

## **PRICE TREND ANALYSIS OF SELECTED FOOD GRAINS IN OGUN STATE, NIGERIA (1988-2012)**

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### **ABSTRACT**

The study examined the price trend of some selected food grains in Ogun State, Nigeria, using descriptive statistics, graphical representation and growth model to analyze its dynamic behaviour over the period of 1988-2012. The study was based on secondary data obtained from Ogun State Agricultural Development Programme for the period (1988-2012) and it covered the rural and urban monthly retail prices of three (3) food grains viz: maize (white and yellow), rice and cowpea (white and brown). Results of analysis revealed a consistent long-term movement or change in the prices of the food grains for both markets. While price fluctuation was observed more with maize and cowpea, minimal adjustments were observed in rice. Exponential regression analysis showed a positive significant coefficient i.e. an upward trend in prices of both rural and urban markets with a significant F-statistics ( $p < 0.01$ ). The highest growth rate was seen in white cowpea in the urban market (i.e. 4.78%) while the least growth rate was in white maize in the rural market (i.e. 3.50%).

**Key words:** Price, Grain Crops, Growth Model, Ogun State.

### **INTRODUCTION**

#### ***Background to the study***

Food crops, especially grains, have always been an important staple food in Nigeria. The consumption cuts across cultures, ages and regions. They are an important part of the diet of an average Nigerian judging from the high proportion consumed. However, in the past few years, there had been consistent increase in the prices of food crops thereby making it to be beyond the reach of low income earners. Okuneye

(2001) observed that the rising costs of food prices have roots in policies and programmes of past governments. In particular, after the Structural Adjustment Programme (SAP) period not much attention was paid to agriculture and food production. As a result, food prices have continued to rise. The resultant effects of these are the problems of malnutrition, household food insecurity and restricted access to nutritious and sufficient food, culminating in greater effect of poverty on many Nigerians. Since 2003, interna-

tional prices of a wide range of commodities have surged upward in a dramatic fashion. In many cases more than doubling within a few years and in some cases a few months. A surge in the price of food is of special concern to the world's poor because many impoverished people depend upon food production for their livelihood, and virtually all poor people spend large portions of their household income on food. Therefore, sharply rising prices offer few means of substitution and adjustment especially for the urban poor, and there are justifiable concerns that millions of people may be plunged into poverty by this crisis (Headey and Fan, 2008). Dorosh (2013) further pointed out that international price for major food commodities such as rice, maize and wheat escalated two record times in three years. The price of major cereals surged in the second half of 2007 and the first half of 2008 to reach record levels in nominal US dollar terms, before falling again in the second half of 2008. Prices surged again in mid-2010 to June 2011 by 43% in real terms and in the second half of 2011 the index stabilized but at a level about 10% higher than the previous value in 2008 (Conceição *et al.*, 2011). In Nigeria, at the level of high food prices, according to FEWSNET (2008) "most urban and rural markets are exhibiting historically high prices since 2007 and continued to worsen in April 2008. Some analyst in Nigeria believed that the deregulation of the downstream sector of the petroleum resources and the poor state of rural road networks have manifested into high cost of transporting produce between surplus and deficit areas. The increased cost of transportation meant that poor resource farmers have to depend on middlemen to transport food crops from the producing to the consumption areas. This gives middlemen the oppor-

tunity to exploit farmers' imperfect knowledge of the market to offer low prices for farm produce (Oladapo and Momoh, 2007). According to Agiri (2000), there is no efficient pricing and marketing system for agricultural products in Nigeria. The lack of reliable market outlets forces the farmers to sell their produce at whatever price they can get at the farm gate. Therefore, fluctuation in the market prices of food is a common phenomenon in the Nigerian markets. This is because in periods of glut, prices are forced down since farmers are compelled to sell their produce at low prices to avoid deterioration and loss of produce. On the other hand, in seasons of scarcity, prices of food shoot up. Thus, prices of agricultural produce vary at different times of the season depending on storage costs and some other factors which are location specific. In view of its direct impact on the standard of living of most Nigerians, fluctuations in the prices of agricultural products have become of great concern to economists and policy makers. Therefore, this paper examines the trend in prices of some selected food crops in the rural and urban markets as well as determines the variations in their prices over time.

#### ***Trends in prices of food grains***

Trend movement as defined by Olayemi (1977) is a consistent long-term movement or change in prices. It is usually measured in terms of rates of increase or decrease in prices over long term periods. Trend in agricultural prices is associated with general inflation and deflation in the economy and with factors specific to agricultural products which include increases in population, changes in income and technology. On the other hand, Odozi and Omonona (2012) also refer to price instability as fluctuation in prices over time and reflect the short term disequilibria between supply and demand. In

most studies, the coefficient of variation defined as the standard deviation divided by the mean is used to measure the fluctuation in price series.

In recent years, there has been a well-documented, dramatic increase in world food prices. From 2006 through early 2008, Jensen and Miller (2010) pointed out that the FAO Food Price Index increased by 73%, with across-the-board increases in meat (16%), dairy (100%), oils and fats (144%), and cereals (129%). Within cereals, the price of rice increased by approximately 117%, wheat increased by 100%, and maize by 65%. As a result, there has been considerable concern that such large price increases may lead to increased malnutrition, especially among the poor in the developing world (Jensen and Miller, 2010). According to Abboth and Makeham (1990), most farm products are available only in small quantities at the start of the marketing season. After that, their supply builds up to a peak following which supplies gradually diminish until the produce supply is finished. The first supply at the market usually fetches a good price because of their newness. At this stage, only the rich can afford to buy. As the season continues, deliveries increase, prices fall so that market suppliers are discouraged. Eventually, deliveries will fall off steadily until supply is concluded. Low prices for several seasons lead many producers to reduce the amount they plant. This action will ultimately result in prices going up. Eventually, the area planted and market supplies will expand once more and so the cycle continues.

#### ***Factors affecting food crop prices***

Poor market knowledge and other structural imperfections have been asserted to cause inefficiency in agricultural commodity mar-

kets but the role of information in pricing, the dynamic process of information transmission between markets in price discovery and its implications for marketing efficiency is very important (Mendoza and Rosegrant, 1995).

Okuneye (2001) pointed out in his study that the withdrawal of World Bank loan and the Federal Government Counterpart Funding in 1996/97 and the erratic nature of food crops production were major causes of rise in food prices in Nigeria. He observed that while the output of the major food crops dropped considerably between 1975 and 1985, improvement became noticeable from 1985 onwards mainly due to high rate of inflation on food prices. Other factors identified in literature as causes of increase in prices of food in Nigeria are bad and inadequate feeder roads, inadequate transport facilities to carry products to their various markets and problem of marketing, storage and processing systems. All these have resulted in increase in transportation cost, reduced market accessibility and suppressed farm gate prices (Sefa-dedah, 1995; FAO, 1996; Afolami, (2001; and Ojo and Imoudu, 2001).

Galtier (2009) identified other sources of price fluctuation which are natural and imported. Natural price instability arises when there is production instability caused by natural hazards such as excessive rainfall, drought and crop failure. Food production in Nigeria is climate dependent and several authors in Nigeria have looked into the phenomenon. Adejuwon (2005) observed that during years with unusually low precipitation, crop yield sensitivity becomes more pronounced. Hence, climate change may increase developing countries' exposure to droughts, floods, and other extreme climatic events that heighten the risk of severe fluctuations in food production and thus food

price hike. Therefore, management of natural price instability entails reducing the sensitivity of production to natural hazards or by increasing the price elasticity of production. If production is elastic, producers react to a poor harvest by increasing their production plans the following year. On the other hand, imported price instability arises when instability in international food prices are transmitted to destination markets. In some low-income countries with limited foreign exchange earnings, a sudden increase in food imports could lead to a worsening balance of trade, causing the currency to devalue and making imports more expensive in local currency (World Bank, 2005).

## MATERIALS AND METHODS

### *Study area*

The study focused on variations in price of selected food grains in Ogun State in the South-Western Zone of Nigeria. The state is made up of 20 Local Government Areas and covers a land area of about 16,409.26 sq Km with a population of 3,728,098 as at 2006. The state has a tropical climate with mean rainfall between 1,110 –1,500 millimeters. It is bounded in the south by Lagos State and the Atlantic Ocean, in the East by Ondo State and in the North by Oyo and Osun States. The climate is tropical characterized by bimodal rainfall season that start about March and ends in August. The second rainy season begins on September and ends in November. The main food crops produced in the state include cereals, root and stem tubers, grain legumes, groundnuts and a variety of vegetable and tropical fruits.

### *Data collection*

This study was based on secondary data obtained from Ogun State Agricultural Development Programme (OGADEP) for the

period (1988-2012). The data cover both the rural and urban monthly retail prices of food crops such as maize, rice and cowpea.

### *Model specification*

The data were analyzed using descriptive statistics, graphical presentations to capture the trends while exponential growth model was used to analyze the dynamic behavior of the selected food crops prices over the period of 1988-2012.

The growth model is specified as follow:

$$Y = Ae^{rt} \text{ (exponential/growth rate) } \text{----- (1)}$$

The logarithm of the model is

$$\ln Y = \ln A + rt + e_t \text{ -----(2)}$$

where:  $Y$  = Average price

$\ln$  = Natural logarithm

$r$  = growth rate/growth coefficient of the given prices of selected food crops over the years.

$A$  = Constant term parameter

$t$  = time trend, ranges from 1-96 quarters

$e_t$  = the error term.

## RESULTS AND DISCUSSION

Descriptive statistics such as monthly mean prices and standard errors were obtained for the selected crops for the rural and urban markets as shown in Table 1. It was observed that the differences in the mean prices between the rural and urban markets for each grain crop are minimal ranging from ₦0.35 to ₦7.05 per kilogram. The highest amount of ₦7.05 per kilogram was recorded in white cowpea while the least difference of ₦0.35/kg was in rice. Others are ₦4.69/kg for brown cowpea, ₦2.05/kg for yellow maize and ₦1.63/kg for white maize. As expected, the mean prices were higher in the urban market compared to the rural market

**Table 1: Distribution of Mean Rural and Urban Market Prices of Selected Grain Crops for the period 1988-2012.**

CROPS	Mean Urban Prices (₦/Kg)	Mean Rural Prices (₦)
White Maize	32.08 (2.341)	30.45 (2.247)
Yellow Maize	34.68 (2.484)	32.63 (2.375)
Rice	92.98 (8.188)	92.63 (8.078)
Brown Cowpea	95.58 (10.664)	90.89 (9.656)
White Cowpea	93.29 (10.919)	86.24 (9.481)

**Source:** Secondary market price data from OGADEP, 2013

\*Figures in parenthesis are the standard errors of means

#### **Growth rates of the selected food crops**

Growth model was used to establish trends of growth for prices in both rural and urban markets. The results of the regression analysis in Table 2 reveal positive significant coefficients ( $p < 0.01$ ), which is an indication of upward trend in prices in both markets of the selected food grains. The F-values for all the variables were significant ( $p < 0.01$ ) as well, which indicates the goodness of fit of the function. The adjusted  $R^2$  values obtained ranges between 0.841 and 0.954. This simply shows that the variation observed in the prices of the selected grain food crops can be explained by time.

Table 3 on the other hand, shows that the null hypothesis that there is no significant difference between rural and urban mean prices for white and yellow maize was rejected while it was accepted for rice, white and brown cowpea. Differences between white and yellow maize market pairs were significant ( $p < 0.01$ ). Thus, there is a significant difference between the rural and urban mean retail prices of white and yellow maize. However, there is no significant dif-

ference between the rural and urban mean retail prices of rice, white and brown cowpea which shows that they are not market sensitive, that is, it does not matter where the product is purchased.

The growth rates for both markets are further presented in Table 4 to identify the rate at which each of the selected crops is growing in each of the market. It is observed that the rate of growth for both the white (4.41%) and brown cowpea (4.34%) in the rural market were greater than all other crops while the least growth is found in white maize (3.50%). The same trend is observed in the urban market as shown in the Table. When the two markets are taken into consideration, the highest growth is seen in the white cowpea in the urban market and the least rate in white maize in the rural market.

#### **Graphical presentation of price trends**

This section employed the use of graphs to explain the long run trend of price adjustment for the selected food grains in both the urban and rural markets for the period of 1988-2012. The quarterly retail prices were used for all the crops.

**Table 2: Results of the Exponential Regression Analysis of the selected Food Grains**

VARIABLE	bo (A)	b1 (r)	Adjusted R <sup>2</sup>	F value
ln RPWMZ	1.061	0.0350*** (25.46)	0.867	648.288
ln UPWMZ	1.131	0.0370*** (23.44)	0.847	549.395
ln RPYMZ	1.057	0.0360*** (24.37)	0.857	593.958
ln UPYMZ	1.166	0.0380*** (22.93)	0.841	525.639
ln RPRICE	2.011	0.0390*** (34.58)	0.923	119.500
ln UPRICE	1.998	0.0410*** (35.44)	0.927	125.600
ln RPWCP	1.537	0.0441*** (43.24)	0.950	187.000
ln UPWCP	1.428	0.0478*** (45.28)	0.954	205.100
ln RPBCP	1.724	0.0434*** (35.54)	0.927	126.300
ln UPBCP	1.612	0.0451*** (36.77)	0.932	135.200

**Source:** Secondary market prices data from OGADEP

Figure in parenthesis are computed t- values

\*\*\* = significant at  $P < 0.01$ ; \*\* = significant at  $P < 0.05$ ; \* = Significant at  $P < 0.10$

**Table 3: T- test of difference of Means between Urban and Rural Prices of Selected Grain Crops**

Variable	Mean	N	Df	t-value	Decision
White Maize	-0.058	100	99	-3.177	Reject Ho
Yellow Maize	-0.075	100	99	-3.986	Reject Ho
Rice	0.002	100	99	0.460	Accept Ho
Brown Cowpea	0.009	100	99	0.529	Accept Ho
White Cowpea	-0.007	100	99	-0.513	Accept Ho

**Source:** Secondary market price data from OGADEP, 2013

**Table 4: Growth Rates of selected Food Grains in the Rural and Urban Markets**

Variable	Rural Market (%)	Urban Market (%)
White Maize	3.50	3.70
Yellow Maize	3.60	3.80
Rice	3.90	4.10
White Cowpea	4.41	4.78
Brown Cowpea	4.34	4.51

**Source:** Secondary market price data from OGADEP, 2013

#### ***Graphical presentation of price trends***

This section employed the use of graphs to explain the long run trend of price adjustment for the selected food grains in both the urban and rural markets for the period of 1988-2012. The quarterly retail prices were used for all the crops.

#### **Trend of Quarterly Prices of White Maize in the Rural and Urban Markets (1988-2012)**

The Figure 1 presents the graph of the quarterly price trend of white maize in the rural and urban markets of Ogun State. It is observed from the graph that the rate at which price fluctuation took place in both rural and urban markets of white maize was minimal in the first five years i.e. 1988-1993. Subsequent years however show rapid price adjustment in both markets. Two major peaks occur within the years 2000-2005 and 2011-2012 with the highest occurring in the urban market. The increase in the price of maize during this period could be as a result of the increase in the price of petroleum products and the persistence shortage of the products as also observed by Oladapo and Momoh, 2007.

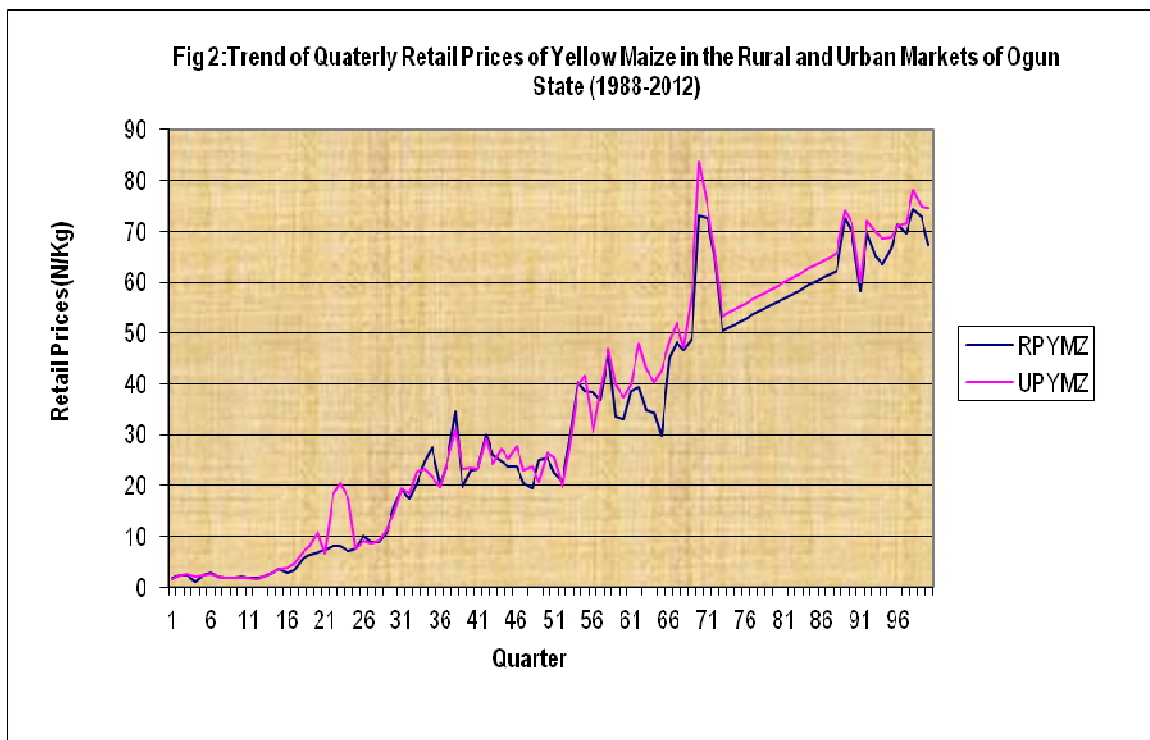
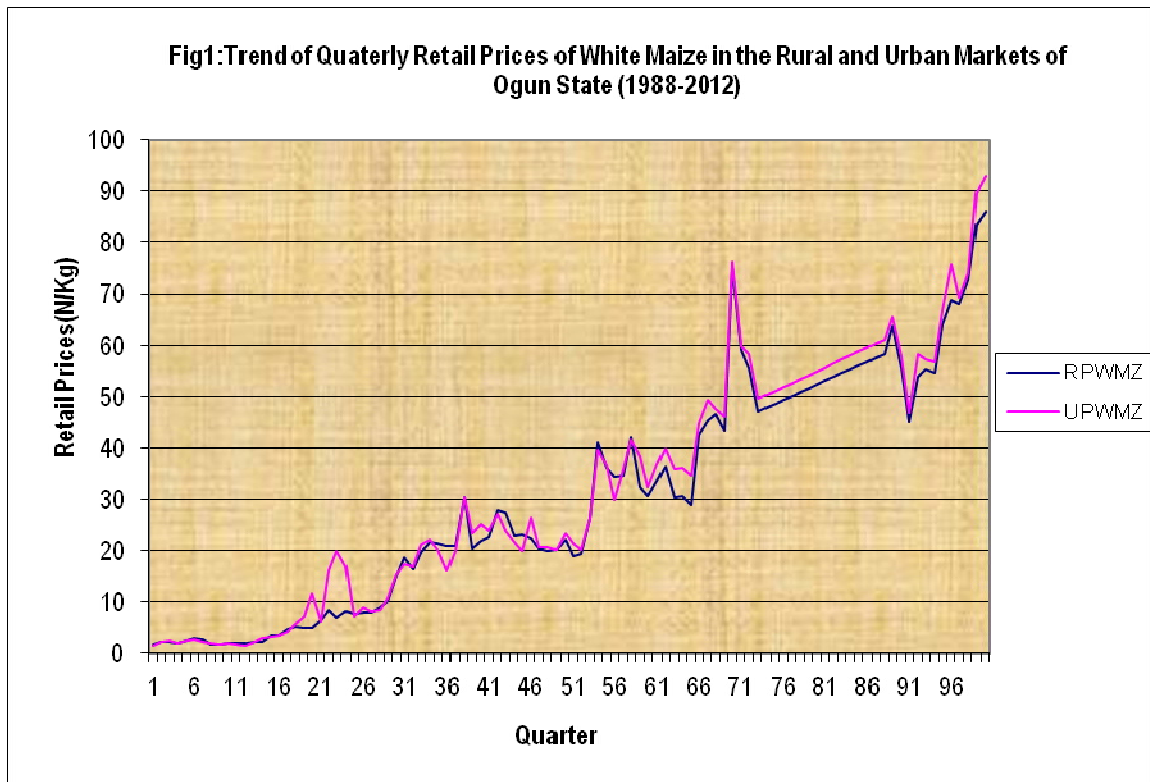
#### ***Trends in quarterly prices of yellow maize in the rural and urban markets (1988-2012)***

Figure 2 displays the graph of the quarterly

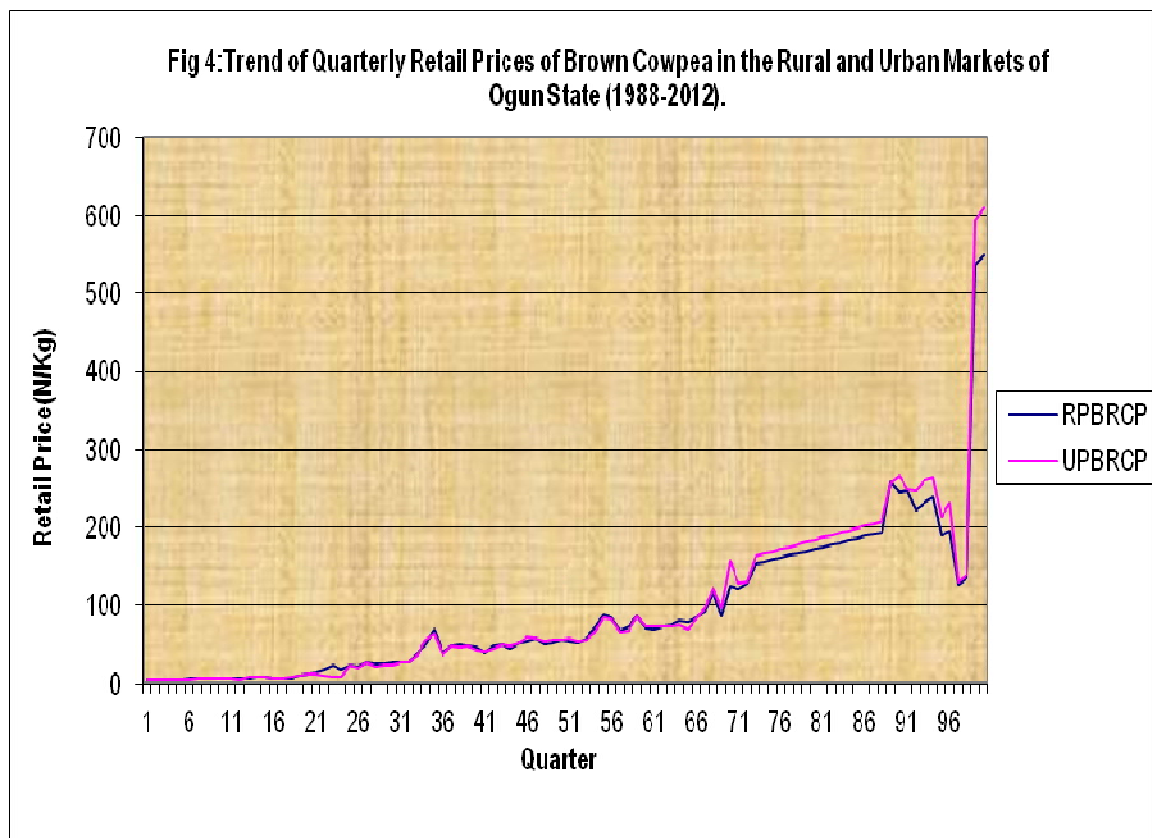
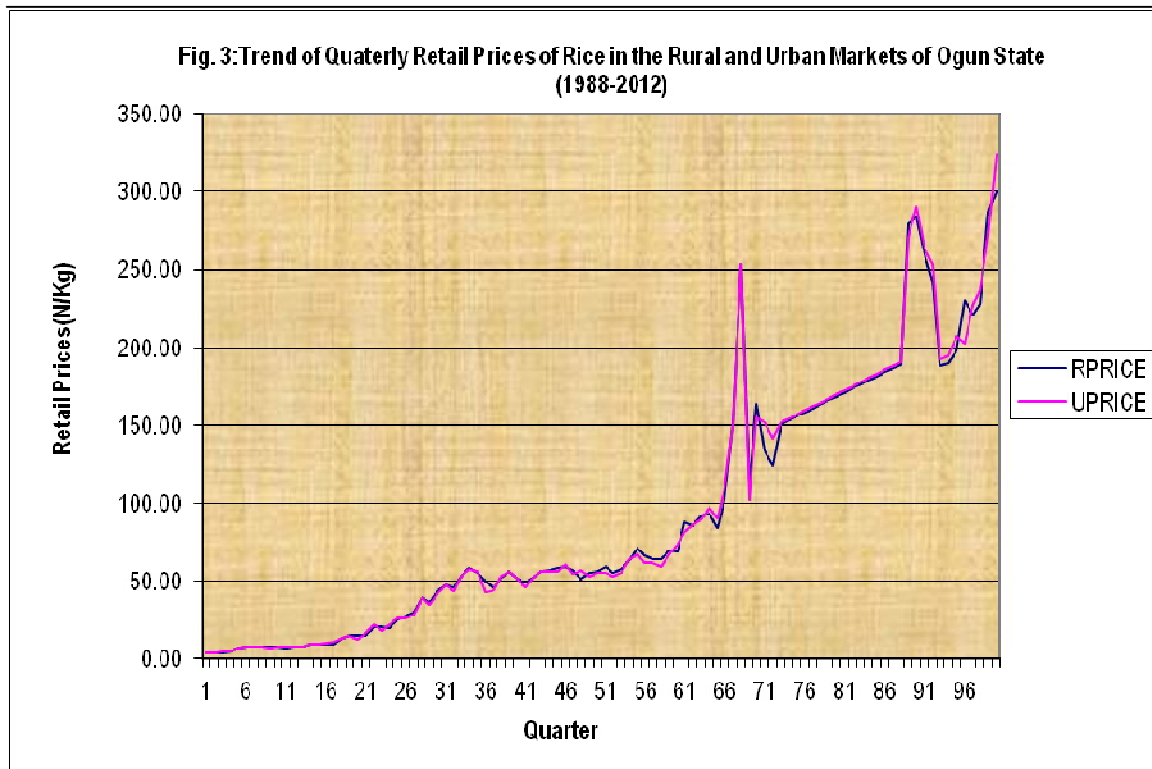
price trend of rural and urban markets of yellow maize for the same period above. The rate of fluctuation in prices of yellow maize in both rural and urban markets followed a similar pattern as observed in white maize. However, the highest peak can be seen in the last quarter of 2005 and between 2010-2012 in the urban market. For most part of the quarters, the urban market prices were higher than those of the rural market except in quarters that fell in the years 1996-1997.

#### ***Trends in quarterly prices of rice in the rural and urban markets (1988-2012)***

Figure 3 shows the graph of the trend of quarterly retail prices of rice in the rural and urban markets of Ogun State. It is observed that the price adjustment in the rural and urban markets of rice was gradual and minimal for most parts of the period covered. The highest peak was however observed in the years 2004-2005 and between 2009-2010 for the two markets with the urban price taking the lead. This could be as a result of the ban placed on importation of rice by the federal government during this period which brought about the increase in the price of rice.



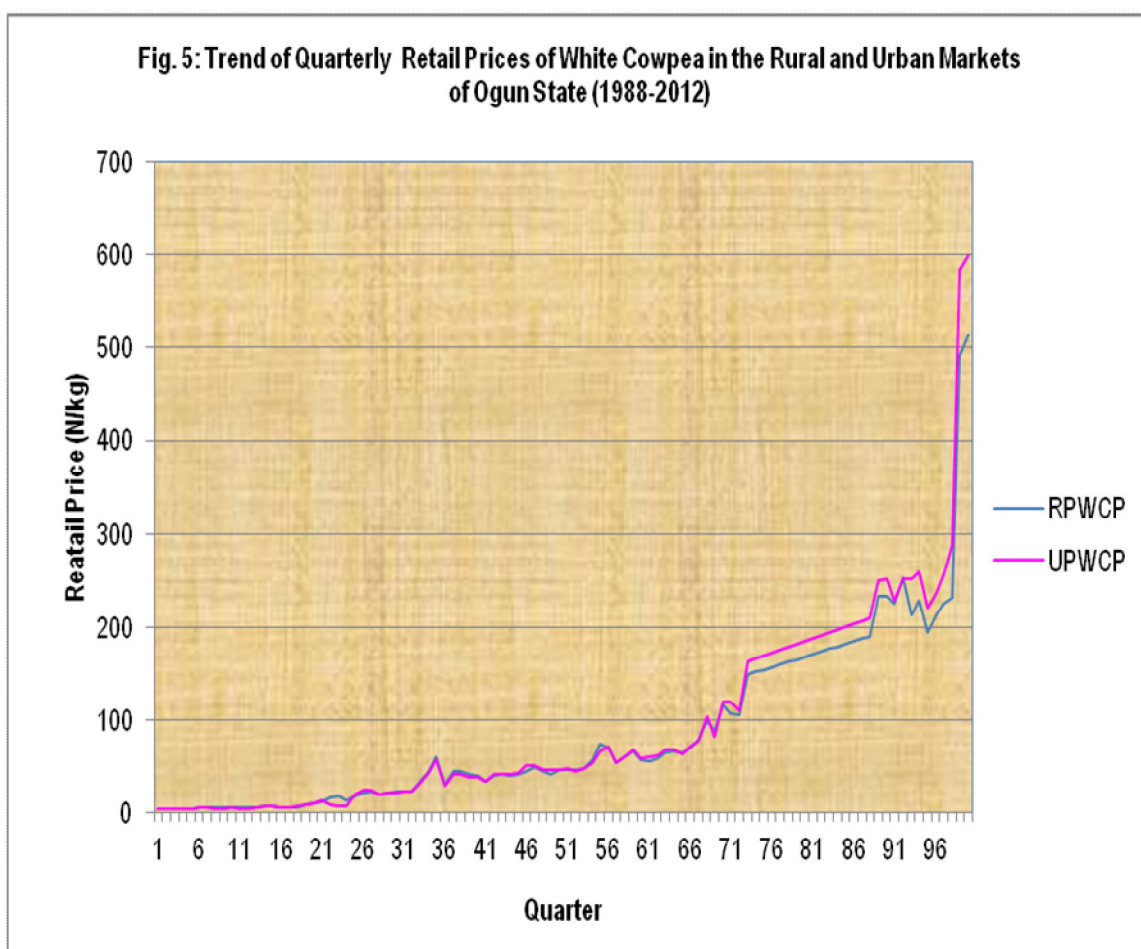




**Trends in quarterly prices of brown cowpea in the rural and urban markets (1988-2012)**

Figure 4 displays the graph of long run price adjustment on quarterly basis of brown cowpea in the rural and urban markets of Ogun State. As observed from the

graph, the first eight years witnessed minimal or no fluctuation in prices of cowpea in both the rural and urban markets. However, five major peaks can be observed between 1996 and 2011 at both markets. The highest peak occurred in 2012 at the urban market.



**Trends in quarterly prices of white cowpea in the rural and urban markets (1988-2012)**

Figure 5 shows the graph of trend of quarterly retail prices of white cowpea in the rural and urban markets of Ogun State. The price trend of white cowpea followed similar pattern observed in brown cowpea. However, the first major fluctuation was

observed in the year 1996 while subsequent adjustments were observed in 2002-2005 and the latter part of the period 2009-2012. The urban price of white cowpea recorded the highest retail price.

## CONCLUSION AND RECOMMENDATION

The exponential regression analysis revealed that there is an upward trend in prices of both rural and urban markets of the selected food grains for the period of the study which covers 1988-2012. The variations observed in the prices are explained by time. Therefore, it is recommended that government should formulate policies that will stabilize prices of these crops thereby making them affordable especially to the low income earners.

## REFERENCES

- Abboth, J.C, Makeham, J.P.** 1990: *Agricultural Economics and Marketing in the Tropics*. Second Edition, Intermediate Tropical Agricultural Series, Published by Longman Group.
- Adejuwon, J.O.** 2005: Food Crop Production in Nigeria. Present effects of Climate Variability. *Climate Research*, 30(1): 53-60.
- Afolami, C.A.** 2001: "Market Integration and Inter-temporal pricing efficiency for Cowpea in Nigeria". *Asset Series A*, 1( 2): 171 – 185.
- Agiri, O.I.** 2000: "Price Analysis of some selected Food Crops in Nigeria : A Case Study of Lagos Metropolis". Unpublished B.Sc. Project Report, Department of Agricultural Economics, University of Ibadan, Ibadan.
- Conceição, P; Levine, S., Brixiova, Z.** 2011. The Food Price Spikes of 2008/09 and 2010/11: Country-Level Impacts and Policy Responses in Africa. Paper prepared for the 2011 African Economic Conference. 15p <https://web.undp.org/africa/knowledge/WP-2011-003-cva-food%20prices.pdf>
- Dorosh, P.A.** 2013. Rice Stocks and Trade Policy in Asia: A role for International Stock Arrangements? *IFPRI. Agricultural Transformation in Asia: Policy options for food security*. Siem Reap, Cambodia.
- FAO 1996: "Market Liberalization Impact Studies, Zambia, from Transition to Consolidation". A Critical Review of the Liberalization of Maize and Input Market. *Food and Agriculture Organization*, Rome, Italy.
- Famine Early Warning Systems Network (FEWSNET). 2008: Nigeria Food Security Outlook, March to September, 2008.
- Galtier, F.** 2009: How to Manage Food Price Instability in Developing Countries? Working Paper Moisa No. 5/2009, Montpellier F-34000, France.
- Heady, D., Fan, S.** 2008: "Anatomy of a Crisis: The Causes and Consequences of Surging Food Prices". *Journal of Agricultural Economics*, 29:375-391.
- Jensena, R.T.. Miller N.H.** 2010: Do Consumer Price Subsidies Really Improve Nutrition? (Working Paper 16102). National Bureau of Economic Research, 1050 Massachusetts Ave, Cambridge M.A. 02138. <https://www.nber.org/papers/w16102>
- Mendoza, M.S., Rosegrant, M.W.** (1995): "Pricing Behaviour in Philippine Corn Markets: Implication for market efficiency", International Food Policy Research Institute.
- Odozi, J.C, Omonona, B.T** (2012): Governance Options for Price Instability: A Review of the Food Grain Commodity in Nigeria". *Journal of Development and Agricultural Economics*, 4(4):93-100.

- OGADEP** (2012): Compilation of Market Prices of some Agricultural Commodity/Produces in some selected Rural and Urban Markets in Ogun State. OGADEP Bulletin, Abeokuta. Nigeria.
- Oladapo, M.O, Momoh, S.**( 2007): "An Analysis of Price Transmission for Selected Agricultural Commodities in Ogun State, Nigeria". *Nigeria Journal of Horticultural Science*, 12: 99-105.
- Ojo, S.O., Imoudu, P.B.** (2001): "Efficiency Measurement in Palm oil marketing in Ekiti State of Nigeria", *Journal of Economics and Social Studies*. 1( 1): 58-67.
- Okuneye, B.** (2001): "The Rising Cost of Food/Food Insecurity in Nigeria and its Implication for Poverty Reduction", *Central Bank of Nigeria Economic and Financial Review*, 39( 4): 102 -108.
- Olayemi, J.K.** (1977): "A Statistical Analysis of Price Spreads for some Nigerian Food Commodities", *Journal of Rural Economics and Development*, 2( 1): 37 – 47.
- Sefa-dedah, B** (1995): "Traditional Fish Process: Technology Quality and Evaluation Technique in West African " IDAF Technical Report No. 66.
- Sotunde, A.A.** (1997): "A Comparative Analysis of Producer and Consumer Prices of Food Crops in Oyo State: 1982 – 1992". Unpublished B.sc Project, Department of Agricultural Economics, University of Ibadan. Ibadan, Nigeria.
- World Bank Annual Report** (2005). Managing Food Price Risks and Instability in an Environment of Market Liberalization. Agriculture and Rural Development Department. <https://www.worldbank.org>

#### ABBREVIATIONS

- RPWMZ - Rural Price White Maize  
UPWMZ - Urban Price White Maize  
RPYMZ - Rural Price Yellow Maize  
UPYMZ - Urban Price Yellow Maize  
RPRICE - Rural Price Rice  
UPRICE - Urban Price Rice  
RPWCP - Rural Price White Cowpea  
UPWCP - Urban Price White Cowpea  
RPBCP - Rural Price Brown Cowpea  
UPBCP - Urban Price Brown Cowpea

(Manuscript received: 29th October; 2012 accepted: 28th April, 2014).