International Research Journal of Agricultural Science and Soil Science (ISSN: 2251-0044) Vol. 5(6) pp. 150-158, November, 2015
Available online http://www.interesjournals.org/IRJAS
DOI: http:/dx.doi.org/10.14303/irjas.2015.075

Full Length Research Paper

Empirical assessment of the trend in rice production and imports in Nigeria (1980 – 2013)

D.O. Onu, K.C. Obike, F.E. Ebe, and B.O. Okpara

Department of Agricultural Economics, Michael Okpara University of Agriculture Umudike, P.M.B 7267 Umuahia, Abia State
*Corresponding Author's E-mail: dononu@yahoo.com

Abstract

The broad objective of this study was to empirically assess the trend in rice production and imports in Nigeria. The study covered 1980 -2013 period. Secondary data were used for the study. The data were analyzed by the use of descriptive statistics and econometric methods. Findings revealed that between 1980 and 2013, a total of 60,111,000 thousand metric tons of rice was domestically produced in Nigeria. The mean quantity of rice production in Nigeria between 1980 and 2013 was 8,587,286 thousand metric tons while the mean change in rice production within the same year was 1,586,333 thousand metric tons. The growth rate of rice production varied from a minimum of -2.73 percent between the years 2000- 2004 to a maximum of 94.99 percent between the years 1985- 1989. The overall average growth rate of rice production between the year 1980 and 2013 was 31 percent. Similarly between 1980 and 2013, a total of 39,763,500 thousand metric tons of rice was imported in Nigeria. The mean quantity of rice imports in Nigeria between 1980 and 2013 was 5,680,500 thousand metric tons per annum while the mean change in rice imports within the same year was 1,638,917 thousand metric tons per four years interval. The growth rate of rice imports in Nigeria between 1980 and 2013 is relatively higher than the growth rate in rice production in Nigeria within the same year. The growth trend of rice production and imports in Nigeria per annum within the period under study (instantaneous rates of growth) are 4.8% and 6.6% respectively and the rate of growth of rice production and imports in Nigeria over the study period under study (compound rates of growth) are 4.92% and 6.82% respectively.. There was a significant difference (t = 5.238*) in the mean quantity of rice production and imports within the period under review. There was a significant difference (t = 2.021***) in the mean growth rate of quantity of rice production and imports within the period under review.. The study recommended that policies aimed at reducing rice imports in Nigeria should consider those significant price and non-price factors that determined rice imports in Nigeria in both short and long terms. Also policies aimed at increasing rice production in Nigeria should consider those significant price and non-price factors that determined rice production in Nigeria in both short and long terms. A restriction of rice imports through the use of import taxes, increased government support to domestic rice farmers through provision of credit and subsidies for rice farmers is advocated.**

Key words: Rice production, import, growth rate, trend, Gross Domestic Product.

INTRODUCTION

Agriculture dominated the domestic economy of Nigeria, and accounts for about 40% of the Gross Domestic Product (GDP) and two-third of the labour force. Agriculture supplies food, raw material and generates house hold income for the majority of the people (Binuomote *et al*., 2012). According to Binuomote *et al*., (2012), the external sector is dominated by petroleum, which generates about 95% of Nigeria's foreign exchange earnings while agriculture contributes less than5%. Trade imports are dominated by capital foods,

raw materials and food. Nigeria is the largest rice producing country in the West African region. Rice is a leading staple crop in Nigeria cultivated and consumed in all parts of the country. Its domestic supply therefore has a great implication for food security and self-sufficiency in the country. Rice production rose gradually over the years with area expansion to surpass major rice producing countries like Cote d'Ivoire and Sierra Leone (Ayanwale *et al*, 2011).

Population growth and urbanization are the principal factors driving increased rice production in Nigeria (Nnamerenwa, 2006). In 2002, Nigeria accounted for nearly 44 % of the total rice output and 57 % of the total rice producing area in West Africa (WARDA 2010). Rice yields are however low even by West African standards (Binuomote *et al*., 2012). Rice is the leading staple food crop in Nigeria, it is cultivated in virtually all the agro-ecological zones of Nigeria, from the mangrove and swamps environment of the coastal areas, to the dry zones of the Sahel in the North (Akande, 2002). In 2007, about 1.7 Million hectares were under rice cultivation in Nigeria with an estimated national production of 3.4 million metric tons (National Food Reserve Agency, NFRA, 2008). NFRA (2008) also reported that rice yield in the same year was estimated at 2 metric tons per hectare, a negligible decrease of 0.03 percent over 2006 and 1 percent annual growth rate from 1999. About 5.3 million metric tons was produced nationally in 2008 resulting from the cultivation of about 2.3 million hectares and a yield of 2.3 metric tons per hectare (International Rice Research Institute, IRRI, 2010).

On the other side, the demand for rice has been soaring over the years (Ayanwale *et al*, 2011). Since mid-1970s, rice consumption in Nigeria has risen tremendously growing by 10.3% per annum, a result of accelerating population growth rate, increasing per capita consumption, rapid urbanization, increased income levels, and associated changes in family occupational structures (Ayanwale *et al*, 2011; Akpokodje *et al*., 2001; Akande, 2002; UNEP, 2005). About 3 billion people eat rice everyday with Nigerians consuming over 3.5 million metric tons per annum (Ayanwale *et al*, 2011; Thisday, 2009).

Nigeria has made significant strides towards increasing their rice production by encouraging the adoption of new and improved varieties but mostly through area expansion and intensification. Initiatives currently underway in is contributing to what is likely to become a trend of increasing rice production. Rice is cultivated virtually in all the agro-ecological zones in Nigeria. Despite this, the area cultivated to rice still appears small. In early 2000, about 25 million hectares of land cultivated to various food crops, about 6.37% was cultivated to rice. Paddy rice production in Nigeria first experienced a boom in 1967 when output stood at 385 thousand tons. During this period, area cultivated to rice stood at 262 thousand hectares while average national yield was 1.47 tons per hectare. 2

Another significant improvement in rice production in Nigeria occurred in 1980 when output increased to 1 million tons while area cultivated and yield rose to 550 thousand hectares and 1.98 tons per hectare respectively. Throughout the 1980s, rice output and yield increased. But in the 1990s, while rice output increased, the yield of rice declined, suggesting extensive rice cultivation. In 2011, paddy rice production in SSA was estimated at 14.2 million tons. Rice production in SSA grew at 3.23% per annum from 1961 to 2005. This growth rate was higher than the yearly population growth rate of 2.90% during the same period. From 2001 to 2012, the expansion of rice production stepped up in Nigeria with an average growth rate of 6.58%. The average quantity of milled rice produced in Nigeria during this same period milled about 2103.40 tons per year; in fact, rice production in West Africa in 20 years has increased greatly from 2.76 million tons in 1985 t0 6.70 million tons in 2011.

The performance of rice production in Nigeria, measured by the average annual growth rate of rice production was substantial (6.70) during 2001 to 2012. Production rate in Nigeria grew faster with that of West Africa than the overall growth rate of production on the continent. But the annual rice consumption decreased at 5.08% below the production growth rate in the year 2001 to 2012.

Production increase in rice has been unable to match the consumption increase in the same commodity (Okoruwa *et al*, 2006; Rahji *et al*, 2008), and domestic production capacity is below the national requirements for rice (Rahji and Adewumi, 2008). Food security goals are often pursued by most developing economies through imports, especially when growth in domestic food production is not adequate with the needs of the ever-growing population and consumer's preference at least in the short-term (Nnamerenwa, 2006). In so doing, countries usually embark upon trade mostly in those commodities that they enjoy a comparative disadvantage in production in other to attain global welfare. Imports form a core part of international trade and Nigeria is one of the major food importing countries of the world (Nnamerenwa, 2006). As reported by the West African Rice Development Agency (WARDA) in 2001, the Nigerian economy relies heavily on the importation of food to supplement domestic food production and rice is one of the most important food commodities in the country's food import basket.

Over the years the country had resorted to imports to bridge this deficit. For instance in 1999, the value of rice imports was US$259 million and this increased to US$655 million in 2001 and US$756 in 2002. Between 1990 and 2002, Nigeria imported 5,132,616 tons of rice valued at US$1, 883, 553 million. In 2002 alone, the

country imported 1.882 million tons of rice (FAO 2002) and the figure had tripled in 2013.

Because rice has become a strategic commodity in the Nigerian economy, it is important to empirically assess the trend in rice production and imports in Nigeria with a view to improve production and as much as possible reduce rice importation in Nigeria without causing food crisis in the long-run.

This study sought to empirically assess the trend in rice production and imports in Nigeria (1980 – 2013). Specifically, this study was designed to :analyze the trend in rice production and imports in Nigeria within (1980 – 2013); estimate the instantaneous (at a point in time) and the compound (over period of time) rate of growth of rice production and imports in Nigeria within the reference period and to compare the variations in the volume of rice production and imports in Nigeria as well as in their growth rates within the reference periods.

RESEARCH METHODOLOGY

The study area

This study was carried out in Nigeria. Nigeria is the most populous African country south of the Sahara (FOS, 1992). It is a geo-political and sovereign entity that is composed of 36 states and the Federal Capital Territory (FCT-Abuja). Nigeria is situated along the coast of West Africa between latitudes 4^{o} and 14^{o}N and longitudes 3^{O} and 15^{O}E. It shares a common boundary with Niger on the West, Cameroun Republic on the East, and Gulf of Guinea on the south. Nigeria occupies a land area of 98.3 million hectares, of which only about 34.2 million hectares are actually being cultivated and less than one percent of the arable land is irrigated (NBS,2008). Its terrain ranges from southern coastal swamps to tropical forest, open woodlands, grasslands and semi-desert in the far north. The country enjoys an annual rainfall ranging from 381cm along the coast to 64cm or less in the far north. Rainfall, as one of the important climatic factors influencing agriculture in the country, is characterized by an alternation of wet and dry seasons of varying duration. In the south, rainfall lasts from January to October with a peak in September while in the north; rainfall lasts from May to September with a peak in August. The mean annual temperature ranges from 28^{0} – 31^{0}C in the south. Interestingly, there exists a multiplicity of ethnic groups in Nigeria but the three largest groups are the Igbo's in the east central, the Hausa's in the north and the Yoruba's in the south west (FOS, 1996).

In 2009, the total population of the country was approximately 149.1million people as provided by the National Population Commission (NPC, 2009). Over 60 per cent of the population lives in the rural areas (Obiechimina, 2007). The south west of Nigeria is most densely populated with an average population density of 118 persons per square kilometer.

Farming, mining and manufacturing, craft works and trading to mention a few assume a major share of occupation of the people. However, agriculture is the dominant sector of the economy and contributes immensely to the Gross Domestic Product (GDP) and employs about 68 per cent of the working population. Agriculture as one of the critical sectors of the economy contributed about 33% of the total GDP of $183 billion in 2008 and 41.8 percent to real GDP in 2009. About 89.1 percent of total agricultural production was accounted for by rain fed crop production while livestock, forestry and fisheries contributed 6.4 per cent, 1.3 per cent and 3.3 per cent respectively (Akande, 2003).

Nigeria enjoys a comparative resource advantage in the form of favourable climatic, edaphic and ecological conditions which enable the cultivation of many crops and harvesting of natural products, rearing of animals and practising of aquaculture. Crop production in the country is usually for food or export purposes (Akande, 2003) while imports of food in the country is to shorten the gap between supply and demand of rice which results due to low self- sufficiency in rice production (Nnamerenwa, 2006). Rice is one of the principal food crops in Nigeria.

Method of Data Collection

The study made use of secondary data, mostly time series. For the purpose of analysis of rice production and imports, Nigerian national level data on rice output, area, yield, price, and import will obtained from the International Rice Research Institute (IRRI); the United State Development Agency (USDA) version will be chosen over the Food and Agricultural Organization (FAO) version contained in the IRRI statistics because it was better updated, comprehensive and consistent for the targeted time interval (1980-2013). Supplementary data on the price and non-price variables will also be obtained from the International Institute of Tropical Agriculture, publications of development finance and research department of the CBN. Also documents of the National Bureau of Statistics (NBS), National Planning Commission (NPC), and other official sources. Secondary data that will be utilized for the research will cover the periods 1980 -2003.

Method of Data Analysis and Model Specification

Descriptive statistics, trend analysis and paired sample Z-test were employed in analyzing the data.

In modeling trend for this study, the exponential trend or log-linear trend was employed in line with Diebold (2004). The exponential trend or log-linear trend equation for the

quantity of rice production and imports in Nigeria will be modeled as follows;

$InRp_t = \beta_0 + \beta_1 t + e_i$……(3.1)

$In\ Ri_t = \beta_0 + \beta_1 t + e_{it}$ ..... (3.2)

$InRiv_t = \beta_0 + \beta_1 t + e_{it}$ …… (3.3)

Where,

$InRp_t$ = quantity of domestic output of rice (measured in metric tons) at period t.

$In\ Ri_t$ = volume of rice imports (measured in metric tons) at period t.

$In\ Riv_t$ = value of quantity of rice imported (measured in millions of naira) at period t.

β_0 = the constant in the regression line.

β_1 = the trend coefficients. +

t = trend measured in years.

e_{it} = the error term.

The instantaneous (at a point in time) growth model is given as;

Growth rate = $\beta_i t \times 100$ …… (3.4)

Where,

β_i = relative change in quantity of rice output and imports respectively;

t = trend measured in years

By multiplying the relative change in quantity of rice output and imports respectively by hundred, we obtained the percentage change or the growth rate in quantity of rice output and imports for an absolute change in time. After the estimation of equation (3.4) for instantaneous (at a point in time) growth rate of rice production and imports, the compound rate of growth was computed in line with Onyenweaku (2004), Gujarati and Porter (2009) and Nnamerenwa (2012) as;

$$r = (e^{\beta} - 1) \times 100 \text{ ……} \quad (3.5)$$

Where,

e = Euler's exponential constant (2.71828).

β = estimated coefficient in equations (3.1), (3.2) and (3.3) respectively.

The z- statistic is given as;

$$Z_{cal} = \frac{\bar{X}_i - \bar{X}_j}{\sqrt{\frac{S^2 X_i}{n_i} + \frac{S^2 X_j}{n_j}}} \text{ ……(3.10)}$$

where,

$\bar{X}_{ij}$ = mean quantity of domestic output of rice (measured in metric tons) at period t.

$\bar{X}_j$ = mean volume of rice imports (measured in metric tons) at period t;

$S^2 X_i$= squared standard deviation for quantity of domestic output of rice (measured in metric tons) at period t.;

$S^2 X_j$= squared standard deviation for volume of rice imports (measured in metric tons) at period t;

n_i = number (years) of domestic output of rice (measured in metric tons) at period t considered;

n_j = number (years) of rice imports (measured in metric tons) at period t considered.

RESULTS AND DISCUSSION

Trend In Rice Production And Imports In Nigeria Within (1980 – 2013)

Table 1 below shows the pattern in rice production and imports in Nigeria economy covering the period 1980 – 2013.

Table 1 showed that between 1980 and 2013, a total of 60,111,000 thousand metric tons of rice was domestically produced in Nigeria. Quantity of rice production in Nigeria varied from a maximum of 12,454,000 thousand metric tons from 2010-2013 to a minimum of 2,936,000 thousand metric tons from 1980-1984. The quantity of rice production increased from 2,936,000 thousand metric tons between 1980 and 1984 to 9,517,000 thousand metric tons between 1995 and 1999 and subsequently decline to 9,257,000 thousand metric tons between 2000 and 2004. It again increased from sum total of 11,560,000 thousand metric tons between 2005 and 2009 to 12,454,000 thousand metric tons from 2010-2013. A total of 2,789,000 thousand metric tons of rice was found to be the difference between the quantity of rice produced between 1980-1984 and 1985-1989. The quantity of rice produced between 2000 and 2004 was 260,000 thousand metric tons lesser the quantity of rice produced between 1995 and 1999. The highest change in the quantity of rice production of 2,937,000 thousand metric tons was witnessed within the years 1985-1989 and 1990-1995. The mean quantity of rice production in Nigeria between 1980 and 2013 was 8,587,286 thousand metric tons while the mean change in rice production within the same year was 1,586,333 thousand metric tons.

The result further indicated that rice production showed heterogeneity in growth between 1980 and 2013. The growth rate of rice production varied from a minimum of -2.73 percent between the years 2000- 2004 to a maximum of 94.99 percent between the years 1985-1989. The overall average growth rate of rice production between the year 1980 and 2013 was 31 percent. The growth rate of rice production in Nigeria between 1980 and 2013 is relatively low. Prevalence of favourable weather conditions across the country's ecological zones and implementation of the various intervention programmes are imperative for the growth of rice production in Nigeria economy (CBN, 2011). It is possible that the inconsistency in the growth rate of rice production in some of those years could be due to unfavourable weather conditions across the country's ecological zones and the lack of implementation of the various intervention programmes targeted at developing rice production.

Table 1: Trend in rice production and imports in Nigeria within (1980 – 2013)

Years	Quantity of Rice Production (1000MT)	Quantity of Rice Imported (1000MT)	Change in Rice Production (1000M11T)	Change in Rice Imported (1000MT)	Percentage Change in Rice Production	Percentage Change in Rice Imported
1980-1984	2,936,000	3,278,000	-	-	-	-
1985-1989	5,725,000	2,181,000	2,789,000	-1,097,000	94.99	-33.47
1990-1994	8,662,000	1,642,000	2,937,000	-539,000	51.30	-24.71
1995-1999	9,517,000	3,231,000	855,000	1,589,000	9.87	96.77
2000-2004	9,257,000	7,870,000	-260,000	4,639,000	-2.73	143.58
2005-2009	11,560,000	8,450,000	2,303,000	580,000	24.88	7.37
2010-2013	12,454,000	13,111,500	894,000	4,661,500	7.73	55.17
Total	60,111,000	39,763,500	9,518,000	9,833,500	-	-
Mean	8,587,286	5,680,500	1,586,333	1,638,917	31	41

Source: CBN statistical bulletin and annual statement of accounts, various issues (1980 -2013). Change and percentage changes in rice production and imports were researcher's computation.

Similarly, Table 1 showed that between 1980 and 2013, a total of 39,763,500 thousand metric tons of rice was imported in Nigeria. Quantity of rice imports in Nigeria varied from a maximum of 13,111,500thousand metric tons from 2010-2013 to a minimum of 1,642,000 thousand metric tons from 1990-1994. The quantity of rice imports decreased from 3,278,000 thousand metric tons between 1980 and 1984 to 1,642,000 thousand metric tons from 1990-1994 and subsequently incline from 3,231,000thousand metric tons between 1995 and 1999 to 13,111,500 thousand metric tons from 2010-2013. A total of 1,097,000 thousand metric tons of rice was found to be the change between the quantity of rice imported between 1980-1984 and 1985-1989. The quantity of rice imported between 2000 and 2004 was 4,639,000 thousand metric tons more than the quantity of rice imported between 1995 and 1999. The highest change in the quantity of rice imports of 4,661,500 thousand metric tons was witnessed within the years 2005-2009 and 2010-2013. The mean quantity of rice imports in Nigeria between 1980 and 2013 was 5,680,500 thousand metric tons per annum while the mean change in rice imports within the same year was 1,638,917 thousand metric tons per four years interval.

The result further indicated that rice imports showed heterogeneity in growth between 1980 and 2013. The percentage change (growth rate) of rice imports varied from a minimum of -24.71 percent between the years 1990- 1994 to a maximum of 143.58 percent between the years 2000-2004.The overall average growth rate of rice imports between the year 1980 and 2013 was 41 percent. The growth rate of rice imports in Nigeria between 1980 and 2013 is relatively higher than the growth rate in rice production in Nigeria within the same year. The inability of domestically produced rice to meet up with population demand may have caused the growth in rice importation to be increasing more than the increase in domestic rice production.

Figure 1 confirmed that between 1980 and 2013, the quantity of rice production and imports increased and decreased severally overtime.

The data on rice production and importation in Nigeria between 1980 and 2013 was subjected to further analysis using the exponential growth equations to examine the holistic percentage change in rice production and importation within the reference period. The result of the estimated exponential growth equations for rice production and imports in Nigeria within (1980 – 2013) is presented in Table 2 below.

Exponential trend equations for quantity produced and imported of rice in Nigeria (1980 -2013)

Table 2 shows that quantity of rice production and quantity imported of rice in Nigeria exhibited significant growth during the period under review. The results show that the coefficient of the time variable was positive and statistically significant at 1% with respect to quantity of rice production and quantity imported of rice indicating an increase in yield of rice and quantity imported of rice in Nigeria within the reference period. This implies that time trend variable was a major factor in determining quantity of rice production and quantity imported of rice in Nigeria.

Table 2 shows further that the coefficient of multiple determination is high (R^2=0.787 for rice production; and 0.601 for rice imports) and significant ($p<0.01$) during the periods of significant growth in rice production and imports. This implies that growth in rice production and imports is highly time dependent

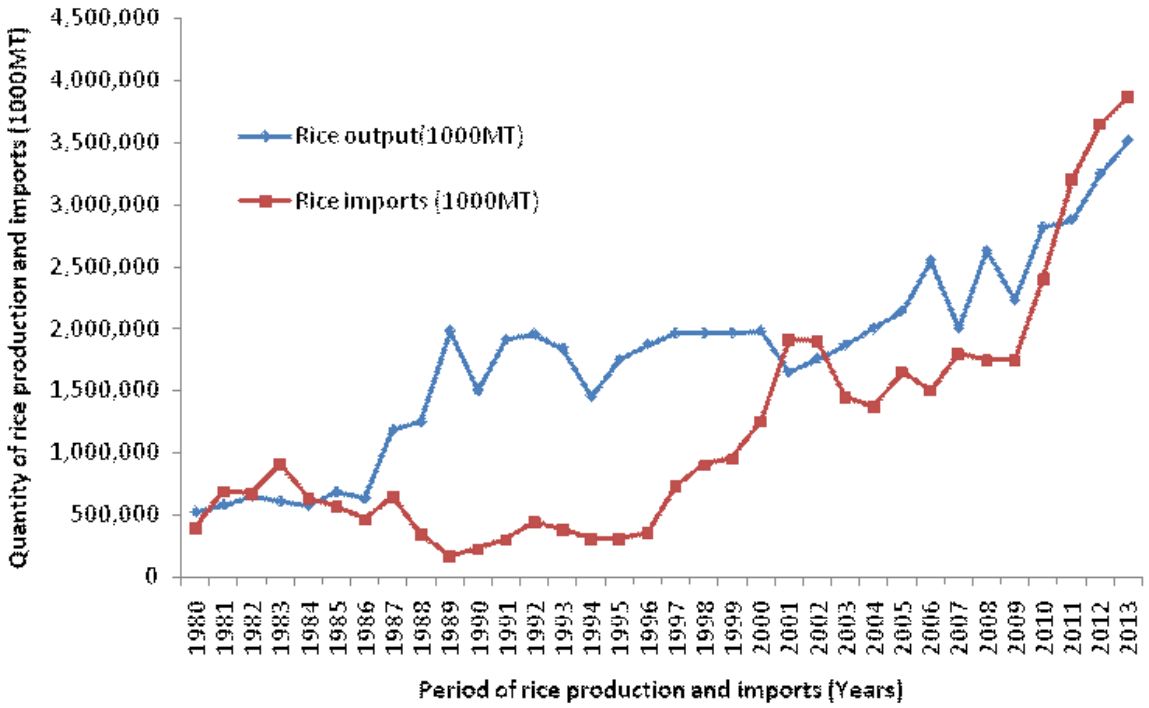

Figure 1: Trend in rice production and imports in Nigeria between 1980 and 2013.

Table 2: Estimated exponential trend equations for quantity produced and imported of rice in Nigeria (1980 -2013)

Dependent Variable	B_0	B_1	R^2	Adj. R^2	F-ratio
Quantity of rice produced	13.416(150.312)***	0.048(10.882)***	0.787	0.781	118.416***
Quantity of rice imported	12.494(65.882)***	0.066(6.944)***	0.601	0.589	48.221***

Note: *** represent 1% significance level.
Source: Computed by the author from CBN (2013) Annual Report and Statement of Accounts for the year Ended 1st 31 December, 2013.

Instantaneous (At A Point In Time) And Compound (Over Period Of Time) Rate Of Growth Of Rice Production And Imports In Nigeria (1980-2013)

The computed instantaneous and compound rates of growth in quantity produced and imported of rice in Nigeria within the study period are presented in table 3.

In the estimated growth rate models in table 2, the slope coefficients of 0.048 and 0.066 for rice production and imports for a given change in quantity of rice produced and imported respectively by hundred, we obtained the percentage change or the growth rate in quantity of rice produced and imported for an absolute change in time.

Rixce production: Growth rate = relative change x 100
Growth rate = 0.048 x 100
Growth rate = 4.8%
Rice imports: Growth rate = relative change x 100
Growth rate = 0.066 x 100
Growth rate = 6.6%

The growth rates of 4.8% and 6.6% for rice production and imports respectively implies that over the period of 1980 – 2013, the production and importation of rice in Nigeria increased at instantaneous (at a point in time) rate of growth and not the compound (over period of time) rate of growth. Compound growth rate (r) were estimated from the instantaneous rates of growth, in that 4.8% and 6.6% are the instantaneous growth rates:

Compound growth rates (r) = $(e^{b1} – 1) \times 100$
Rice production: $r = (e^{0.048} - 1) \times 100$
$r = (2.71828^{0.048} – 1) \times 100$
$r = 4.92\%$

Rice imports: $r = (e^{0.066} - 1) \times 100$
$r = (2.71828^{0.066} – 1) \times 100$
$r = 6.82\%$

Table 3: Instantaneous and Compound growth rate for quantity of rice produced and quantity imported of rice.

Variables	Parameter (β_1)	Exponential Instantaneous Growth rates (%)	Exponential compound Growth rates (%)
Quantity imported of rice	0.066***	6.6	6.82
Quantity of rice produced	0.048***	4.8	4.92

Note: *** represent 1% significance level.
Source: Computed by the author from CBN (2013) Annual Report and Statement of Accounts for the year Ended 1st 31 December, 2013.

Table 4: Test of significance of the difference in the mean quantity of rice production and imported in Nigeria (1980-2013)

Samples	Mean	Standard Deviation	Std. Error Mean	D.f	z-statistic
Quantity of rice produced	1767970.59	776943.72	133244.75		
Quantity of rice imported	1169514.71	972907.19	166852.22		
Paired difference	598455.88	666197.22	114251.88	33	5.238***

Note: *** represent 1% significance level. [a] represents paired sample differences.
Source: Computed by the author from CBN (2013) Annual Report and Statement of Accounts for the year Ended 1st 31 December, 2013.

Therefore, the growth trend of rice production and imports in Nigeria per annum within the period under study (instantaneous rates of growth) are 4.8% and 6.6% respectively and the rate of growth of rice production and imports in Nigeria over the study period under study (compound rates of growth) are 4.92% and 6.82% respectively. This finding is in line with Ojoehemon *et al.,* (2009), who noted that both rice production and consumptions have vastly increased with rice demand outstripping rice production thus spurring rice importation. The 6.82%per annum growth rate estimate in this study is closely related to the 7% per annum used to make a projection of rice demand of 35 million tones in 2050 (Ayanwale and Amusan, 2012). The result of this study indicates that the rice demand-supply gap scenario have been an existing trend that would continue if appropriate measures are not taken to salvage the situation. The compound growth rate in the quantity imported of rice in Nigeria was fastest (6.92% per annum) while the compound growth rate in the quantity produced of rice in Nigeria was slowest with a compound growth rate of 4.92% per annum. This result suggests that the lower rate of increase in the quantity produced of rice in Nigeria increases the rate of increase in the quantity of rice imports in the country in other to satisfy the rice consumption need of the entire population of Nigeria. Low yield, inconsistent production pattern, low adoptive tendencies to improved technology in rice production, high rate of dissertation of rice farming caused by rural-urban migration, disease and pest incidence, and the prevalence of redundant workers in rice farm sector may give justification to the decrease in the growth rate of rice production despite the implementation of various policy aimed at promoting domestic rice production in the country. The higher instantaneous and compound growth rates of rice imports over rice production imply that there would be continuous importation of rice to curb the demand-supply gap and this is detrimental to the Nigerian economy. This spurs the increase in rice imports in the face of the geometrically increasing Nigerian population whose demand for rice could only be met through rice imports. As noted by Bamba *et al.,* (2010), the cost of rice imports represents a significant amount of lost earnings for the country in terms of jobs and income. This condition offers opportunity for youths empowered in rice production to reduce the gap in rice demand and supply by increasing domestic production of rice. This will not only offer sustainable means of livelihood for the teaming youth population but will help to achieve self-sufficiency in rice production in Nigeria.

Comparison of the mean quantity and growth rate of rice production and imports in Nigeria (1980-2013).

The z-test result of the difference in the mean quantity of rice production and imported in Nigeria (1980-2013) is presented in Table 5.

The mean quantity of rice produced and imported varies within the period under study. The mean quantity of rice produced and imported were 1767970.59 tonnes and 1169514.71tonnes respectively There was a significant difference (t = 5.238***) in the mean quantity of rice production and imports within the period under review. This indicates that the mean quantity of rice production was more than the quantity imported of rice

Table 5. Test of significance of the difference between the growth rate of quantity of rice production and imports in Nigeria (1980-2013)

Samples	Mean	Standard Deviation	Std. Error Mean	D.f	z-statistic
Growth in Rice production	7.607	24.737	3.728		
Growth in Rice imports	11.730	32.985	5.657		
Paired difference	-4.123	27.514	2.021	33	2.040**

Source: Computed by the author from CBN (2013) Annual Report and Statement of Accounts for the year Ended 1st 31 December, 2013

within the study period. Similarly, there were variations in the average growth rate of rice production and imports in the study periods (see table 5.). The mean growth rate of rice produced and imported were 7.61% and 11.73% respectively. There was a significant difference (t = 2.021***) in the mean growth rate of quantity of rice production and imports within the period under review. This indicates that the mean growth rate in quantity of rice imports was more than the growth rate in quantity of rice production within the study period.

Summary of findings, conclusion and recommendations

Between 1980 and 2013, a total of 60,111,000 thousand metric tons of rice was domestically produced in Nigeria. The mean quantity of rice production in Nigeria between 1980 and 2013 was 8,587,286 thousand metric tons while the mean change in rice production within the same year was 1,586,333 thousand metric tons. The result further indicated that rice production showed heterogeneity in growth between 1980 and 2013. The growth rate of rice production varied from a minimum of -2.73 percent between the years 2000- 2004 to a maximum of 94.99 percent between the years 1985-1989. The overall average growth rate of rice production between the year 1980 and 2013 was 31 percent. Similarly, Table 2 showed that between 1980 and 2013, a total of 39,763,500 thousand metric tons of rice was imported in Nigeria The mean quantity of rice imports in Nigeria between 1980 and 2013 was 5,680,500 thousand metric tons per annum while the mean change in rice imports within the same year was 1,638,917 thousand metric tons per four years interval. Rice imports showed heterogeneity in growth between 1980 and 2013. The overall average growth rate of rice imports between the year 1980 and 2013 was 41 percent. The growth rate of rice imports in Nigeria between 1980 and 2013 is relatively higher than the growth rate in rice production in Nigeria within the same year. The growth rates of 4.8% and 6.6% for rice production and imports respectively imply that over the period of 1980 – 2013.

The growth rate of rice production in Nigeria between 1980 and 2013 is relatively low. Time trend variable was a major factor in determining quantity of rice production and quantity imported of rice in Nigeria. The production and importation of rice in Nigeria increased at instantaneous (at a point in time) rate of growth and not the compound (over period of time) rate of growth. Rice demand-supply gap scenario has been an existing trend that would continue if appropriate measures are not taken to salvage the situation. There would be continuous importation of rice to curb the demand-supply gap and this is detrimental to the Nigerian economy.

Based on the principal findings of this study, the following recommendations are made:

1. Research must be intensified in order to improve rice production technologies significantly in a way that the rate of growth will achieve the needed self- sufficiency in domestic rice production and thereby reduce the amount of money spent in rice imports in this country.
2. Effort must be made to grow rice production level geometrically to maintain pace with population growth if food security is to be ensured in Nigeria. This can be pursued through adequate and timely financing of rice production activities. As rice output increased; smallholder rice farmers in Nigeria will be transformed from a subsistence orientation to a market orientation.
3. Policies aimed at reducing rice imports in Nigeria should consider those significant price and non-price factors that determined rice imports in Nigeria in both short and long terms. Also policies aimed at increasing rice production in Nigeria should consider those significant price and non-price factors that determined rice production in Nigeria in both short and long terms

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