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A study on market integration of Ramanagaram and Siddlaghatta markets and forecasting of their prices and arrivals*

R. BARATHI, Y. N. HAVALDAR., S. N. MEGERI, G. M. PATIL AND B. L. PATIL

Department of Agricultural Statistics,
University of Agricultural Sciences, Dharwad-580005, India
E-mail: ynhavaldar@rediffmail.com

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Abstract : Ramanagaram and Siddlaghatta were class I reeling cocoon markets in Karnataka. The present study was to determine the market integration between Ramanagaram and Siddlaghatta markets and to forecast the price and arrival of cocoon. The study was exclusively based on secondary data and the study period was ten years from 1998-99 to 2007-08. Correlation technique and concurrent deviation method was used to determine the market integration. Auto Regressive Integrated Moving Average (ARIMA) model was used to forecast the arrival and price. Suitable model was identified based on the Autocorrelation function and Partial Autocorrelation Function. The adequacy of the model was judged based on the values of Box-Pierce Q statistics and Akike Information Co-efficient (AIC). Market integration is found to be perfect between two markets. Forecasted values of arrival showed increasing trend in both the markets and price showed decreasing trend in Siddlaghatta market.

Key words : ARIMA model, forecast, market, price

Introduction

Ramanagaram and Siddlaghatta market were class I reeling cocoon markets in Karnataka. The Ramanagaram cocoon market is the largest and oldest cocoon market in India. The Siddlaghatta cocoon market is second largest cocoon market in Karnataka. The cocoon prices and arrivals were usually subjected to frequent fluctuations. The price instability was also observed in the markets. Hence the present study was conducted to determine the market integration of Ramanagaram and Siddlaghatta markets and to forecast the price and arrivals.

Material and methods

The data collected for the study were monthly price and arrivals of cocoon from Ramanagaram and Siddlaghatta markets for ten years (*i.e.*) from 1998-99 to 2007-08. Data on monthly arrivals were recorded in million tonnes and monthly price in `/kg.

The correlation coefficient technique was adopted to assess the nature and magnitude of association between arrivals and prices of cocoon in the Ramanagaram and Siddlaghatta markets. The coefficient of correlation 'r' was calculated using the following equation.

$$r\ (X,Y) = \frac{\sum XY - \sum X \sum Y / n}{\sqrt{[(\sum X^2 - (\sum X)^2/n)\ (\sum Y^2 - (\sum Y)^2/n)}}$$

Where,

r = Correlation coefficient
x = Prices of cocoon in selected markets
y = Arrivals of cocoon in selected markets
n = Number of observations

The significance can be tested by't' test with n-2 degrees of freedom

Concurrent deviation method used for time series data, gives idea about short term fluctuation in variables. It is used to find whether both variables are moving in same direction or not.

$$r_{cd} = \pm\sqrt{\frac{\pm 2c - n}{n}}$$

c = concurrent deviate
n = N-1
Where n = total number of observations

Box-Jenkins models

The Box-Jenkins procedure is concerned with fitting a mixed Auto Regressive Integrated Moving Average (ARIMA) model to a given set of data. The main objective in fitting this ARIMA model is to identify the stochastic process of the time series and predict the future values accurately (Makridakis, 1979).

The ARIMA notation can be extended readily to handle seasonal aspects and the general shorthand rotation is ARIMA

(p.d.q.)	(P.D.Q.)s
(non-seasonal part of the model)	(Seasonal part of the model)

s = number of periods per season

Results and discussion

Market integration can be found by correlation technique. Correlation coefficient was computed to ascertain the pattern of association between market arrivals and prices of cocoon in selected markets. Negative relationship between arrivals and prices was noticed for Ramanagaram market and then negative and significant relationship was observed for Siddlaghatta market (Prabhakara, 1988). In concurrent deviation method, positive relationship was noticed for arrivals between Ramanagaram and Siddlaghatta market. It indicates the arrivals of Ramanagaram market increase with the increase in arrivals of Siddlaghatta market. Similarly positive relationship was recorded for prices between Ramanagaram and Siddlaghatta market. Thus market integration between two markets was found to be perfect for both arrivals and prices. (Table: 1& 2) (Rajeshekar, 2008)

The tentative models are first identified based on the Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) for the different series Yt for selected markets

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(Parameshwarappa, 1997). Hence, based on ACF and PACF many models are tried, finally estimated models for arrivals and prices of cocoon are presented below.

Monthly arrivals of cocoon in Ramanagaram market: (1, 1, 3) (1, 1, 1)
Monthly prices of cocoon in Ramanagaram market: (0, 1, 0) (1, 1, 1)
Monthly arrivals of cocoon in Siddlaghatta market: (2, 1, 1) (1, 1, 1)
Monthly prices of cocoon in Siddlaghatta market: ((0, 1, 0) (1, 1, 1)

Forecasted values of arrivals showed an increasing trend and prices showed decreasing trend in Ramanagaram market and in Siddlaghatta market, the arrivals showed an increasing trend and prices showed decreasing trend. The forecasting models and forecasting values are presented in Table 3 & 4 (Achoth, 1985).

The Ramanagaram and Siddlaghatta cocoon markets were

Table 1. Correlation between arrivals and prices of cocoon

Market	Correlation
Ramanagaram	-0.116
Siddlaghatta	-0.197*

* Significant at 0.05 level

Table 2. Concurrent deviation between Ramanagaram and Siddlaghatta markets

Variables	Values
Arrivals	0.615
Prices	0.557

Table 3. Residual analysis of Ramanagaram and Siddlaghatta markets

Market	Model	AIC	Box Pierce Q statistics
A. Ramanagaram			
Arrivals	(1.1.3) (1.1.1)	546.40	20.23
Prices	(0.1.0) (1.1.1)	424.23	16.31
B. Siddlaghatta			
Arrivals	(2.1.1) (1.1.1)	561.11	9.74
Prices	(0.1.0) (1.1.1)	426.59	15.67

Table 4. Forecasted values of arrivals and prices of cocoon

Month	Ramanagaram market		Siddlaghatta market	
	Arrivals (million tones)	Prices (` /kg)	Arrivals (million tones)	Prices (` /kg)
April-2008	853.26	106.28	1060.08	105.80
May-2008	841.10	101.13	1161.54	100.13
June-2008	822.44	103.50	1151.42	101.66
July-2008	983.49	96.02	1399.36	90.17
August-2008	811.01	100.42	1274.65	96.23
September-2008	931.45	94.36	1307.85	93.84
October-2008	881.44	87.07	1372.77	82.86
November-2008	898.36	95.24	1314.26	79.73
December-2008	823.68	109.49	1282.95	97.31
January-2009	779.85	110.14	1262.79	101.03
February-2009	775.60	114.79	1215.94	110.23
March-2009	1099.61	99.64	1474.06	99.43
April-2009	816.37	99.95	1159.74	99.23
May-2009	811.04	94.77	1253.94	94.81
June-2009	778.13	97.03	1230.03	93.90
July-2009	956.41	89.70	1475.05	82.21
August-2009	770.60	94.08	1350.83	86.80
September-2009	900.22	88.05	1385.69	85.30
October-2009	831.86	80.80	1447.21	73.14
November-2009	845.06	88.79	1393.43	71.95
December-2009	772.32	103.01	1361.21	86.80
January-2010	731.70	103.66	1343.59	92.78
February-2010	731.22	108.32	1292.61	98.50
March-2010	1054.31	93.19	1555.51	83.95
April-2010	768.31	93.46	1239.37	83.70
May-2010	763.67	88.25	1333.76	78.87
June-2010	730.17	90.47	1309.85	78.59
July-2010	907.25	83.10	155.20	66.90
August-2010	721.09	87.46	1431.41	71.85
September-2010	849.95	81.39	1466.04	70.04
October-2010	781.91	74.11	1528.57	58.16
November-2010	795.28	86.06	1475.36	56.37
December-2010	721.25	96.25	1443.53	71.93
January-2011	680.06	96.86	1426.41	77.22
February-2011	678.24	101.49	1375.72	83.86
March-2011	1001.02	86.32	1639.18	70.31

spatially integrated and thereby price efficient. So farmers need to increase their production along with high quality to fetch high price. With the help of forecasting of arrivals and prices, farmers can predict the month fetching high price, so that they can plan accordingly to increase their production. Suitable storage technique has to be developed for storing the cocoons to fetch good price in the future.

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