Analysis of Cowpea Market Integration in Kiyawa Local Government Area of Jigawa State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author YNK designed the study, wrote the protocol and supervised the work. Authors AHW and BYM carried out all laboratories work and performed the statistical analysis. Author AHW managed the analyses of the study. Author YNK wrote the first draft of the manuscript. Author BYM managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

The study examined temporal and spatial price integration of cowpea markets in Kiyawa Local Government Area of Jigawa State. Four periodic cowpea markets (Duhuwa, Kazuba, Kiyawa and Shuwarin) were purposively selected. Recurring survey was used to collect cowpea retail prices from 260 selling agents, 208 were for temporal market integration, while 52 respondents were selected for spatial price integration analysis. Shuwarin market was selected as the base market in the spatial survey and cowpea retail prices were collected weekly for 3 month. Similarly the month of September was selected as the base month for the temporal price integration and weekly prices of the commodity were collected for 12 month. Data were analyzed using correlation matrix t-statistics. Result of the t-statistics revealed a positive relationship between the base month and the month of October, November and February with t- values of 0.5, 0.35 and 0.35 respectively. However, no price connection was realized against June and July with t- value of 0.00. Correlation matrix showed a strong price integration (p>0.01) between Shuwarin and Kazuba cowpea markets. Similarly Shuwarin prices significantly (p>0.01) influences prices of cowpea at Duhuwa market. However lower level (P>0.05) of price connection was found between Shuwarin and Kiyawa cowpea markets.

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Therefore it was concluded that, cowpea markets in this area have shown strong evidence of price responsiveness even though, the degree of responsiveness varied across the markets. It was recommended that, market and price policy instruments should capture plans at local, state and national level that would eventually lead to stability in prices, creation of an efficient marketing environment that would subsequently increase production and enhances food security and marketing.

Keywords: Cowpea; temporal; spatial and price integration.

1. INTRODUCTION

Cowpea, *Vigna unguiculata* (L), a multi variety crop is grown by farmers throughout the world [1]. Nigeria is reported as the largest producer and consumer of cowpea across the world [2]. Indeed the country accounted for about 32% and 57% of world area under production and total production respectively. [3] reported that substantial production comes from the drier regions of Northern Nigeria. The region had about 4 million hectres under cultivation with about 1.7 million tonnes of cowpea output annually [4].

Price and market phenomena are growing in importance as the key factors influencing the success or failure of effort to improve food production and consumption in the country. Farmers stay in business regardless of the effect of the business fluctuation upon the demand for farm products, this behavior assures consumer of the availability of product but also means great instability in product prices [5]. Farmers are not only interested in higher yield per se, but also better prices that would facilitate a remunerative business. Good market prices for food crops provide access to consumers who depend on the market for their supplies and to farmers who shift from subsistence to market oriented production.

Market for cowpea have been given producers, marketers and consumers erratic signals characterized by extreme uncertainties and instability of prices, with sharp rise in prices observed when supply is lean and fall in prices when supply is plentiful.

This price instability presumably stemmed from the effect of weather, upstream and downstream activities, pest and diseases and manipulation of supply by the middlemen, while the uncertainty comes from lack of adequate information on spatial and temporal price pattern of the commodity.

Cowpea is a major proteinous crop consumed by the majority of people in Jigawa State, most of whom are poor and unable to afford the commodity at reasonable prices throughout the year. Seasonal and spatial price instability of agricultural commodities has been a major concern of government and consumers in the state. However, [6] posited that, the poor income classes are most vulnerable to price changes.

Examining the process of price integration is an important aspect of the analysis of the functioning of a commodity markets, as it fits in to a wider study including the relationship between market structure, market conduct and market performance [7], An integrated market is synonymous with pricing efficiency [8]. Additionally, no market is working in isolation and able to exert influence, thus, markets are interdependent with each other. Although, market integration studies are by no means sufficient to indicates the degree of temporal and spatial allocation [9]. Its specific measurement can be viewed as basic data for understanding of how specific market works [8].

Several models have been developed to analyzed spatial and temporal price relationship and the functioning of price integration [7], but price series correlation is regarded as a convenient indicator of market integration since prices are the only required data in the evaluation of inter-market price differentials [8,10].

Cowpea being largely produced and traded everywhere in Jigawa, adequate knowledge of temporal and spatial price integration of the commodity is imperative.

This will provide an empirical basis for trade and pricing policy formulation and adjustment in local, state and national planning which would eventually lead to stability in prices, creation of an efficient marketing environment and subsequently increase production and enhance marketing. Therefore the study aimed at:

i. Determining the temporal cowpea price integration with respect to the price of September, 2006.

ii. Analyzing the spatial cowpea market integration between the selected markets, with Shuwarin as the base market.

2. METHODOLOGY

2.1 Study Area

Kiyawa LG is situated in the south eastern part of Jigawa State, within latitude 11.42^oN and longitude 9.40^oE. Its landform is characterized by undulating land with sand dunes of variable sizes spanning across the northern part of the local government. The south eastern part consist of fine textured clay to sandy loam soil that is grayed and have some humus content that favored arable agricultural practices in the area. Average annual rainfall of about 550mm. Mean annual temperature of 23.75^oC and average relative humidity of about 45% has been recorded. The area lies within the Sudan Savannah type of vegetation [11].

2.2 Data Collection

Four periodic cowpea markets were purposively selected based on the availability of the commodity throughout the year, the Market operations and their dominance in cowpea marketing. Two out of the four markets were urban markets, while the other two were rural markets. The urban periodic markets are Shuwarin and Kiyawa having their market days on Monday and Friday. Kazuba and Duhuwa were the two rural periodic markets having their market days on Tuesday and Wednesday, respectively.

Retail prices of cowpea were collected weekly from October to December, 2005 for the spatial survey, while for the temporal survey retail prices of the commodity were collected from October, 2005 to September 2006. Retail price per unit of measure (Mudu) were noted and recorded by the researcher from 260 selling agents selected at random. 52 respondents were for the spatial survey, while 208 selling agents were used for the temporal analysis. The observation was done during the busy hours of the market day, However, as rule of thumb, the prices recorded in Naira per Mudu were then converted to price in Naira per kg, as one Mudu of cowpea weigh approximately to 2.5 kg.

2.3 Data Analysis

Inferential statistics involving t- statistics model and correlation matrix were employed to test between means of retail prices of the commodity for the markets and the months studied as per the spatial and temporal price connection respectively. Statistical Packages for Social Sciences SSPS (version 10) was used to analyzed the data.

3. RESULTS AND DISCUSSION

3.1 Temporal Market Integration between September (Base month) and other Eleven Months Studied in Shuwarin Market

Result of the t-test analysis (Table 1) showed a positive relationship of cowpea prices between the base month and the month of October, November, and February with t-values of 0.500, 0.349 and 0.349 respectively. It further revealed that, positive relationship but lower values of 0.211, 0.156, 0.146, 0.119 and 0.048 were recorded for the month of May, December, April, March, August and January. However, price relationship between the base month and the month of June and July could not be substantiated as values of (t=0.000) were found to be zero.

The implication of this result is that, commodity's prices were well integrated between the base month (September) and the month of October, November and February.

Similarly, price connectivity were also established but with lower linkages between base month and the remaining month with exception of June and July whose values were zero meaning that, their prices were not integrated with that of September.

Table 2 presents the correlation result of the twelve months studied computed using SSPS series (version 10), values of r = 0.90 and 0.71 were found between base month and the month of January and April. Negative r-values of -0.688, -0.302, -0.762 and -0.905 were recorded for September against December, February, March, and August respectively. Perfect relationship of prices of the commodity were observed between base month and the month of June and July as r=1.00. While no correlation was established between base month and October prices of the commodity.

The finding indicated a significant relationship (price integration) of cowpea price between September and January at 1% and 5% level of

significance. Similarly, the price of the commodity was also found to be integrated to that of April at 5% confidence level. This finding was similar to what was reported by [8] that, with non- random price behavior characterized by non-integrated markets, the bivariate correlation coefficient of price movement is expected to be zero, conversely, the correlation coefficient of price movement in an integrated market is expected to be close to unity. Additionally, integrated price value of 0.70 recorded between September and April was within the range of values 0.70 to 0.80 observed as correlation coefficients of cowpea prices in Nigerian markets by [12,13].

Surprisingly, a negative price relationship was evident between September and the month of December, February, March and August. This may however be due to poor level of information flow, time lag and economic inefficiencies as earlier believed by researchers like [14,15,7].

3.2 Spatial Market Integration between the Selected Markets

Correlation results between the four selected markets involved in the study is presented in Table 3. It indicated a significant price relationship (integration) between base market (Shuwarin) and the other (Kazuba and Duhuwa) markets at 1% and 5% level with values of r=0.970 and 0.976 respectively, except for Kiyawa market that was only significant at 5% level with a value of r=0.92. The extent of price connection between Shuwarin and Kazuba cowpea markets showed that, Shuwarin market dominantly determine prices of most (above 90%) available at Kazuba market. This revelation is not far from normal expectation owing to the position of Shuwarin as an urban market and the largest market involved with trading of the commodity in the area. It position as a regional cowpea market may also lend additional support. Moreover, Kazuba market is more or less a rural

Table 1. T-test result between September and other months of study

	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.
Sep.	1											
Oct.	.500	1										
Nov.	.349	.163	1									
Dec.	.156	.244	.258	1								
Jan.	.048	.298	.455	.120	1							
Feb.	.349	.163	.091	.050	.273	1						
Mar.	.119	.193	.477	.133	.017	.247	1					
Apr.	.146	.342	.287	.338	.074	.500	.069	1				
May	.211	.371	.065	.434	.239	.239	.280	092	1			
Jun.	.000	.500	.349	.156	.048	.349	.119	.146	.211	1		
Jul.	.000	.500	.349	.156	.048	.349	.119	.146	.211	.000	1	
Aug.	.048	.433	.182	.327	.091	.455	.155	.047	.065	.048	.048	1

Source: Field survey, (2006)

Table 2. Correlation matrix of cowpea prices between months of study in Shuwarin market

	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug
Sep.	1											
Oct.	.000	1										
Nov.	.302	.674	1									
Dec.	-.688	-.513	.484	1								
Jan.	.905**	.405	.091	-.761	1							
Feb.	-.302	-.674	.818**	.899**	-.455	1						
Mar.	-.762	-.614	.046	.735	.966	.506	1					
Apr.	.707*	.316	.426	-.324	.853*	.000	-.863	1				
May	.577	-.258	.870	.132	.522	.522	-.440	.816**	1			
Jun.	1.00	.000	.302	-.688	.905**	-.302	-.762	.707*	.577	1		
Jul.	1.00	.000	.302	-.688	.905**	-.302	-.762	.707*	.577	1.00	1	
Aug.	-.905	.135	-.636	.346	-.818	-.091	-.690	-.853	-.870	-.905	-.905	1

Source: Field survey, (2006).
* = Significant at 5%, ** = Significant at 1%

Table 3. Correlation matrix between Shuwarin and other three markets studied

	Shuwarin	Kazuba	Duhuwa	Kiyawa
Shuwarin	1			
Kazuba	0.970**	1		
Duhuwa	0.976**	0.982**	1	
Kiyawa	0.915*	0.957*	0.950*	1

Source: Field survey (2005)
* Significant at 5%, ** Significant at 1%

market with more of producers (farmers) around its vicinity than the traders, hence it is a village collection point for the commodity.

When Duhuwa prices were compared to that of Shuwarin, the strength of market connection was found to be higher than the Shuwarin-Kazuba price linkage with coefficient of determination of 95%. This is not unexpected for the fact that, Shuwarin-Duhuwa distance is less than that of Shuwarin- Kazuba, and also traders concentration is higher in Duhuwa than Kazuba cowpea market. The finding in Table 3 additionally showed that, Shuwarin-Kiyawa cowpea market pair indicated a slightly lower integration (coefficient of determination = 83%) than the two previous comparison. This finding may not be surprising; perhaps both markets are more or less urban markets with each of the markets having its own local supply sources of cowpea located within its vicinity. More so, the distance between these two markets were comparatively more than the preceding pairs. Proximity of Shuwarin market to Dutse (headquarter) of Jigawa state may also lend additional support.

4. CONCLUSION

Analysis of cowpea price integration between the markets and the months studied showed a significant level of price linkage. However, the level of price connection was found to be stronger for the base market compared to the two rural markets on the spatial perspective. Similarly, for the temporal price linkage, perfect price integration was recorded between base month and the month of June and July. September prices also appeared to control that of January and April. In cognizance of the aforementioned, the pairs of the cowpea markets spatially and temporally exhibited strong evidence of market connection. Suffice therefore to further conclude that, the market have shown strong evidence of price responsiveness even though the degree of the responsiveness varied with distance, level and availability of local supply around the domain of a market and the market facilities available.

5. RECOMMENDATIONS

Sequel to the findings of this research, the following recommendation were drawn;

i. Temporal and spatial arbitrage are handled with some level of satisfaction by the market system, however, there is need to improve the efficiency of agricultural produce markets through institutional support of provision of market and public facilities
ii. Since market conditions vary between places and even market segment, and seasonality further increases variability, policy instrument should therefore focus on spatial and seasonal emphasis
iii. Policy instruments should also capture plans at local, state and national level that would eventually lead to stability in prices, creation of an efficient marketing environment that would subsequently increase production and enhances food security and marketing.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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