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Original Research Article

Price Analysis of Garlic for Major Markets of Maharashtra, India

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A B S T R A C T

Garlic is one of the important commercial spice crop belonging to the family Alliaceous. India is one of the leading Garlic producing country. Spices account for 2.2% of total agricultural produce in India. Huge fluctuations in prices of farm produce were observed during past few years. Prices show considerable volatility that could pose considerable risk to different stakeholders.For study purpose the data related to monthly average prices and arrivals of Garlic were collected for major markets of Maharashtra viz. Ahmednagar, Karad, Pune and Nagpur for the period 2005 to 2016. Moving average method was used to estimate seasonal variations and Residual Method for cyclical variations. The prices of Garlic were higher from the month of September to January in selected markets i.e. Ahmednagar, Karad, Pune and Nagpur. The higher prices recorded during the year 2006, 2007, 2011 and 2016. The peak period of arrivals of Garlic in the selected markets was February to April. The higher arrivals were recorded during the years 2008, 2009, 2012 and 2014. The price series of Garlic in all selected markets were stationary at level with lag 1.

Keywords

Garlic for Major Markets, Price Analysis

Introduction

Agricultural marketing plays a significant role in the movement of commodity from the producer to the consumer and in stabilizing the prices. Marketing plays an important role in the economic development as it stimulates production, avoids unnecessary fluctuation in output as well as prices and reduces cost of production. Price instability affects both producers and consumers and has macroeconomic implications as well. In order to reduce the price fluctuations of agricultural commodity there is need to have a thorough understanding of the price behaviour over a time. The knowledge on the interrelations between the arrival and prices of farm product is required for assessing the extent of price fluctuations over a time. The analysis of arrival and prices over time is important for formulating a sound agricultural price policy; price trade helps to understand the month to month variation in arrivals and prices and helps the farmer to make decision about when to sell their produce.

Market efficiency helps the farmer to make decision about where or in which markets to sell their produce so as to earn more profit. Higher the marketing efficiency higher is the profit earned. In such a situation it is important to study analysis of price behavior which is essential requirement for policy formulation.

Materials and Methods

The present study "Price analysis of Garlic for major markets of Maharashtra" was carried out at the Department of Agricultural Economics and Statistics, Dr. PDKV, Akola during the year 2016-17. The study was based on secondary data. Secondary data consisting of monthly prices and arrivals of Garlic were collected from four Agriculture Produce Market Committee (APMC)'s namely, Ahmednagar, Karad, Nagpur and Pune. The website www.agmarknet.nic.in was also used for the purpose.

The study has been confined to the Maharashtra state. Four APMC major markets at four district places of Maharashtra namely Ahmednagar, Karad, Nagpur and Pune were selected purposively for the study. For the study, monthly time series data on the prices and arrivals of Garlic were collected for the period from 2005 to 2016. Most widely used method of measuring seasonal fluctuations i.e. method of moving average was used to calculate seasonal indices. To measure the seasonal variations in prices and arrivals, seasonal indices were calculated by employing twelve months ratio to moving average method. The residual method of estimating cyclical movement in time series was used for estimating cyclical indices, after eliminating the seasonal variation and trend components. Before analysing any time series data testing for stationarity is per-requisite. The stationarity of time series data on Garlic prices was tested by applying the Augmented Dickey-Fuller test (ADF). The (ADF) test is the test for the unit root in a time series sample. To access the presence of price volatility the ARCH-GARCH analysis was carried out. Auto Regressive Conditional Heteroscedasticity (ARCH) models are specifically designed to forecast conditional variances.

Results and Discussion

The data collected were analyzed in relation to each of the specific objective of the study and results have been tabulated.

Seasonal and cyclical variations in prices and arrivals of garlic

Seasonal indices for garlic prices

The mismatch between round the year consumption and seasonality in the production of crop leads to seasonal variations in prices of agricultural commodities. These variations may be purely due to seasonal production, poor storage facilities and retention power of Garlic growers. The seasonal indices of monthly average prices of Garlic in Nagpur, Pune, Karad and Ahmednagar markets were worked out to study seasonal variations, which are presented in Table 1.

From Table 1 it is observed that in selected markets highest price indices were observed during September – January in all the markets. Prices began to decline slightly during June- August which is pre-harvest season. Price indices were lowest in February – May in all markets. This is due to heavy arrivals and post-harvest glut in the market. Due to elastic nature of Garlic, prices fall at the time of harvest. A steady rise upward movement was natured for 5 months till September. Thereafter a steep rise in prices until reaching the peak in month of December.

Cyclical indices for garlic prices

Cyclical variations in prices were analysed in order to know the variations in prices over the years. The cyclical indices for Garlic prices were worked out for the period 2005-2016 and are presented below

It is observed that the cyclical variations were observed in the prices of Garlic in the selected markets. The higher prices were noted in the years 2006,2007,2010,2011 and 2016.

Seasonal indices for garlic arrivals

The arrivals of Garlic start from the month of February to May due to which prices of Garlic are low during these months. From the Table 3 it is observed that higher indices of market arrivals were noticed immediately after harvest in different months i.e. February – April and up to May for Karad market. The lower value of indices of arrivals was during the period of July to November indicated lean period in Garlic arrivals in all markets. For Ahmednagar & Karad arrivals are low from July- January.

Cyclical indices for garlic arrivals

From Table.4, it is observed that the cyclical variations were observed in the arrivals of Garlic in the selected markets. Higher arrivals were recorded during the year 2008,2009,2012 and 2014 for all markets. In Karad market relatively higher arrivals was also observed in the year 2005 & 2015. Lower arrivals were noted in the years 2006, 2011, 2013 and 2016.

Price volatility

Testing of stationarity in price series

Table 5 presents the results for testing for unit roots in Garlic price series by Augmented Dick-Fuller (ADF) test to check whether Garlic prices are stationary in all selected markets. The test is applied for Nagpur, Pune, Karad and Ahmednagar markets. It is observed that at level with lag 1 the ADF value for Nagpur market is less than the critical value at 1 % level of significance indicated the existence of unit root which implied that the price series of Nagpur is stationary. The table further showed that at first order difference with lag 1 the ADF values of Pune, Karad and Ahmednagar market were lower than the critical value indicated that the price series of these markets become stationary.

Table.1 Seasonal indices of Garlic prices for selected markets

Month	Nagpur	Pune	Karad	Ahmednagar
Jan	**198.52**	**113.64**	**117.73**	**114.11**
Feb	74.15	83.65	101.58	86.31
Mar	54.81	58.35	72.68	63.88
Apr	62.21	69.33	76.30	60.17
May	73.86	79.48	79.81	69.66
Jun	83.23	90.34	85.85	96.27
Jul	91.51	97.99	94.63	100.85
Aug	100.01	106.09	97.35	105.44
Sep	**106.96**	**114.26**	**107.05**	**115.719**
Oct	**110.56**	**118.04**	**111.29**	**127.36**
Nov	**120.28**	**130.90**	**121.88**	**127.15**
Dec	**98.05**	**137.87**	**133.80**	**133.03**

Table.2 Cyclical indices of garlic prices for selected markets

Year	Nagpur	Pune	Karad	Ahmednagar
2005	76.86	73.94	74.86	90.79
2006	**151.35**	**137.73**	**116.94**	**119.29**
2007	**136.29**	**132.68**	**145.29**	**124.72**
2008	51.31	56.06	64.24	55.04
2009	82.53	80.65	76.90	63.50
2010	**162.53**	**179.09**	**164.66**	**199.31**
2011	**121.97**	**131.12**	**140.39**	**136.82**
2012	32.01	33.38	34.12	33.23
2013	49.33	55.86	63.62	70.33
2014	67.19	67.83	88.38	70.90
2015	158.63	109.02	88.50	88.80
2016	**109.94**	**142.59**	**142.02**	**147.21**

Table.3 Seasonal indices of Garlic arrivals for selected markets

Month	Nagpur	Pune	Karad	Ahmednagar
Jan	76.36	67.07	19.25	4.36
Feb	**219.71**	**200.73**	**81.09**	**147.76**
Mar	**238.68**	**174.93**	**250.74**	**330.81**
Apr	**153.82**	**120.08**	**201.55**	**326.97**
May	73.44	78.54	**241.77**	88.26
Jun	95.05	101.45	110.19	57.01
Jul	54.17	74.32	38.56	35.61
Aug	48.35	64.11	34.95	27.06
Sep	59.16	80.00	59.56	69.93
Oct	54.02	72.30	42.47	29.15
Nov	50.28	68.86	23.62	14.71
Dec	76.89	97.54	96.19	68.32

Table.5 ADF test results of Garlic Prices for selected markets

Market	Level (ADF)	Critical Value (1%)	Stationary at
Nagpur	-9.655	-4.023	Original series
Pune	-9.131		1st order
Karad	-11.722		1st order
Ahmednagar	-11.356		1st order

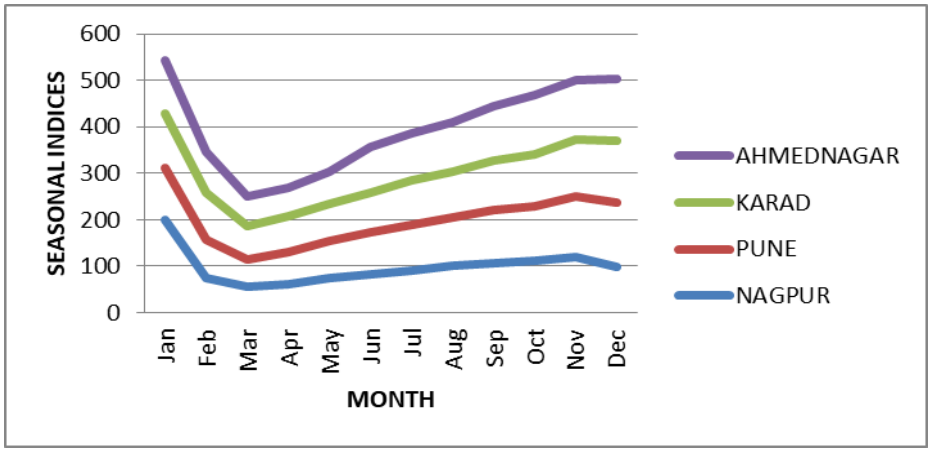
Table.4 Cyclical indices of Garlic arrivals for selected markets

Year	Nagpur	Pune	Karad	Ahmednagar
2005	62.94	**116.72**	**266.49**	9.62
2006	32.55	85.42	35.80	8.10
2007	21.87	84.21	26.32	9.08
2008	**142.07**	98.61	53.81	85.40
2009	**130.72**	**46.32**	**17.80**	**14.73**
2010	97.93	44.75	27.15	14.66
2011	43.14	49.08	3.49	8.62
2012	**381.02**	**374.30**	**516.28**	**987.52**
2013	62.55	64.14	17.93	7.80
2014	**107.30**	83.64	87.12	34.08
2015	77.68	76.23	128.86	13.34
2016	40.16	76.52	18.90	7.00

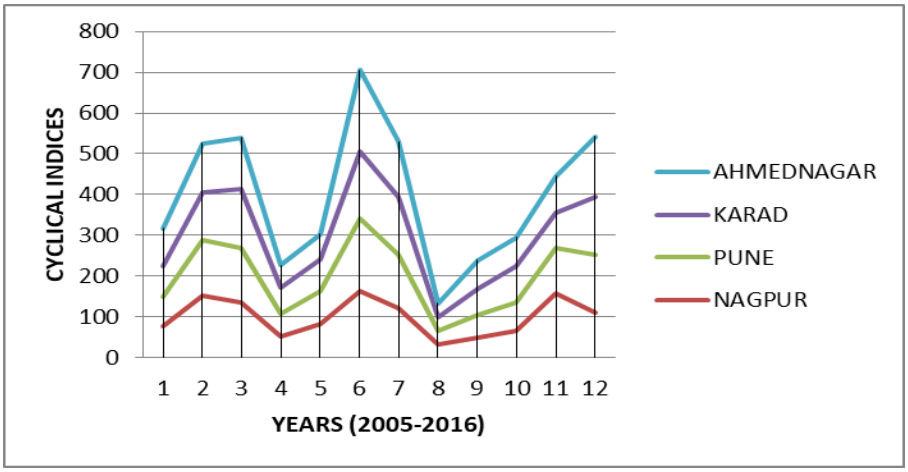
Table.6 Results of ARCH-GARCH analysis of Garlic prices for selected markets

Parameter	Nagpur	Pune	Karad	Ahmednagar
Alpha (α)	-0.097	1.087	1.055	1.134
Beta (β)	1.107	-0.061	-0.002	-0.092
Sum of α & β	**1.01**	**1.026**	**1.053**	**1.042**

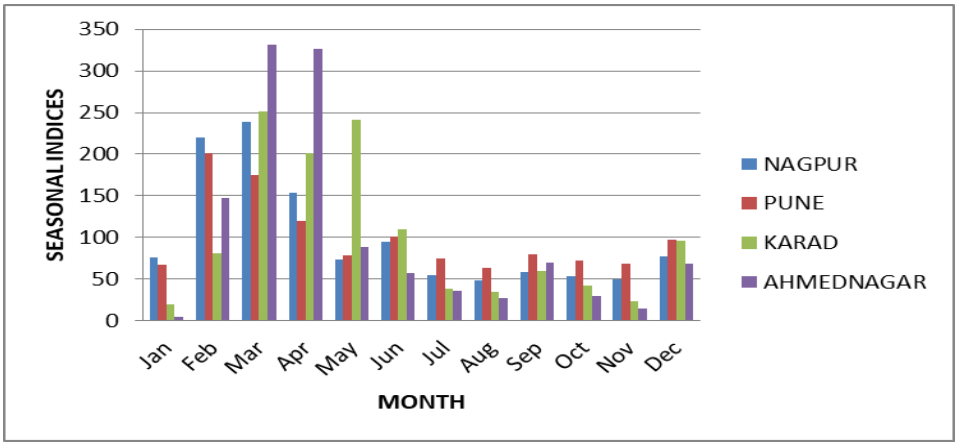
Seasonal indices of Garlic prices for selected markets



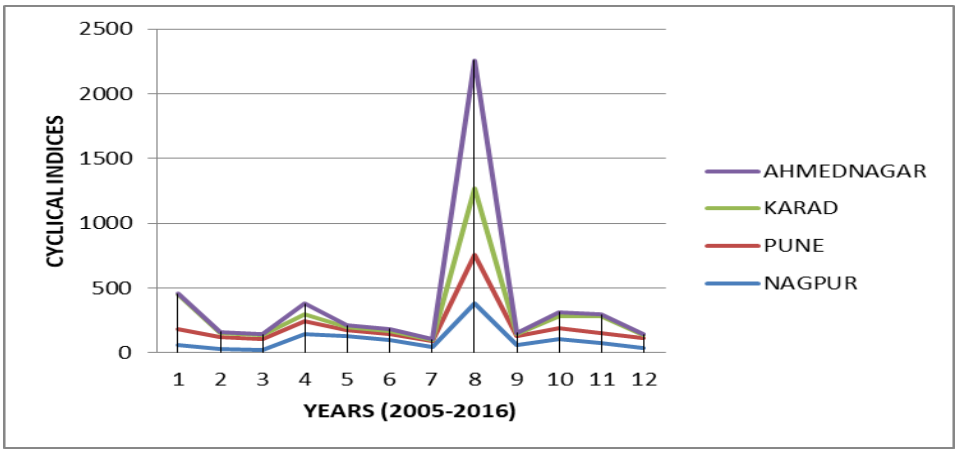
Cyclical indices of Garlic prices for selected markets



Seasonal indices of Garlic arrivals for selected markets



Cyclical indices of Garlic arrivals for selected market



Presence of price volatility

To assess the presence of price fluctuations in the prices of Garlic in Nagpur, Pune, Karad and Ahmednagar markets, ARCH-GARCH analysis was carried out and the results are presented in Table 6. The sum of Alpha and Beta (α+β), indicated ARCH and GARCH effect for the given market. It was observed that among the markets, the sum of Alpha and Beta is nearer to 1 i.e. 1.01, 1.026, 1.053 and 1.042 for Nagpur, Pune, Karad and Ahmednagar markets, respectively, indicated that the volatility shocks in the prices of Garlic are quite persistent for a long time in these markets. Hence the hypothesis proposed for present study is accepted. Lucy Ngare, Jaquelino Massingue (2014) studied Analysis of Price Volatility in Mozambique and revealed the presence of seasonality, and high volatility by using GARCH model.

Conclusion

The prices of Garlic were higher from the month of September – January in selected markets i.e Pune, Nagpur, Karad and Ahmednagar. The cyclical variations were observed in the prices of Garlic in the selected markets. The higher prices recorded during the year 2006, 2007, 2011 and 2016. The peak period of arrivals of Garlic in the selected markets was February – April. Arrivals are high in this period because most of the marginal farmers are in need of the money immediately after harvesting of the crop. The lean period of arrivals of Garlic in the markets was from July to November.The cyclical variations were observed in the arrivals of Garlic in the selected markets. The higher arrivals were recorded during the years 2008, 2009, 2012 and 2014. The price series of Garlic in Nagpur market was stationary at original series and in other markets the price series became stationary after first order differencing.

The results of ARCH-GARCH analysis showed that there was high variability in the prices of Garlic. In selected markets, volatility shocks in the prices of Garlic were quite persistent.

Policy implications

In order to minimize the price risk and to protect the price risk and to protect the price security of farming community under Garlic crop of Maharashtra state which is very volatile commodity in terms of market prices, it is recommended that the long term procurement policy should be adopted to maintain price stability throughout the year by declaring the MSP and procurement by Nodal agencies at least for major markets of the state.

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