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# IMPACT OF MARKET-DETERMINED EXCHANGE RATES ON RICE PRODUCTION AND IMPORT IN NIGERIA

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**Abstract**

*Rice is an economically important food security crop, cultivated in almost all of Nigeria's 36 States. Nigeria spends more than 356 billion naira (2.24 billion US dollars) annually on rice import. This paper set out to analyze the trend in rice production, productivity, import, value of import and consumption that follows the adoption of the Structural Adjustment Programme (SAP) in Nigeria, with emphasis on the effects of exchange rate (ER) deregulation on domestic rice production and rice imports over the period 1986-2010. Relevant time series data were collected and used. A semi-log growth rate model and 2simple linear regression models were developed and estimated. Highlights of the findings include (i) accelerated rate of growth in rice production (Instantaneous Growth Rate (IGR) 2.2%; Cumulative Growth Rate (CGR) 2.2%); rice hectarage (IGR 3.7%; CGR 3.8%); rice importation (IGR 8.5%; CGR8.9%); expenditure on rice importation (IGR 10.6%; CGR 11.2%) and rice consumption (IGR 3.4%; CGR 3.5%) alongside a significant deceleration in rice yield (IGR -1.4%; CGR -201.4%) (ii) The observed significant increase in domestic rice production cannot be confidently attributed to ER deregulation alone because it does not lead to a decrease in rice importation into Nigeria. (iii) The significant increase in domestic rice importation as observed contradicts a priori expectation that ER deregulation will lead to significant decrease in rice importation. The study concluded that free market approach alone cannot stimulate local agricultural production in countries where farmers producing under low-technology-agriculture are put in direct competition with farmers from advanced-technology-agriculture; hence governments need to restrict importation to protect local producers.*

**Keywords**: *Nigeria, SAP, exchange rate, rice, production, productivity, imports, consumption*

## 1. Introduction

Agriculture was the backbone of the Nigerian economy at Independence in 1960 and immediately after. It provided employment to over 75% of the population; more than 70% of total food consumed in the country; raw materials for its agro-based industry, as well as export earnings to finance imports (Reynolds, 1966; Alamu, 1981). Ilugbuhi (1968) noted that "peasant agricultural production for export provided the stimulus to Nigeria's overall economic growth" then. However, about 21 years after Independence, Abdullahi (1981) observed that Nigeria's agriculture was neither capable of producing enough food for the country's fast growing population; nor able to "cope with the growing demands for agricultural raw materials to keep the country's agro-based industries running". In other

words, Nigeria became incapable of meeting its food and agro-based raw materials requirement.

Several reasons were put forward to explain the progressive decline in the performance of the Nigerian agricultural sector. One key argument, the oil boom factor, attribute the decline in the performance of the Nigerian agricultural sector to government neglect of the Nigerian agricultural sector that followed the exponential increased foreign exchange earnings realized from the export of crude oil between 1972 and 1980(Asiabaka&Owens, 2002; Walkenhorst, 2007; Sekumade, 2009). The international oil market plunged in 1982, drastically reducing Nigeria's ability to finance imports, including food, leading to persistent current account deficits and the accumulation of unpaid trade bills (Osuntogun et al., 1997). Trade deficits, budget deficits, inflation, balance of payments problems, and other symptoms of economic decline became seriously manifest (Osaghae, 1995).

Schultz (1976) argued that much of the difference in the economic performance of the agricultural sector is a consequence of governments' intervention in agriculture. In fact, it is documented that the structural adjustment framework for economic policy reform in Sub-Saharan Africa was based upon the central argument that state and state interventionism were key to the economic distortions experienced by African economies since their respective independence from colonialism (Colclough& Manor, 1991; Lensink, 1996; Olukoshi, 2004). The effects of governments' interventionism on economic outcomes have been established in the literature (Schultz, 1976; North, 1981; Jones, 1981; Olson, 1982; North &Weingast, 1989; Alesina&Rodrik, 1994; Besley&Coate, 1998). Government interventionism in agriculture is usually in form of agricultural policies. As observed by Idachaba (2002), attempts towards explaining the widening gap between the high promises of agricultural research findings and the disappointing reality on farmers' fields has led to a consensus on policy being the principal constraint facing agriculture in countries like Nigeria.

Nigeria's major relationship with the Bretton Woods Institutions appeared to have started in the early 1970s when World Bank's "loans" and "expertise" were packaged to commence the Integrated Agricultural Development Projects (Garba, 2001; World Bank, 2001; Ammani, Auta&Aliyu, 2010). This was followed with the International Monetary Fund's spectacular entry in the 1980s when its Gospel of Structural Adjustment Programmes provided the overriding framework for key economic policy design and implementation in most Sub-Saharan African countries (Oyejide, 2003). Nigeria adopted, as a policy, the Structural Adjustment Programme (SAP) in 1986. The broad objective of Nigeria's SAP was "to restructure and diversify the productive base of the economy in such a way as to reduce dependency on the oil sector and imports" (Moser, Rogers & van Til, 1997). The adoption of a market-determined exchange rate was one of the main policy strategies utilized in attaining the objectives of Nigeria's SAP (Moser *et al*., 1997). This is based on the argument that overvalued exchange rates makes domestic products, including agricultural products like rice, not only less competitive with imports but also less profitable as export (Mamingi, 1997). Thus, exchange rate depreciation is expected to lower the price of export in foreign currency, and by so doing increase not only the volume of exports but also the domestic currency value of export revenue (Fang, Lai &Miller, 2005; Hadiwibowo, 2010; Azgun, 2011). Empirical studies by Bahmani-Oskooeeand Kara (2003) and Abolagba*et al*. (2010) reported that currency devaluation increases exports.

The problem that arises for this study is whether or not the adoption of a market-determined exchange rate that started in 1986, consequent of SAP, has significantly improve the performance of the Nigerian agricultural sector as evidenced from rice production and import in Nigeria. Specifically, more than 25 years since the commencement of SAP, is Nigeria able to increase its domestic rice production capacity to a level that will reduce its dependency on rice imports and by so doing save the huge amount it expends annually on rice importation?

The study seeks to achieve the following objectives:

- Describe trends in rice production, hectarage, productivity, consumption, importation and importation expenditure over the period (1986-2010).
- Analyze the impact of market-determined exchange rate on domestic rice production over the study period (1986-2010).
- Investigate the impact of market-determined exchange rate on rice importation over the study period (1986-2010).

The following hypotheses were formulated and tested in this study:

- Market-determined exchange rate has no significant effect on aggregate rice production.
- Market-determined exchange rate has no significant effect on aggregate rice import.

An analysis of the growth rates in rice production, hectarage, productivity, consumption, importation and expenditure on importation; and the impact of exchange rate deregulation on rice production and importation in Nigeria for the period (1986-2010) is not only expected to contribute to literature, but also provide a basis for intervention planning.

The choice of rice as agricultural produce of interest for this study is based on the following facts. Nigeria is Africa's foremost consumer and producer of rice; it is also among the leading rice importers in the world (USAID, 2009). Over the years, rice has become an important component of the Nigerian diet especially for the urban dwellers. Akanji (1995) attributed the rise in demand for rice in Nigeria to population growth, increase in levels of income and rapid urbanization and its attendant changes in family occupational structures. Rice is cultivated in almost all of Nigeria's 36 States (FMAWR 2007). Rice is an important food security crop (USAID, 2009). Rice is an economically important commodity in Nigeria. According to FMARD (2011), Nigeria is the second largest importer of rice in the world, spending more than 356 billion naira (2.24 billion US dollars) annually on rice import. The choice of the period 1986-2010 was made purposively to coincide with the period of the commencement of SAP in Nigeria, the era from which exchange rate deregulation started.

## 2. Methodology

### 2.1. Data

Time series data on average cross exchange rate of Nigerian Naira (N) to the US Dollar (US$), rice production, rice hectarage, rice imports and expenses on rice imports in Nigeria for the period 1986-2010 were collected and used (see Appendix Table A1 for data and source). Rice productivity and rice consumption data were estimated from the collected data.

### 2.1. Assumptions

For the purpose of this study, the following assumptions were made: (i) yield in MT per hectare was taken as proxy for rice productivity, (ii) the sum of annual quantity of rice domestically produced and annual quantity of rice imported was taken as proxy for annual quantity of rice consumed in Nigeria, and (iii) quantity of rice exported or smuggled out of Nigeria, quantity of rice smuggled into Nigeria and quantity of rice stored from one year to the next, are all assumed to be equal to zero.

## 3. Models Specification:

### 3.1. Trend Analysis

This sub-section is based on Gujarati (2003), Chiang & Wainwright (2005) and Gujarati & Porter (2009). Applying the well known compound interest formula to the problem of rice production/hectarage/yield/consumption/imports/value of import

$$Y_t = Y_0(1+r)_t \quad (1)$$

Where

$Y_t$ = amount of rice produced/hectarage/yield/imported/import value in year t

$Y_0$ = amount of rice produced/hectarage/yield/imported/import value in the base year

r = compound rate of growth of Y

t = time in chronological years

Taking the natural log of eqn (1) to make it linear, thus

$$InY_t = In\ Y_0 + tIn\ (1+r) \quad (2)$$

Substituting In $Y_0$ with $\beta_1$ and In(1+r) with $\beta_2$, eqn (2) is rewritten as

$$In\ Yt = \beta_1 + \beta_2 t \quad (3)$$

Adding the disturbance term to eqn (3) we obtain

$$In\ Yt = \beta_1 + \beta_2 t + \mu t \quad (4)$$

Eqn (4) is the growth rate model developed for, and estimated in, this study. A semi-log growth rate model is developed for this study instead of a linear trend model because the study is interested in both absolute and relative change in the parameters of interest for this study.

The parameter of utmost interest in eqn (4) is coefficient of β2 (b2), the slope coefficient which measures the constant proportional or relative change in Y for a given absolute change in the value of the regressor t.

First, multiplying b2 by 100, gave the instantaneous growth rate at a point in time.

$$IGR = b2 \times 100 \quad (5)$$

Where

IGR = Instantaneous growth rate

b2 = is the least-square estimate of the slope coefficient β2

Second, taking the antilog of b2 and subtracting 1 from it and then multiplying the difference by 100 gave the compound growth rate (CGR) over a period of time.

$$CGR = [\text{antilog } b2 - 1] \times 100 \quad (6)$$

Finally, if b2 is positive and statistically significant there is acceleration in growth, if b2 is negative and statistically significant there is deceleration in growth, if b2 is not statistically significant there is stagnation in the growth process. The growth model eqn (4) was estimated using SPSS 16.0 to achieve the first objective.

### 3.2. Impact of Exchange Rate (ER) Deregulation

The impact of exchange rate (ER) deregulation can be measured as (i) a direct significant increase in the level of domestic rice production and (ii) a direct significant decrease in the level of rice imports resulting from changes in exchange rate.

Based on the aforementioned measurable for the impact of exchange rate deregulation, the following empirical aggregate models were developed, leaving out variables of less interest to this study:

$$RPN_t = \beta_1 + \beta_2 ER_t \quad (7)$$
$$RIN_t = \beta_1 + \beta_2 ER_t \quad (8)$$

Where,$RPN_t$is rice production in year t (measured in MT), $RIN_t$ is rice importation in year t (measured in MT), and $ER_t$is exchange rate of the Naira to the US dollar in year t (expressed as a ratio of the Naira to the US dollar).

Empirical analysis based on time series data assumed that the underlying time series is stationary (Enders, 1995; Seddighi, Lawler &Katos, 2000; Patterson, 2002). Traditional regression methodology can be conveniently applied to data involving non stationary time series by simply establishing stationarity of the residuals from regression equation (Gujarati, 2003). Our regression models eqn (7) and (8) were estimated and the residuals obtained and used to achieve the second and third objectives of the study. Cointegrating Regression Durbin-Watson (CRDW) Test method was used to test for cointegration on the data collected for this study. The computed DW d values of 0.865 and 2.088 obtained from the cointegrating regressions were found to be greater than the critical value of 0.386 at the 5% level, thus it was concluded that the regression residuals are stationary.

## 4. Results and Discussions

### 4.1. Trends in rice production, hectarage, productivity, consumption, importation and importation expenditure over the period (1986-2010)

The results of the trends analysis are presented in Table 1. The discussion follows.

**Table 1: Summary of Trends Analysis Results**

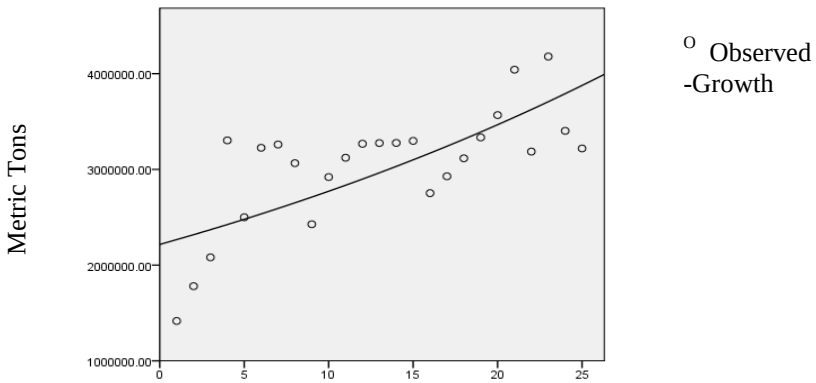
| S/No | Parameter | IGR (%) | CGR (%) | Annual Average | Maximum Average | Minimum Average |
|---|---|---|---|---|---|---|
| 1 | Rice Production | 2.2 | 2.2 | 3037746.80 MT | 4179000MT (2008) | 1416320MT (1986) |
| 2 | Rice Area (Hectarage) | 3.7 | 3.8 | 1859624Ha | 2725000Ha (2006) | 700000Ha (1986) |
| 3 | Rice Yield | -1.4 | -201.4 | 1.70MT/Ha | 2.39MT/Ha (1987) | 1.30MT/Ha (2001&2007) |
| 4 | Rice Import | 8.5 | 8.9 | 789,377.24 MT | 1885334MT (2010) | 200000MT (1988) |
| 5 | Value of Rice Import | 10.6 | 11.2 | US$ 261.89 million | US$ 824.41 million (2010) | US$ 55 million (1988) |
| 6 | Domestic Rice Consumption | 3.4 | 3.5 | 3827124.04 MT | 5150815MT (2008) | 1736320MT (1986) |

**Source:** Trend analysis of the data presented in appendix Table A

### 4.1.1. Trends In Rice Production In Nigeria (1986-2010)

The coefficient of the trend variable, b2, estimated for rice production in the growth model eqn (4) has a value of 0.022. This indicates that over the period 1986-2010, rice production in Nigeria had an annual instantaneous growth rate of 2.2%; and a compound growth rate of 2.2% (Table 1). Thus it can be concluded that there is a slightly accelerated growth in rice production over the study period (Fig 1). The mean annual domestic rice production is estimated as 3,037,746.80MT. The maximum and minimum annual domestic rice production over the study period are 4,179,000MT (in 2008) and 1,416,320MT (in 1986) respectively. Nigeria has maintained a steady 2.2% growth rate in domestic rice production over the period 1986-2010. However, this rate of growth for domestic rice production is inadequate if Nigeria is to bridge the gap that is continuously widening between local production and import.

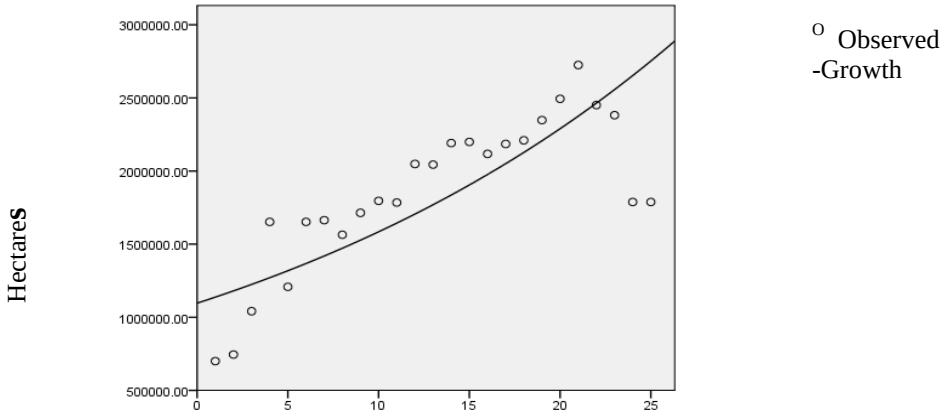
**Figure 1: Rice Production in Nigeria (1986-2010)**




### 4.1.2. Trends In RiceHectarage In Nigeria (1986-2010)

The coefficient of the trend variable, b2, estimated for rice hectarage in the growth model eqn (4) has a value of 0.037. This indicates that over the period 1986-2010, rice production area in Nigeria had an annual instantaneous growth rate of 3.7%; and a compound growth rate of 3.8% (Table 1). Thus it can be concluded that there is a slightly accelerated growth in rice hectarage over the study period (Fig 2). The average annual rice production area is estimated as 1,859,624Ha. The maximum and minimum annual rice hectarage over the study period are 2,725,000Ha (in 2006) and 700,000Ha (in 1986) respectively. When this finding is viewed in light of the previous one, that rice production in has been growing at a steady rate of 2.2%, it will appear that the growth in rice production earlier observed is attributable to hectarge expansion rather than intensification of production.

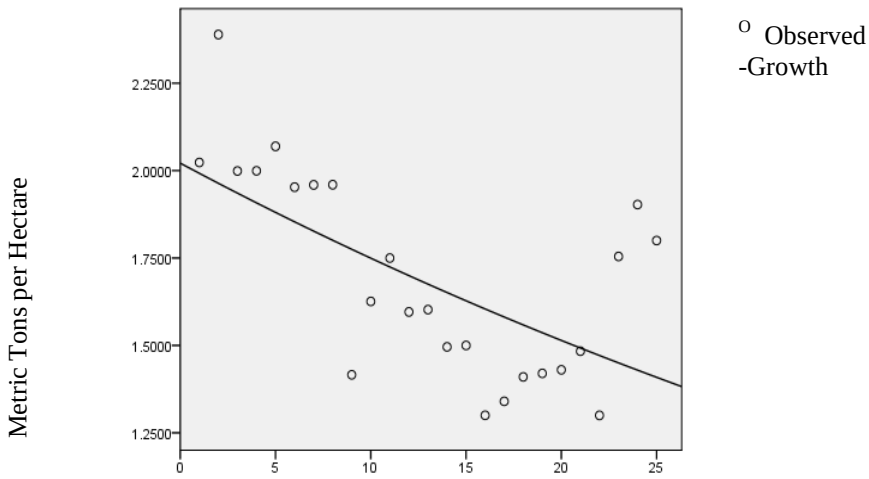
**Figure 2: Rice Production Area in Nigeria (1986-2010)**




### 4.1.3. Trends In Rice Yield In Nigeria (1986-2010)

The coefficient of the trend variable, b2, estimated for rice yield in the growth model eqn (4) has a value of -0.014. This indicates that over the period 1986-2010, rice yield in Nigeria had an annual instantaneous growth rate of -1.4%; and a compound growth rate of -201.4% (Table 1). Thus it can be concluded that there is a significant deceleration in rice yield over the study period (Fig 3). The average annual rice yield is estimated as 1.7MT/Ha. The maximum and minimum annual rice yield over the study period are 2.39MT/Ha (in 1987) and 1.30MT/Ha (in 2001 & 2007) respectively. This finding, that rice productivity has been declining over the years, further support our observation in the previous one, that the slight increase in the quantity of local rice produced in Nigeria is due to increase in the total land area put under rice cultivation. Rice yield is very low. With an average yield of 1.3MT/Ha in 2007, for example, Nigeria was only able to produce 3186000MT of rice on 2451000Ha of land. If the yield is raised to 3MT/Ha, which is just about 40% of the potential of yield of 7.0-9.0MT/Ha estimated for Nigeria according to NFRA (2009), Nigeria would have produced 4167000MT more rice in 2007.

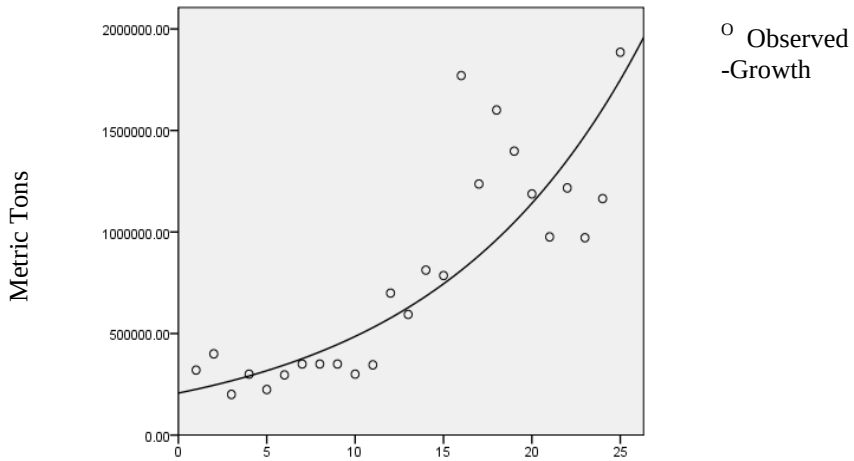
**Figure 3: Rice Yield in Nigeria (1986-2010)**



### 4.1.4. Trends In Rice Imports In Nigeria (1986-2010)

The coefficient of the trend variable, b2, estimated for rice import in the growth model eqn (4) has a value of 0.085. This indicates that over the period 1986-2010, rice imports in Nigeria had an annual instantaneous growth rate of 8.5%; and a compound growth rate of 8.9% (Table 1). Thus it can be concluded that there is a significant acceleration in rice importation over the study period (Fig 4). The average annual quantity of rice imported in to Nigeria is estimated as 789,377.24MT. The maximum and minimum annual quantity of rice imported over the study period are 1,885,334MT (in 2010) and 200,000MT (in 1988) respectively.

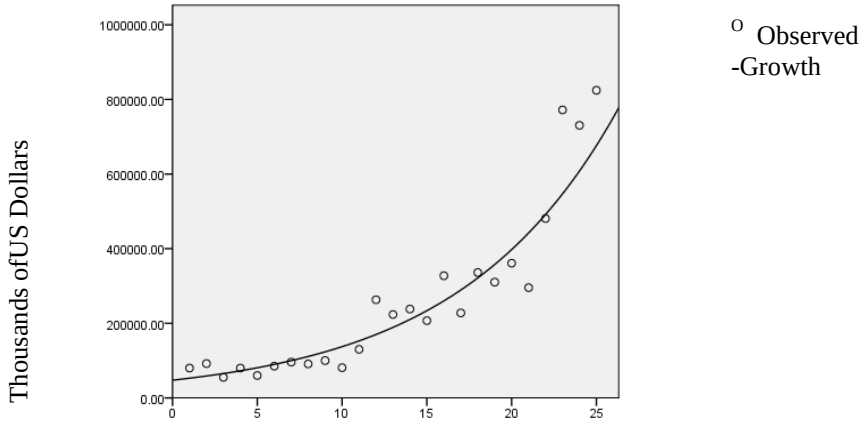
**Figure 4: Rice Importation in Nigeria (1986-2010)**




### 4.1.5. Trends In Expenditure on Rice Imports In Nigeria (1986-2010)

The coefficient of the trend variable, b2, estimated for the value of rice import expressed in US Dollars in the growth model eqn (4) has a value of 0.106. This indicates that over the period 1986-2010, value of rice imports in Nigeria had an annual instantaneous growth rate of 10.6%; and a compound growth rate of 11.2% (Table 1). Thus it can be concluded that there is a significant acceleration in the value of rice importation over the study period (Fig 5). The average annual value of rice imported in to Nigeria is estimated as US$ 261.89 million. The maximum and minimum annual value of rice imported over the study period are US$ 824.41 million (in 2010) and US$ 55 million (in 1988) respectively. Nigeria has continued spending its scarce foreign exchange on rice importation. Over the period covered by this study (1986-2010), Nigeria has spent more than US$ 6.5 billion on rice imports!This finding is more glaring when viewed in relation to the equivalent amount of Nigeria's domestic currency, the naira, spent on the importation of rice based on the fact that the average exchange rate of the naira to the US dollar has increased rapidly from about N2:US$ in 1986 to more than N140:US$ in 2010! The naira now exchange at more than N160:US$.

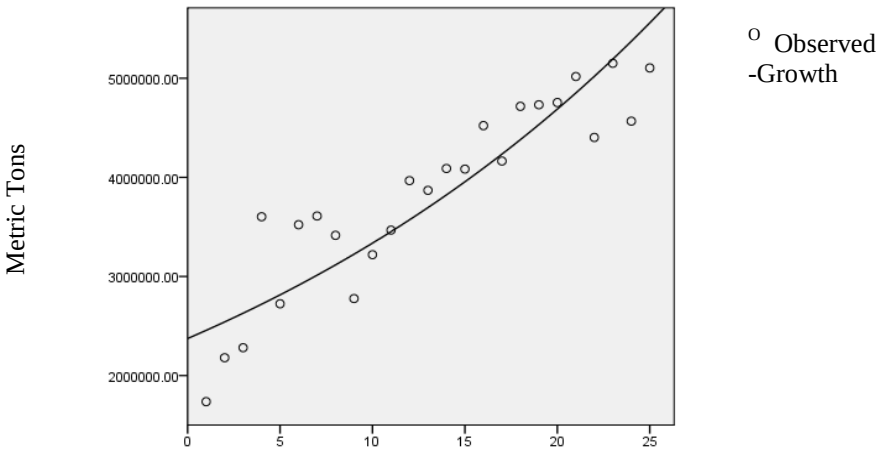
**Figure 5: Expenditure on Rice Imports in Nigeria (1986-2010)**




### 4.1.6. Trends In Rice Consumption In Nigeria (1986-2010)

The coefficient of the trend variable, b2, estimated for rice consumption in the growth model eqn (4) has a value of 0.034. This indicates that over the period 1986-2010, quantity of rice consumed in Nigeria had an annual instantaneous growth rate of 3.4%; and a compound growth rate of 3.5% (Table 1). Thus it can be concluded that there is a significant acceleration in rice consumption over the study period (Fig 6). The average annual quantity of rice consumed in Nigeria is estimated as 3,827,124.04MT. The maximum and minimum annual quantity of rice consumed over the study period are 5,150,815MT (in 2008) and 1,736,320MT (in 1986) respectively. The mean annual quantity of rice imported in to Nigeria (789377.24MT) is about 21% of the mean annual quantity of rice consumed. Thus, more than 20% of the rice consumed in Nigeria is imported.

**Figure 6: Rice Consumption in Nigeria (1986-2010)**



### 4.2. The impact of market-determined exchange rate on domestic rice production in Nigeria over the study period (1986-2010)

The results of the regression analyses are presented in Table 2. The discussion follows. The F value of 11.035 computed for equation (7) is significant, when viewed in relation to its p-value of 0.004. This suggests that the aggregate domestic rice production could be significantly explained by the variation in the average cross exchange rate of the Naira to the US$ in Nigeria over the study period. The estimated value of the intercept of the model (2478000) indicates the obvious, that Nigerian peasant farmers will produce a significant quantity of rice, at subsistence level, even in a scenario without an operational exchange rate.

The computed t value of 3.222 calculated for the coefficient of ER is found to be significant when viewed in relation to the computed p-value of 0.004, hence the null hypothesis is rejected and it is concluded that there is a significant relationship between rice production and exchange rate. The significant increase in domestic rice production observed is expected. However we cannot confidently attribute this observed increase to ER deregulation alone because it does not lead to the expected corresponding decrease in rice importation into Nigeria as can be seen from earlier findings of this study that over the study period rice importation has been growing at an annual and compound rate of 8.5% and 8.9% respectively.

**Table 2: Results of Regression Analysis of Aggregate Domestic Rice Production and Average Cross Exchange Rate of the Naira to the US$ (1986-2010)**

| Independent Variables | Coefficients | t-value | p-values |
|---|---|---|---|
| Constant term | 2.478E6 | 13.833[aa] | 0.000 |
| Exchange Rate | 7175.140 | 3.222[aa] | 0.004 |

$R^2$: 0.367, Adjusted $R^2$: 0.334, R: 0.606, $F_{(model)}$: 11.035, p-value for $F_{(model)}$: 0.004, DW *d*: 0.865, [aa]Statistically significant statistics at both α: 5 and α: 1%,

### 4.3. The impact of market-determined exchange rate on rice importation in Nigeria over the study period (1986-2010)

The results of the regression analyses are presented in Table 3. The discussion follows. The F value of 85.082 computed for equation (8) is highly significant, when viewed in relation to its p-value of 0.000. The estimated value of the intercept of the model (56340.069) indicates that rice importation into Nigeria is not discouraged by the deregulation of the exchange rate. In fact, Nigeria continued the importation of rice at a growth rate of more than 8% even as the average exchange rate of the naira to the US dollar increased swiftly from about N2:US$ in 1986 to more than N140:US$ in 2010!

The computed t value of 9.224 calculated for the ER coefficient is found to be highly significant when viewed in relation to the computed p-value of 0.000, hence the null hypothesis is rejected and it is concluded that there is a highly significant relationship between the exchange rate and aggregate rice importations in Nigeria. However, the positive sign on the ER coefficient estimated from our model contradicts our a priori expectation that ER deregulation will to lead to a significant decrease in rice importation. The reverse is thus observed: highly significant increases in rice import despite deregulation of the average cross ER of the Naira to the US$ over the study period. This could be attributed to the in-action of the Nigerian government towards regulating or restricting rice import in order to protect and enhance the local rice industry.

**Table 3: Results of Regression Analysis of Aggregate Rice Importation and Average Cross Exchange Rate of the Naira to the US$ (1986-2010)**

| Independent Variables | Coefficients | t-value | p-values |
|---|---|---|---|
| Constant term | 56340.069 | 3.385[aa] | 0.003 |
| Exchange Rate | 1850.957 | 9.224[aa] | 0.000 |

$R^2$: 0.817, Adjusted $R^2$: 0.808, R: 0.904, $F_{(model)}$: 85.082, p-value for $F_{(model)}$: 0.000, DW *d*: 2.088, [aa]Statistically significant statistics at both α: 5 and α: 1%,

## 5. Conclusion

This paper set out to analyze the trend in domestic rice production, productivity, import, value of import and consumption that follows the adoption of SAP in Nigeria, with emphasis on the effects of ER deregulation on domestic rice production and rice imports over the period 1986-2010. Relevant time series data were collected and used. A semi-log growth rate model and 2 simple linear regression models were developed and estimated using SPSS 16.0 to achieve the objectives of the study.

Highlights of the findings of the study are that:

- There was a slightly accelerated growth in rice production (IGR 2.2%; CGR 2.2%) and hectarage (IGR 3.7%; CGR 3.8%) alongside a significant deceleration in rice yield (IGR -1.4%; CGR -201.4%) over the study period; indicating that the observed slight increase in growth rate observed for rice production is due to hectarage expansion rather than intensification of production.
- There is a significant acceleration in rice importation (IGR 8.5%; CGR8.9%), expenditure on rice importation (IGR 10.6%; CGR 11.2%) and in rice consumption (IGR 3.4%; CGR 3.5%) over the study period. Over the study period (i) more than 20% of the rice consumed in Nigeria is imported, and (ii) Nigeria has spent more than US$ 6.5 billion on rice imports.
- A significant increase in domestic rice production is observed as expected. However this observed increase cannot be confidently attributed ER deregulation alone because it does not lead to a decrease in rice importation into Nigeria which is evident from the findings of this study.
- A significant increase in domestic rice importation is observed. The positive sign on the coefficient of rice importation estimated from our model contradicts a priori expectation. ER deregulation is expected to lead to significant decrease in rice importation. However what is observed is the reverse: a highly significant increase in rice import which could be attributed to the failure of the Nigerian government to regulate or restrict import in order to protect its local rice industry.

A key lesson derivable from the findings of this study is that the free market approach alone cannot stimulate local agricultural production in LDC countries where farmers producing under *low-technology-agriculture* are put in direct competition with farmers from *advanced-technology-agriculture*. Therefore, government need to restrict importation to protect local producers so that they can survive excessive competition from established advanced agriculture based competitors, this is to enable them gradually overcome their weakness and grow stronger to compete globally.

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**Appendix**

**Table A1: Time series data on aggregate rice production, hectarage, yield, import, consumption and average cross exchange rate of the Naira to the US$ (1986-2010)**

| Year | Production MT | Area (Ha) | Yield (MT/Ha) | Import (MT) | Import (1000US$) | †Consumption (MT) | *Average Cross-Exchange Rate (N: US$) |
|---|---|---|---|---|---|---|---|
| 1986 | 1416320 | 700000 | 2.0233 | 320000 | 80000 | 1736320 | 2.0206 |
| 1987 | 1780000 | 745000 | 2.3893 | 400000 | 92000 | 2180000 | 4.0179 |
| 1988 | 2081000 | 1041000 | 1.9990 | 200000 | 55000 | 2281000 | 4.5367 |
| 1989 | 3303000 | 1652000 | 1.9994 | 300000 | 80000 | 3603000 | 7.3916 |
| 1990 | 2500000 | 1208000 | 2.0695 | 224000 | 60000 | 2724000 | 8.0378 |
| 1991 | 3226000 | 1652000 | 1.9528 | 296000 | 85000 | 3522000 | 9.9095 |
| 1992 | 3260000 | 1664000 | 1.9591 | 350000 | 96000 | 3610000 | 17.2984 |
| 1993 | 3065000 | 1564000 | 1.9597 | 350000 | 91000 | 3415000 | 22.0511 |
| 1994 | 2427000 | 1714000 | 1.4160 | 350000 | 100000 | 2777000 | 21.8861 |
| 1995 | 2920000 | 1796000 | 1.6258 | 300000 | 81000 | 3220000 | 81.0228 |
| 1996 | 3122000 | 1784200 | 1.7498 | 345500 | 130000 | 3467500 | 81.2528 |
| 1997 | 3268000 | 2048000 | 1.5957 | 699054 | 263030 | 3967054 | 81.6494 |
| 1998 | 3275000 | 2044000 | 1.6023 | 594057 | 223524 | 3869057 | 83.8072 |
| 1999 | 3277000 | 2191000 | 1.4957 | 812452 | 238000 | 4089452 | 92.3428 |
| 2000 | 3298000 | 2199000 | 1.4998 | 785745 | 207078 | 4083745 | 100.8016 |
| 2001 | 2752000 | 2117000 | 1.3000 | 1770075 | 327510 | 4522075 | 111.701 |
| 2002 | 2928000 | 2185000 | 1.3400 | 1236415 | 227715 | 4164415 | 126.2577 |
| 2003 | 3116000 | 2210000 | 1.4100 | 1600701 | 336125 | 4716701 | 134.0378 |
| 2004 | 3334000 | 2348000 | 1.4199 | 1398293 | 310206 | 4732293 | 132.3704 |
| 2005 | 3567000 | 2494000 | 1.4302 | 1187786 | 361048 | 4754786 | 130.6016 |
| 2006 | 4042000 | 2725000 | 1.4833 | 975907 | 295585 | 5017907 | 128.2796 |
| 2007 | 3186000 | 2451000 | 1.2999 | 1216962 | 480740 | 4402962 | |
| 2008 | 4179000 | 2382000 | 1.7544 | 971815 | 771739 | 5150815 | |
| 2009 | 3402590 | 1788200 | 1.9028 | 1164335 | 730591 | 4566925 | |
| 2010 | 3218760 | 1788200 | 1.8000 | 1885334 | 824411 | 5104094 | |

Source: FAO (2013),*CBN (2009) and †Author's estimate (see the methodology section of this paper)