FORECASTING THE PRICES OF ONION IN PIMPALGAON MARKET OF WESTERN MAHARASHTRA

Ashwini S. Darekar[1], Snehal B. Datarkar[2], Dr. D.B. Yadav

[1,2,] Ph. D. Scholar, Department of Agricultural Economics, PGI, MPKV, Rahuri. (MH), (India)

[3]Department of Agricultural Economics, PGI, MPKV, Rahuri. (MH), (India)

ABSTRACT

The present study is an attempt to forecast the prices of onion at Pimpalgaon market of Western Maharashtra. The forecasted values revealed an increasing trend for the future years. The results showed the ex-ante and ex-post forecast of monthly prices of onion in selected market from 2004 to 2013. In these markets, it was observed that there was sudden increase or decrease in the prices during 2011, 2012 and 2013. The year-wise alternate decrease in production and adequate storage facilities might be the reasons for the sudden increase in the price. The forecasted price values revealed an increasing trend in the next ensuing years. Hence, farmers need to plan the production process in such a way that a good price for the produce would be expected.

Keywords: Forecasting of Price, Onion, ARIMA Technique

I. INTRODUCTION

Onion is one of the most important commercial vegetable crops grown in India. Among the bulb crops onion is the only member grown to a great extent in this country. Maharashtra State, being one of the major onion producing States in the country had 415.0 thousand hectares under onion with total production of 4905.0 thousand metric tons in the year 2012-13. The State ranks first in terms of onion production in India.

Price has to play an important role in economic planning. They determine not only what should be produced but how much to produced. As the market prices of onion are flexible, which should provide enough incentives to the farmers for increasing the production of onion, but most of the time prevailing marketing networks is against the interest of farmers.

The instability in prices of agricultural commodities has been one of the major factors affecting the income levels of the farmers as well as tempo of agricultural production. This instability in prices of agricultural commodities is influenced by a number of factors like annual variation in production, low price elasticity of demand and seasonality of agricultural production.[1]

Onion poses more problems as compared to other agricultural commodities due to its high degree of perishability. The arrivals and prices of onion are also difficult to predict. There are low prices when arrivals are in large quantity and high prices in the lean season. An increase in price of onion affects the consumer by way of increase in food consumption budget, while a decrease in onion prices below the cost of cultivation affects the producer. There is enough evidence to show that prices of agricultural commodities are more volatile than

those of the non-farm commodities. These commodities are less elastic to price and income and inherently unstable due to weather and institutional risks. The high volatility in prices of agricultural commodities can have a disproportionate, typically nonlinear or asymmetric impact on the economy and may fail to endure exceptional shocks.[4]

It is also important to note that the high inflation of food commodities cannot always be attributed to risks, exogenous shocks and mismatch between demand and supply. It is also caused by market inefficiencies, weak supply chains and monopolies in the market. The spurt in food inflation in the recent months has brought to forefront some critical issues of price volatility in agricultural commodities, agricultural market structures and market efficiency.[2]

Recently the demand for onion has been continuously increasing while supply of onion is less. It is revealing high fluctuation in the prices. In this context it is necessary to know to what extent the arrivals and prices are being fluctuated and to draw meaningful policy conclusion. Hence, the study focuses on the objective to forecast the onion prices by using ARIMA model.

II. METHODOLOGY

10 years data i.e. from January 2004 to December 2013 of prices was collected for estimation of the future onion prices.

2.1 Forecasting the Prices

For quantifying and forecasting the future prices for a given set of data proper model was used. The different models are as below.

2.1.1 Auto Regressive Integrated Moving Average (ARIMA) model (Box-Jenkins models)

The Box-Jenkins procedure is concerned with fitting a mixed Auto Regressive Integrated Moving Average (ARIMA) model. The main objective in fitting ARIMA model is to identify the stochastic process of the time series and predict the future values accurately. These methods have also been useful in many types of situation which involve the building of models for discrete time series and dynamic systems. But, this method was not good for lead times or for seasonal series with a large random component.[3]

Originally ARIMA models have been studied extensively by George Box and Gwilym Jenkins (1968) and their names have frequently been used synonymously with general ARIMA process applied to time series analysis, forecasting and control. However, the optimal forecast of future values of a time-series are determined by the stochastic model for that series. A stochastic process is either stationary or non stationary. The first thing to note is that most time series are non-stationary and the ARIMA model refer only to a stationary time series. Therefore, it is necessary to have a distinction between the original non-stationarity time series and its stationarity counterpart.[4]

2.2 Moving Average Method

If the observation Yt depends on the error term et and also on one or more previous error terms (et ‘s) then we have moving average (MA) process.

$Yt = \mu + et - \Phi 1e(t-1) - \Phi 2e(t-2) - \ldots \Phi qe(t-q)$

Where,

Ti = ith moving average parameter

i = 1, 2, ... q

q = Order moving average

The values of the coefficient are restricted to lie between -1 to +1.

III. RESULTS AND DISCUSSION

3.1 Forecasting of prices of onion in the Pimpalgaon market of Western Maharashtra

3.1.1 Prices of onion in Pimpalgaon markets

The detailed analysis of forecasting prices of onion in Pimpalgaon market has been presented as under.

3.1.2 Identification of the Model

The computed values of ACF and PACF of Pimpalgaon markets are shown in the Table 4 and the numbers of lags shown was up to 20 lags. An examination of ACF and PACF revealed the presence of seasonality in the data. Each individual coefficient of ACF and PACF are tested for their significance using 't' test. Further the absence of peak at first values clearly indicate suitability of the choice of non-seasonal difference d=1 to accomplish stationary series. Hence based on ACF and PACF many models were tested and finally the model (1,0,1) (0,1,1) was identified for prices of onion in Pimpalgaon market.

3.1.3 Diagnostic Checking

The values of these statistics are shown in Table 1 The model (1,0,1) (0,1,1) was found to be the best model for prices in Pimpalgaon market, since it had the lowest statistic of AIC and BIC statistics.

3.1.4 Forecasting of prices

Both ex-ante and ex-post forecasting were done and it was compared with actual values of observations. The forecasting was done up to 2015. The results of ex-ante and ex-post forecast of prices of onion in the market are shown in Table 5. It could be seen from the table that there were narrow variations been observed between actual and forecasted values of prices of onion in Pimpalgaon market and the forecasted values of prices showed an increasing trend in Yeola market. The prices of onion in the market during 2014 will be high 2323.24 per qtl and less 1982.63 per qtl during the month of April and January respectively. In 2015 the prices will be high in the month January 2088.18 and less during the month of July 1247.59.[5]

IV. CONCLUSIONS AND POLICY IMPLICATION

1. The results showed the ex-ante and ex-post forecast of monthly prices of onion in Pimpalgaon market from 2004 to 2013. The forecasted values revealed an increasing or decreasing trend for the future years. [6]
2. It was observed that, in Pimpalgaon market there was sudden increase or decrease in the prices during 2011, 2012 and 2013. The year-wise alternate decrease in production and adequate storage facilities might be the reasons for the sudden increase in the price.[7]
3. The forecasted price values revealed an increasing or decreasing trend in the next ensuing years. Hence, farmers need to plan the production process in such a way that a good price for the produce would be expected.[8]

REFERENCES

[1]. Chaudhari D.J. and A.S. Tingre 2013, Use of ARIMA modeling for forecasting green gram prices for Maharashtra, J. of Food Legumes 27(2):136-139.

[2]. Chaudhari, D.J., C.J. Chaudhari and A. S. Tingre 2014, Forecasting cotton (Gossypium spp) production in India J. Cotton Res. Dev. 28 (2) 342-345.

[3]. Chandran, K . P. and N. K. Pandey 2007, Potato price forecasting using seasonal ARIMA approach. Potato J., 34 (1-2):137-138.

[4]. Chaudhari, D. J. and A. S. Tingre. 2013, Forecasting of milk production in India: an application of ARIMA model. Indian J. Dairy Sci. 66: 72-78.

[5]. Dhakre D.S. and D. Bhattacharya 2014 Price Behaviour of Potato in Agra Market - A Statistical Analysis Indian Res. J. Ext. Edu. 14 (2):12-15.

[6]. Ghosh, H. and Prajneshu 2003, Non-linear time series modelling of volatile onion price data using AR(p)-ARCH (q)-in- mean. Calcutta Statistical Association Bulletin, 54: 231-47.

[7]. Jalikatti, V. N., C. RaghavendrA., M. Gumgolmath., S. Shaeikh and S. Amarapurkar., 2014, Price forecasting of onion in Bijapur market of northern Karnataka using ARIMA technique. Internat. J. Com. & Bus. Manage, 7(1) : 135-141.

[8]. Mishra, P., C Sarkar, Vishwajith K.P, Dhekale B. S. And Sahu P.K. 2013. Instability and forecasting using ARIMA model in area, production and productivity of onion in India J. of Crop and Weed, 9(2):96-101 .

[9]. Mohan Kumar, T.L., Mallikarjuna, H.B., Darshan, M.B. and Sathish Gowda, C.S. 2011, Comparative study of univariate time series technique for forecasting of onion price. Internat. J. Com. & Bus. Manage, 4(2): 304-308.

Table 1 Residual analysis of monthly prices of onion in Pimpalgaon markets of Western Maharashtra

Sr. No.	Market	Model	Akike Information Coefficient (AIC)	Bayesian Information Criterion (BIC)
1	**Pimpalgaon**	(1,0,1) (0,0,1)	1587.91	1601.32

Table 2 ACF and PACF of onion prices in Pimpalgaon market

Lags	Price	
	ACF	PACF
1	1	0.574
2	0.5738	0.256
3	0.5010	-0.030
4	0.3421	-0.064
5	0.2259	-0.122

6	0.0819	0.027
7	0.0513	0.113
8	0.0643	0.065
9	0.0771	-0.004
10	0.0780	-0.061
11	0.0585	-0.023
12	0.0491	0.002
13	0.0254	-0.009
14	-0.0060	-0.016
15	-0.0296	-0.026
16	-0.0455	-0.044
17	-0.0689	-0.028
18	-0.0817	-0.015
19	-0.0888	0.010
20	-0.0778	0.053

Table 3 Ex-ante and Ex-post forecast of monthly prices of onion in Pimpalgaon market

Year	Price (Rs./Qtl.)		Year	Price (Rs./Qtl.)	
	Actual	Predicted		Actual	Predicted
Jan-04	800	-	**Jan-07**	904	560.58
Feb-04	746	-	**Feb-07**	969	670.87
Mar-04	398	-	**Mar-07**	568	693.5
Apr-04	293	-	**Apr-07**	432	653.23
May-04	317	-	**May-07**	513	513.66
Jun-04	419	-	**Jun-07**	795	606.11
Jul-04	366	-	**Jul-07**	852	710.44
Aug-04	398	-	**Aug-07**	1161	842.18
Sep-04	410	-	**Sep-07**	1472	1059.58
Oct-04	535	-	**Oct-07**	1359	1284.68
Nov-04	408	-	**Nov-07**	702	1326
Dec-04	344	-	**Dec-07**	474	859.01
Jan-05	282	807.9	**Jan-08**	256	801.67
Feb-05	250	524.03	**Feb-08**	262	610.83
Mar-05	222	168.82	**Mar-08**	296	290.44
Apr-05	301	193.13	**Apr-08**	281	339.21
May-05	228	320.03	**May-08**	253	414.55

Jun-05	286	425.05	**Jun-08**	372	595.33
Jul-05	359	374.82	**Jul-08**	691	603.5
Aug-05	509	467.94	**Aug-08**	779	910.65
Sep-05	920	588.62	**Sep-08**	653	1113.18
Oct-05	1073	899.29	**Oct-08**	637	957.11
Nov-05	1061	869.13	**Nov-08**	1009	605.93
Dec-05	375	832.5	**Dec-08**	1040	684.53
Jan-06	313	667.44	**Jan-09**	1219	808.24
Feb-06	224	488.19	**Feb-09**	1091	982.99
Mar-06	181	270.51	**Mar-09**	727	883.69
Apr-06	261	301.87	**Apr-09**	435	745.79
May-06	229	307.56	**May-09**	479	594.8
Jun-06	316	400.76	**Jun-09**	637	711.1
Jul-06	324	437.13	**Jul-09**	614	882.76
Aug-06	382	540.96	**Aug-09**	644	934.6
Sep-06	346	773.56	**Sep-09**	663	892.2
Oct-06	395	793.37	**Oct-09**	1310	841.31
Nov-06	596	665.64	**Nov-09**	1527	1152.99
Dec-06	707	323.11	**Dec-09**	1273	1248.45

Contd……..

Year	**Price (Rs./Qtl.)**		**Year**	**Price (Rs./Qtl.)**	
	Actual	**Predicted**		**Actual**	**Predicted**
Jan-10	1269	1294.83	**Jan-13**	1363	1077.23
Feb-10	940	1198.72	**Feb-13**	1484	856.6
Mar-10	583	836.63	**Mar-13**	905	957.35
Apr-10	522	576.4	**Apr-13**	778	902.29
May-10	578	606.98	**May-13**	836	850.75
Jun-10	630	779.58	**Jun-13**	1290	909.71
Jul-10	646	819.62	**Jul-13**	9161	1172.93
Aug-10	805	865.09	**Aug-13**	3208	4630.3
Sep-10	1203	910.47	**Sep-13**	4665	3276.27
Oct-10	1344	1397.37	**Oct-13**	4367	3589.18
Nov-10	2735	1512.61	**Nov-13**	3765	3763.22
Dec-10	2361	1872.37	**Dec-13**	1267	3210.56
Jan-11	2223	2003.88	**Jan-14**	-	1982.63
Feb-11	857	1772.52	**Feb-14**	-	2234.16
Mar-11	428	968.04	**Mar-14**	-	2315.66

 ISBN: 978-81-931039-8-2

Apr-11	494	616.66	**Apr-14**	-	2323.24
May-11	575	643.55	**May-14**	-	2299.45
Jun-11	665	759	**Jun-14**	-	2264.53
Jul-11	805	804.49	**Jul-14**	-	2228.02
Aug-11	1046	966.96	**Aug-14**	-	2194.15
Sep-11	1045	1248.81	**Sep-14**	-	2164.55
Oct-11	871	1410.52	**Oct-14**	-	2139.51
Nov-11	919	1990.21	**Nov-14**	-	2118.79
Dec-11	494	1337.82	**Dec-14**	-	2101.87
Jan-12	340	1077.35	**Jan-15**	-	2088.18
Feb-12	325	166.51	**Feb-15**	-	1977.18
Mar-12	317	89.6	**Mar-15**	-	1868.39
Apr-12	355	325.38	**Apr-15**	-	1261.39
May-12	355	504.58	**May-15**	-	1655.82
Jun-12	413	618.24	**Jun-15**	-	1551.41
Jul-12	538	702.57	**Jul-15**	-	1247.91
Aug-12	588	895.38	**Aug-15**	-	1845.15
Sep-12	477	948.22	**Sep-15**	-	1742.97
Oct-12	819	860.95	**Oct-15**	-	1641.24
Nov-12	1084	1359.13	**Nov-15**	-	1539.89
Dec-12	1226	984.29	**Dec-15**	-	1438.81