 1)$

Compound rate of growth(r) = 0.059 %

Post-SAP period

r = $(e^{0.014} - 1)$

Compound rate of growth(r) = 0.014 %

Therefore, the rate of growth of maize output in Nigeria per annum during the pre-SAP period, SAP period and post-SAP periods (instantaneous rates of growth) are of – 0.1%, 5.7% and 1.4 % and the rate of growth of maize output in Nigeria over the periods 1970 – 1985, 1986 – 1994 and 1995 – 2007 (compound rates of growth) are – 0.001 %, 0.059% and 0.014% respectively. It was observed that the compounded growth rate of maize output in Nigeria during the SAP era was higher than during the pre-SAP and post-SAP eras and also the compounded rate of growth was slightly higher than the instantaneous growth rate by 0.2 and this is attributed to the compounding effect. The implication of the growth rate of maize being higher in the SAP era as compared to the pre-SAP era and post-SAP era is that the policy reform of the SAP era was favourable in ensuring increased maize production in Nigeria and therefore, the notion that SAP was a complete failure is misleading. According to Ugwu and Kanu(2011),despite the policy measures in the SAP period, the agricultural sector did not register significant overall growth but the findings of this study shows that there was significant growth rate of maize production in Nigeria during the SAP era as against the pre-SAP and post-SAP eras.

This study agrees with Badmus(2010) who found out that market liberalization had a positive impact on maize production in Nigeria and also, Ncema,(2003) who opined that in spite of the mixed performance of Structural Adjustment Programme in the country, it is important to stress the continued relevance of its basic tenets to our social and economic situation now and in the future and therefore, calls for an in-depth analysis of the past reform programmes with a view to drawing lessons for future reforms.

LESSONS FOR SUSTAINABLE RURAL ECONOMY

Maize occupies a central position in the agrarian economy of rural Nigeria especially the Northern Nigeria. The result of this study indicated that the growth rate of maize in the SAP period is higher than the pre-SAP and post-SAP periods. This implies that the increase in maize production in Nigeria in recent times is due to expansion of area harvested other than the increase in productivity(yield) and this is in line with FARA, (2009), who that Maize production in Africa is increasing faster (2.8% per annum) than global production (2.5% per annum) but global yields are increasing faster (1.6% per annum) than yields in Africa (1.3% per annum).Therefore, there is the need for increase in production of maize from increase in yield other than increase in area harvested to geared towards sustainable development of maize value chain and growth of the rural economy. Favourable elements of previous policy regimes should be taken into consideration in the formulation of policies for the rural economy of Nigeria.

CONCLUSION

The instantaneous growth rates and compound growth rates of maize production in the pre-SAP, SAP and post-SAP periods in Nigeria were estimated using a growth rate model. The results of the analysis showed that the instantaneous growth rates of maize production in Nigeria are – 0.1%, 5.7% and 1.4 % for the pre-SAP, SAP and post-SAP periods respectively and the compound rates of growth of maize production in Nigeria are – 0.001 %, 0.059% and 0.014% for the pre-SAP, SAP and post-SAP periods respectively. The compound rate of growth of maize in the SAP era was found to be higher than that of the pre-SAP and post-SAP eras in Nigeria. From the findings of this study, it can be inferred that the policy reforms in the SAP era was effective in achieving increased production of maize relative to other policy reforms in the pre-SAP and post-SAP eras and therefore, past policy reforms should be properly reviewed in the process of formulating future policies for the sustainable growth of rural economy in Nigeria.

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