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Analysis of Producer Price of Rice in Nigeria

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Abstract:

The study examined the analysis of producer price of rice in Nigeria. The specific objectives were to: examine the behaviour of producer price of rice in Nigeria; examine the government policies affecting the producer price of rice and forecast the real producer price of rice in Nigeria for the year 2020. The analytical tools used were: the three year moving average and simple regression technique. Secondary data were used for the analyses which were sourced from Food and Agriculture organisation, National Bureau of Statistics and Central Bank of Nigeria annual reports and Trade year Books. The moving average indicates an increase of 0.07% between 1985 and 1986. Conversely, between 1987 and 1988, the real producer price of rice decreased by -0.05%. The real producer price of rice was forecast to be ₦1, 290.75 per tonne by the year 2020. The volatility in the real producer price of rice over the years was as a result of different government policy interventions in the Nigerian rice industry. Therefore, it was recommended that local production should be encouraged at all level, government should pursue policies that discourage large importation of cheap rice into the country, and price stabilization policies such as minimum farm gate prices should be introduced.

Keywords: moving-average, producer-price, rice, simple regression

1. Introduction

Nigeria is West Africa's largest producer of rice, producing an average of 3.2 million tonnes of paddy rice (two million tonnes of milled rice) annually. Rice ranks as Nigeria's fourth most important crop grain, after maize, sorghum and millet, and it is one of the primary sources of carbohydrates of farmers (FAO, 2008). Because of its wide popularity as food item, rice is among the most marketable of all crop assets in Nigeria. Rice is both a food and a cash crop for farmers, contributing to smallholders revenues in the main producing areas. West African Rice Development Association (WARDA) estimates that per capita rice consumption in Nigeria has nearly doubled between the 1980s and 2006, growing from 15.4 kg/year to 25.4 kg/year (WARDA, 2004). Empirical evidence suggests that the price elasticity of demand for rice is low at the urban market. The low elasticity means fiscal instrument like tariff can be increased without a corresponding decline in demand because rice is still considered a staple food in many urban centres and government can continue to use high tariffs to protect domestic producers (Daramola, 2005). The Nigerian government imposed ban on rice imports in 1985 with the objective of increasing domestic production in meeting the increasing demand of the product. It is important to note that rice is not only a key source of food, but it is a major source of employer of labour and source of income for the rural poor (WARDA, 2004).

The prices of most farm products do not remain constant throughout the season; they follow some regular seasonal patterns (Olukosiet al., 2005). Most farm products are available only in small quantities at the start of the season. After that their supply builds up to a

peak, following which supplies gradually diminish until the crop is finished. These increases and declines in deliveries are matched by inverse movement in prices, the first supply to the market usually fetch good price because of their novelty, although quality may improve later. As the season continues, deliveries increase, prices fall and lower income consumers are able to buy. But if prices fall so far that market supplies are discouraged, and if consumers are still interested in buying, prices should improve (Abbot & Makeham, 1984). Cyclical movement in the prices of certain farm product is an evidence of imperfection in the functioning of the marketing system over a period of time. They cause alternate periods of shortage and glut. They partly result from imperfect forecasting of prices on the part of producers (Olukosiet *al.*, 2005). Rice price variability levels are generally and relatively low, which on the average is less than 30% (Akande & Akpokodje, 2003), with variability higher in the prices of local rice than imported. However, the difference between this variability does not appear to be very huge. The relatively low price variability in both local and imported rice implies that consumers can plan on future purchases. The rising rice prices in Nigeria may be as a result of short supply from exporting countries. Prices play a prominent role in the allocation of resources in the economy at large, and more specifically in the rice economy (Lancoet *al.*, 2003). Because of the important role prices play in resources allocation for optimum profit maximisation, future planning and on-farm investment decision, the study therefore, aimed to achieve the following objectives:

- i. to examine the behaviour of producer price of rice;
- ii. to examine the government policies affecting the producer price of rice in Nigeria; and
- iii. to forecast the real producer price of rice in Nigeria for the year 2020.

2. Material and Methods

2.1. Types and Sources of Data

Secondary data were used for the study. The study covers the period from 1985-2007. The data were mainly sourced from the Central Bank of Nigeria (CBN), Food and Agriculture Organisation (FAO), National Bureau of statistics (NBS) and Trade year books.

2.2. Data Analysis

The analytical tools used for the study were:

- i. The moving average; and
- ii. Simple regression technique.

2.2.1. The Moving Average

The data collected were analysed using the three year moving average to remove the cyclical component as well as the seasonal factor from the data thereby obtaining a smooth data. The three year moving average can be estimated as follows:

$$Y_t = \frac{Y_{t-3} + Y_{t-2} + Y_{t-1}}{3}$$

Where

Y_t = price index in the i^{th} period

Y_{t-3} , Y_{t-2} and Y_{t-1} = prices in the third, second and first periods (years).

2.2.2. The Simple Regression Techniques

A forecast can be achieved using simple regression equation. In order to obtain an accurate forecast using regression technique, a model that gives a high coefficient of determination (R^2), appropriate sign and magnitude of coefficient and a least standard error of estimate is selected among different models. The selected model is then used for the forecasting process.

These models are given as follows:

Linear model: $Y_i = a + bX_i + e_i$

Exponential model: $Y_i = ae^{b_i X_i} + e_i$

Semi-log model: $Y_i = a + b \log X_i + e_i$

Double-log model: $\log Y_i = a + b_i \log X + e_i$

Where

Y_i = forecast Real Producer price of rice in the i^{th} year

X_i = value of year to be forecast, i.e. 2020

'a' and 'b_i' are the parameters to be estimated from the regression equation

e_i = error term.

The year to be forecasted is substituted into the equation or model with the highest coefficient of determination (R^2) and a least standard error of estimate to obtain the forecast price of rice for the year 2020.

3. Results and Discussion

3.1 Real Producer Price of Rice Obtained from Nominal Prices

The result in Table 1 column two shows the nominal (actual prevailing) producer price of rice in Nigeria from 1985-2007. Column three shows the producer price, index of rice, which indicate the index by which the actual (nominal) producer price differ from the price in 1985 (which is the base year) while column four shows the real producer price of rice in naira per tonne from 1985 - 2007. A real price is the price expressed in another year's price called the base year. It indicates economic scarcity; it also shows whether the price of a commodity rose faster than prices in general. Between 1985 and 1986, the real producer price of rice in Nigeria increased by 0.07%. Similarly, between 1987 and 1988, the real producer price of rice decreased by -0.05% whereas between 1988 and 1989, there was an increase of 0.02%. The real producer price of rice in Nigeria remained unchanged from 1998 to 2007 at ₦ 1,293 per tonne. This volatility in the real producer price of rice over the years was as a result of different government policy interventions in the Nigerian economy and rice industry in particular. Figure 1 shows graphical illustration of the real producer price of rice in Nigeria.

Years	Nominal price/tonne	Producer price Index(1985=1.00)	Real price index
1985	1293	1.00	1,293
1986	970	0.75	1,293
1987	728	0.56	1,300
1988	1438	1.11	1,295
1989	2840	2.19	1,297
1990	5610	4.34	1,293
1991	7544	5.84	1,292
1992	12602	9.75	1,293
1993	18780	14.53	1,293
1994	12300	9.51	1,293
1995	14280	11.05	1,292
1996	25840	19.99	1,293
1997	25280	19.56	1,292
1998	31950	27.71	1,293
1999	27030	20.19	1,293
2000	28414	21.98	1,293
2001	54930	42.49	1,293
2002	58380	45.16	1,293
2003	74705	57.79	1,293
2004	98026	75.83	1,293
2005	112895	87.33	1,293
2006	121847	94.25	1,293
2007	131509	101.73	1,293

Table 1: Nominal Price, Producer Price Index and Real Producer Price of Rice from 1985-2007
Source: FAO Statistics Division 2009

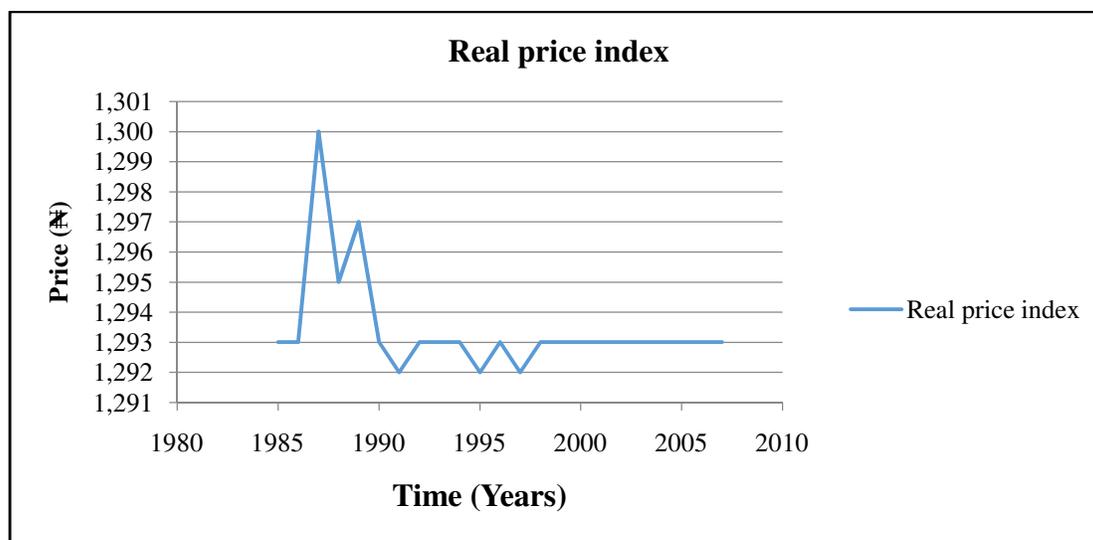


Figure 1: Real Producer Price of Rice in Nigeria (1985-2007)

The result in Table 2 shows the three year moving average in column four which give the trend values. The moving average was used to remove cyclical component as well as the seasonal factor from the time series data which give a clear picture of the producer price of rice in Nigeria over the period under review (1985 - 2007). The result shows a slight increase (0.01%) in the three year moving average of the real producer price of rice between 1987 and 1988, similarly, an increase of 0.01% was experienced between 1988 and 1989. Conversely, from 1989 - 1993, there was a -0.05% decrease in the three year moving average of the real producer price of rice in Nigeria. It then moves at ₦ 1,293 from 1994 - 2005. Figure 2 graphically illustrates the three years moving average of the real producer price of rice in Nigeria; it depicts the true movement of the producer price of rice in Nigeria from 1985 - 2007. The rapid price fluctuation experienced between 1987 and 1990 may not be unconnected with the ban imposed on rice importation which came into effect in 1985. It was anticipated to stimulate domestic production of rice through increases in the price of the commodity. Similarly, the fluctuation could also be due to the abolition of the marketing boards in Nigeria in 1986 and following the ban placed on rice importation and the liberal trade policy adapted by the government towards rice in the country. During the pre-ban period (before 1986), government policies had artificially lowered domestic rice and fertiliser prices relative to the world price level. This was achieved through: massive importation of rice between 1975 and 1985 resulting in low price of domestically produced rice; Government involvement in the distribution and marketing of the imported rice with non-transfer of actual cost of marketing to consumers but rather absorbed by government; protection of elite urban consumers at the expense of farmers leading to depressed farm gate prices and protection of producers through input subsidies such that actual input costs were not translated into production decision making process. The ban on rice importation came into effect in 1985. It was anticipated to stimulate domestic production through increases in the prices of the commodity. The introduction of the Structural Adjustment Program (SAP) in 1986 reinforced the ban already placed on rice importation under SAP, various trade policies were put in place. This was in addition to the depreciation of the naira arising from exchange rate deregulation. The overvalued exchange rate had served as an implicit tax on rice producers as it makes imported rice relatively cheaper.

Years	Real price	Three years moving total	Three years moving average
1985	1,293	-	-
1986	1,293	-	-
1987	1,300	3886	1295
1988	1,295	3888	1296
1989	1,297	3892	1297
1990	1,293	3885	1295
1991	1,292	3881	1294
1992	1,293	3877	1292
1993	1,293	3877	1292
1994	1,293	3879	1293
1995	1,292	3878	1293
1996	1,293	3878	1293
1997	1,292	3877	1293
1998	1,293	3878	1293
1999	1,293	3878	1293
2000	1,293	3878	1293
2001	1,293	3878	1293
2002	1,293	3878	1293
2003	1,293	3878	1293
2004	1,293	3878	1293
2005	1,293	3878	1293
2006	1,293	3878	-
2007	1,293	3878	-

Table 2: The Three Year Moving Average of Real Producer Price of Rice in Nigeria (1985-2007)

Source: Extracted from Table 1

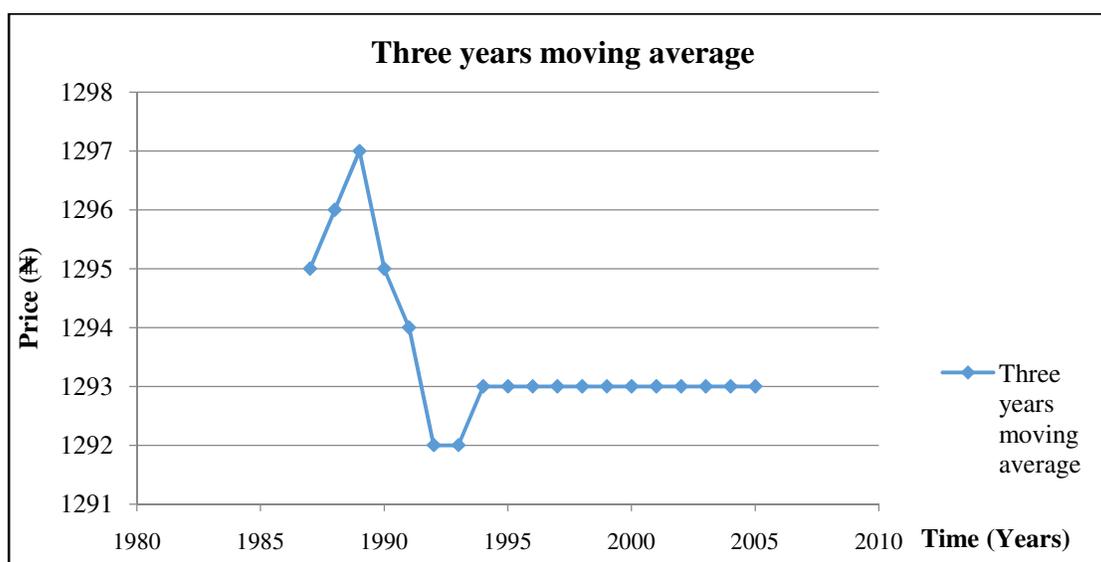


Figure 2: Graph of Three Year Moving Average

3.2. Government Policy Thrust Affecting Producer Price of Rice

A policy is a statement of intentions about the future. Government policy is a public action plan that is geared to serve the interest, and ensure the well-being of the citizenry. Agricultural policies play a key role in increasing farm production (Rahji&Adewumi, 2008). The farmer's response to price changes is useful for policy formulation. If farmers respond positively to prices movement supply of rice will be affected by the increase in price. Effectiveness and cost of alternative pricing policies depends on the magnitude and significance of the estimated response. Nigeria is among many African countries that have engaged in agricultural liberalisation since 1986 in the hope that reforms emphasising price incentives will encourage producers to respond. Hitherto, the reforms seem to have introduced greater uncertainty into the market given increasing rates of price volatility (Ajetomobi, 2010). The rice issue is an offshoot of the policy inconsistencies that the Nigerian agriculture sector has been subjected to in recent times. Nigeria's rice policy has been inconsistent over the years, oscillating between high import tariffs, imports restrictions, and outright ban. For instance, Table 3 shows that between 1986 and 1994, rice imports were illegal. In 1995, imports were allowed at 100% tariff. In 1996, the tariff was reduced to 50% and came full cycle to 100% in 2002 and partially in 2008 (FAO Food Outlook Global Market Analysis, 2009). The restrictions in trade of rice stems primarily from the use of protectionist mechanisms to achieve national policy objectives of domestic food security and support for producer prices and incomes in major rice producing and consuming countries (Agricultural Information, 2009). The link between domestic stabilization policies and rice prices has been exaggerated, emphasising instead the role of thin and fragmented markets. Clearly, however, domestic price stabilization policies have been pursued by restricting imports, in turn contributing substantially to international market inaccessibility. Therefore, it is difficult to ignore the effect of domestic stabilization policies achieved through imports and exports restrictions as a significant course of international rice price instability (Agricultural Information, 2009).

Rice is a major food staple and a mainstay for the rural population and their food security. It is mainly cultivated by small farmers in holding of less than two hectares. Rice is also a wage commodity for workers in the food crop or non-agricultural sectors. This duality has given rise to conflicting policy objectives, with policy-maker intervening to save farmers when prices drop, or to defend consumer purchasing power when there are sudden price increases (Calpe, 2002). Because of the importance of rice for food security and political stability, a significant proportion of trade is conducted by state trading enterprises. However, many of these state enterprises have lost their monopoly power and private traders have taken on greater responsibility for dealing with rice imports (FAO, 2002). Government-to-government transactions, which used to account for about half of world trade in the 1970s, are now estimated to represent less than 10% of the total. In the past few years (2006 - 2008), however, they have regained popularity as low international prices have incited or compelled government to play a more active role in the trade either to gain bargaining power or as an indirect means of sustaining producer price (FAO, 2001). Government support to producers in developing countries concentrates mainly on: research in improved or hybrid rice varieties, investments in irrigation, preferential credits extension and distribution of improved seeds. Intervention to influence price is also common through procurement purchases or releases from stocks, or through changes in trade policies. Government often plays an important role in the first phase of the marketing cycle, by procuring paddy at minimum producer prices. The government obliges millers to purchase paddy at a predetermined price and to charge fixed mark ups at each stage of marketing process and sometimes the government distributes rice at fixed retail prices. It is common practice to manage rice stocks or to adapt trade policy measures in order to stabilise domestic market prices (General thrust of Rice Government policies FAO, 2002). Over the past two decades, inconsistency, shifting between open and protectionist trade policy have characterised Nigerian rice policy. Such changes hinder the ability of stakeholders to develop long-term strategies. While trade policy has been viewed as the only option for developing the rice sector, there has been a lack of policy to take advantage of the protection and enhance the domestic sector's efficiency. In addition, the import ban itself is difficult to enforce, which reduces its efficiency. Key issues for the domestic sector are the availability of inputs and credit, and processing, marketing and quality management.

Period of Policy Measures	Policy Measures Undertaken
Before April of 1974	66.6% Tariff
April 1974 – April 1975	20%
April 1975 – April 1978	10%
April 1978 – June 1978	20%
June 1978 – October 1978	19%
October 1978 – April 1979	Imports in containers under 50kg were banned
April 1979	Imports under restricted license only; Government Agencies
September 1979	6 months ban on all rice imports
January 1980	Import license issued for 200,000 tonnes of rice
October 1980	Rice under general import license with no quantitative restrictions
December 1980	Presidential Task Force (PTF) on rice was created and it used the Nigerian National Supply Company to issue allocations to customers and traders
May 1982	PTF commenced issuing of allocations to customers and traders in addition to those issued by NNSC
January 1984	PTF disbanded. Rice importation placed under general license restrictions
October 1985	Importation of rice (and maize) banned
July 1986	Introduction of SAP and the abolition of Commodity Boards to provide production incentives to farmers through increased producer prices
1995	100% Tariff
1996	50% Tariff
1997	50% Tariff
1998	50% Tariff
1999	50% Tariff
2000	50% Tariff
2001	85% Tariff
2002	100% Tariff
2004	100% Tariff
2005	ECOWAS Common Tariff Regime ECT

Table 3: Nigeria's Rice Economy Trade Policy From 1974-2005

Sources: Federal Government Budgets, 1984 – 1986; 1995 – 2000. World Bank 2010

3.3. Forecasting the Real Producer Price of Rice Using Simple Regression Technique

Simple regression technique was used to forecast the real producer price of rice for the year 2020. Linear equation of $Y_t = 1,294.64 - 0.11x$ was obtained with $R^2 = 0.19$, $R^{-2} = 0.15$ and standard error of estimate of 1.59. The constant term (a) was 1294.64 while the regression coefficient (b) was -0.11.

The estimated regression line is given by:

$$Y_t = 1294.64 - 0.11x_i$$

Where

Y_i = forecast real producer price of rice

X_i = value of the year to be forecasted i.e. 2020.

Using this regression equation, the predicted real producer price of rice for the year 2020 would be:

$$Y_t = 1294.64 - 0.11(35)$$

$$Y_t = 1294.64 - 3.89$$

$$Y_t = 1290.75$$

Therefore, the real producer price of rice by the year 2020 would be ₦ 1,290.75 per tonne; which implies that the real producer price of rice in Nigeria will be 0.02% lower by the year 2020 than it was in 1985 which was the base year for the analysis. Consequently, it is imperative for policy makers to develop, implement and pursue policies that help rice producers get better returns for their effort.

4. Conclusion and Recommendations

The price variability of locally produced rice in Nigeria over time had been minimal. The three year moving average indicate a slight increase of 0.01% between 1987 and 1988 whereas, there was a decreased of -0.05% between 1989 and 1993. The study also concluded that the real producer price of rice in Nigeria would be ₦ 1290.750 per tonne by the 2020. Before the introduction of the Structural Adjustment Program (SAP), the abolition of the commodity boards and other government policies on rice intended to provide production incentives to farmers through increased producer prices, exchange rates and foreign exchange allocation policies acted as a major source of price distortion and distinctive towards farming enterprises. The following recommendations were

proposed: local production of rice should continue to be encouraged at all levels as the country cannot afford to depend on importation of the commodity to feed its growing population; the government should pursue policies that discourage the large importation of cheap rice into the country; price stabilization policies such as minimum farm gate prices of rice should be introduced so as to ensure a stable income to the producers of the commodity; the quality of the locally produced rice should be improved to meet the requirement of local consumers; and rice production inputs should be subsidised to boost production of rice in all the rice production areas in Nigeria.

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