



## Jaggery Price Behavior in Anakapalle Regulated Market: a Statistical Analysis

### KEYWORDS

Trend, Growth Rate, Jaggery, Coefficient of variation, Price, Returns, Arrivals

### Dr. S. Govinda Rao

Scientist (Statistics), Acharya NGR Agrl. University, Regional Agrl. Research Station, Anakapalle, Visakhapatnam, Andhra Pradesh, India.

### Dr. I.V.Y. Rama Rao

Scientist (Ag. Economics) (CCS) Acharya NGR Agrl. University, Regional Agrl. Research Station, Anakapalle, Visakhapatnam, Andhra Pradesh, India.

### H. Srinivasa Rao

Scientist (Ag. Economics) Acharya NGR Agrl. University Regional Agrl. Research Station, Anakapalle, Visakhapatnam, Andhra Pradesh, India.

### ABSTRACT

The present study was an attempted to identify the trends, estimating growth rates and examining the fluctuations of prices of jaggery in Anakapalle regulated market. Prices and arrivals data for 2000-01 to 2013-14 was collected. Trend analysis, Compound growth rates and Coefficient of variation were employed for achieving the objectives.

The results revealed that there was inverse relationship between prices and arrivals. Highest and lowest growth rate was noticed in January and October respectively similar trend was noticed in instability also. Change in mean price (108.6%) had higher effect on the total returns than the mean arrivals

### Introduction

The estimated total jaggery (including khandsari) production in India during 2012-13 is 88.1 Mt. In Andhra Pradesh, the major jaggery producing districts in Telangana, Coastal Andhra and Rayalaseema regions are Nizamabad, Visakhapatnam and Chittoor districts respectively. AP ranks sixth with 5.33 Mt of production and 6.05 per cent share in total production. Anakapalli regulated market located in Visakhapatnam district is the second largest jaggery market in India.

Jaggery processing is an important cottage industry in sugarcane growing regions of Andhra Pradesh. It is worth nearly 250 crores providing employment to three lakh people in the state. The jaggery manufacturers are mostly small and marginal farmers relying on quick returns from jaggery. During last thirty years the sugar cane supplied to sugar factories and that which is crushed for jaggery manufacturing has been fluctuating owing to price risk, marketing problems and lack of technology support. These lead to poor performance of sugarcane growers in recent years affecting the economic benefits of the rural poor. Naidu (1993) estimated that producers' share in consumers rupee is 80 to 93 per cent. Against this background, it is imperative to take up a comprehensive study on behaviour of jaggery prices with following objectives:

- 1) To identify trends in prices and arrivals
- 2) To estimate the growth rates for jaggery prices
- 3) To workout the extent of fluctuations in jaggery prices

### Materials and methods

Monthly prices (per quintal) and arrivals (Quintals) of jaggery in Anakapalle market for the period April'2000 to March' 2014 were collected from Anakapalle regulated market. Then following analytical tools were employed to achieve the objectives.

### 1. Estimation of Growth Rates:

Compound growth rates were estimated by fitting an exponential function of the following form.

$$Y = A \cdot b^t$$

$$\text{Log } Y = \text{Log } A + t \cdot \text{log } b$$

Where,

$$Y = \text{Prices (Rs)} \quad A = \text{Constant} \quad b = (1+r)$$

$$r = \text{Compound Growth Rate} \quad t = \text{Time variable in years} (1, 2, 3, \dots, n)$$

The value of antilog of 'b' was estimated by using LOGEST function in MS-Excel. Then, the percent Compound Growth Rate is calculated as below;

$$\text{CGR (\%)} = [\text{LOGEST}(Y_1; Y_{10}) - 1] \times 100$$

### 2. Measures of Instability:

Coefficient of Variation was used to measure the magnitude of instability in prices of jaggery.

$$\left[ \frac{1}{N-1} \sum (X_t - X)^2 \right]^{1/2}$$

$$\text{CV} = \frac{\text{Standard Deviation}}{\text{Mean}}$$

X

Where,

N = Number of years  $X_t$  = Prices (Rs) in the year 't'  
X = Mean of prices.

### 3. Decomposition of Change in average total returns

Change in average total returns between the periods arises from changes in mean prices and mean arrivals, inter-

action between changes in mean prices and mean arrivals and change in prices-arrivals covariance (Hazell, 1984).

The change in average total returns  $\Delta E (TR)$  between the periods 2000-01 to 2006-07 and 2007-08 to 2013-14 can be obtained as follows:

$$\Delta E (TR) = P_1 \cdot \Delta Q + Q_1 \cdot \Delta P + \Delta P \cdot \Delta Q + \Delta Cov (P,Q)$$

Where,

$P_1 \cdot \Delta Q$ ,  $Q_1 \cdot \Delta P$ ,  $\Delta P \cdot \Delta Q$  and  $\Delta Cov (P,Q)$  are Change in mean prices, Change in mean arrivals, Changes in mean prices & mean arrivals and Changes in price & arrivals covariance respectively

**Results and Discussion**

**I. Trends in prices and arrivals:**

It can be noticed from graph 1 that mean monthly prices of jaggery was highest during August (Rs.1774) and lowest in February (Rs.1512) with mean monthly prices for 2000-01 to 2013-14 was Rs.1659. Thus, prices among the months deviating Rs. 100 on the both sides of the mean.

Mean yearly prices of jaggery lowest (Rs. 864) and highest (Rs. 2681) during 2000-01 and 2012-13 respectively with mean monthly prices for 2000-01 to 2013-14 was Rs.1659 (Graph 2). Thus, mean yearly prices are highly fluctuating than the variation in the prices among the months.

It can be noticed from graph 3 that mean monthly arrivals of jaggery was highest during March (1,17,690 Qtl) and lowest in July (2,682 Qtl) with mean monthly arrivals for 2000-01 to 2013-14 was 48,148 quintals. Thus, arrivals among the months deviating highly on the both sides of the mean.

Mean yearly arrivals of jaggery was highest during 2004-05 (70,852 Qtl) and lowest point in 2002-03 (32,742 Qtl) with mean monthly arrivals for 2000-01 to 2013-14 was 48,148 quintals (Graph 4). Thus, arrivals increased from 2000-01 and reached zenith in 2004-05, then it is declining reached nadir during 2009-10 (33,105 Qtl) and again reached zenith in 2011-12 (68,163 Qtl) and declining afterwards.

**II. Growth rates and Extent of instability:**

It is clear from table 1, that growth and instability in prices are positively related. When growth rate was highest (11.52%) during January, instability (52.57%) was also highest, while growth rate was lowest (9.59%) during October, instability (42.31%) was also lowest. Thus, instabilized higher growth in January changed into stabilized lower growth in October month. That shows price of jaggery is highly fluctuating. Coming to the magnitude also both growth rates and instability were on higher side.

Growth and instability in arrivals are on higher side. Growth rate was highest (6.69%) during December, whereas, instability (122.59%) was highest in July. Growth rate was lowest (- 12.32%) during July, instability (20.90%) was lowest in February. Thus, instabilized lower growth was noticed in July changed into stabilized higher growth during December to February months. That shows arrivals of jaggery is highly fluctuating.

**III. Sources of instability:**

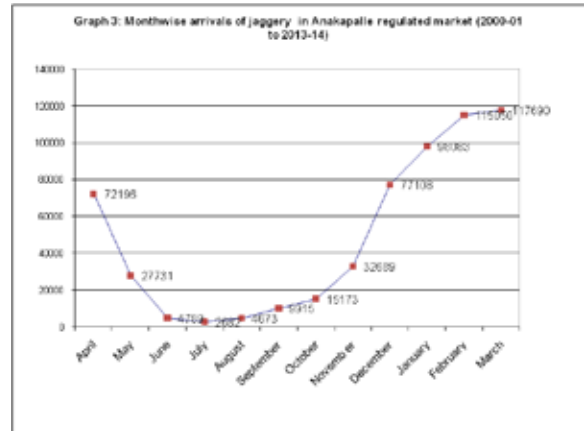
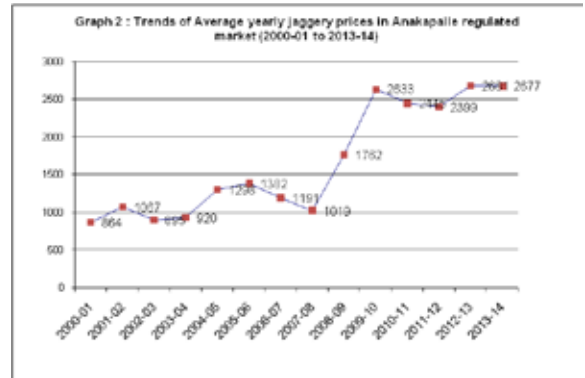
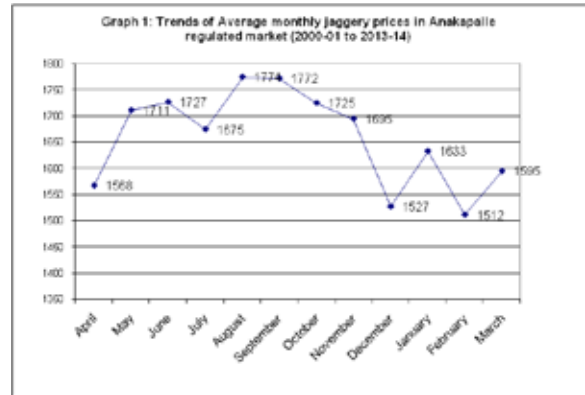
Sources of variation in the total returns of the jaggery in Anakapalle regulated market was estimated placed in the table 2. It is clear from table that change in mean to-

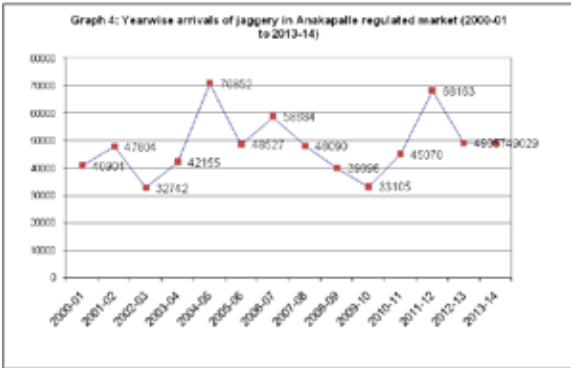
tal returns between 2000-01 to 2006-07 and 2007-08 to 2013-2014 was more influenced by the change in mean prices (108.6%) than any other sources of change. Further, change in mean arrival contributed negatively (-2.8%).

**Literature cited**

Naidu M R and Reddy T G 1981 A critical review of jaggery marketing at Anakapalle regulated market, A.P. Agricultural Marketing 24(3) : 15-17.

Sugar statistics (2014), Cooperative sugar, 45(7):4 0-42.





**Table 1: Month wise Growth rates and Instability of Jag-gery prices during (2000-01 to 2009-10)**

Months	Prices		Quantity	
	CGR	CV	CGR	CV
April	9.63	44.38	1.77	31.44
May	10.22	45.87	2.65	50.03
June	10.76	48.59	-3.30	63.01
July	9.79	43.49	-12.32	122.59
August	10.18	44.18	-9.68	70.71
September	10.56	46.82	-1.46	41.86
October	9.59	42.31	1.67	45.53
November	10.18	44.16	2.70	55.16
December	10.48	44.85	6.69	50.89
January	11.52	52.57	1.78	26.16
February	10.05	44.26	0.73	20.92
March	10.74	45.69	-1.19	21.44

**Table 2: Components of change in Total Returns in Jag-gery between 2000-01 to 2004-05 and 2005-6 to 2009-2010**

Sources of Change (%)			
Change in mean Arrivals	Change in mean Prices	Changes in mean Arrivals & mean prices	Changes in Arrivals & Prices covariance
( $\Delta Q$ )	( $\Delta P$ )	( $\Delta Q \cdot \Delta P$ )	( $\Delta Cov(Q,P)$ )
-2.8	108.6	-2.94	-2.83