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## Market based financial measures of sugar industry in India

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### Abstract

Worldwide sugar is being produced in over 100 countries for the past several years. Larger proportion of world sugar production is consumed domestically and internationally small proportion only traded. Due to the small trading proportion leads to changes in production and government policies. As only a small proportion of world sugar production is traded freely, sugar price is unstable in the global market. Government control over quantum distribution of free sale sugar in the open market in turn affected the price of the sugar and minimum support price for sugarcane. The study would help the decision makers of sugar companies to focus on the major activities that may improve the overall market performance. Forty sugar companies which are listed in the Bombay Stock Exchange were selected based on the extent of market capitalization and annual volume of sales. The data were collected from the PROWESS database Centre for Monitoring Indian Economy (CMIE), Mumbai for the period from 2007 to 2012. The data collected were consolidated and subjected to market structure, conduct and performance analysis (SCP) to draw meaningful inferences. In order to study the market structure and power of the sugar companies Herfindahl Hirschman index and Lerner index was used. The market structure of the companies in North and West zone was highly competitive and these companies had little control over pricing implying lesser market power.

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**Keywords:** Market structure, market conduct, market performance, lerner index and herfindahl – hirschman index

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### Introduction

Sugarcane as cash crop occupies the world's largest area. In 2011, sugarcane was cultivated in about 23.8 million hectares, in more than 90 countries, with a worldwide harvest of 1.69 billion tonnes. (FAO, 2011) Brazil is the largest producer of sugar cane in the world. The next five major producers in decreasing production are India, China, Thailand, Pakistan and Mexico. The world demand for sugar is the primary driver of sugarcane cultivation and cane accounts for 80% of sugar produced; most of the rest is made from sugar beets.

In India, sugarcane is one of the most important crops in the economy alongside tea, coffee and horticultural crops. Farm household and rural business income to a significant level depends on the injection of cash derived from the industry. Besides the socio-economic contribution, the industry also provides raw materials such as bagasse for power cogeneration and molasses for a wide range of industrial products including ethanol to other industries. The sugar companies are divergent in terms of usage of inventory level, utilization of resources, cane payment and production capacity leading to marked variations in profitability. Poor working capital management and weak capacity utilization among the sugar companies and variations in production technology resulted in overall fall in the technical efficiency. The internationally traded raw sugar and refined sugar are two different products. Raw sugar is produced only from sugarcane, whereas sugarbeets are directly processed into refined sugar. Beet sugar producing countries export refined sugar, while cane sugar producing countries export either raw or refined sugar. In recent years, the share of raw sugar in total sugar exports has been about 50%

#### (CATPS, 2012)

The sugar industry provides direct employment to nearly about 5 lakh people and about 7.5% of the rural population of India is directly or indirectly dependent on the sugar industry. The Indian sugar industry uses sugarcane for production of sugar and hence maximum number of the companies is likely to be found in the sugarcane growing states of India such as Uttar Pradesh, Maharashtra, Gujarat, Tamil Nadu, Karnataka, and Andhra Pradesh. The sugar industry's contribution to the Indian economy is presently enormous with its total turnover of over fifty five thousand crores or 12 billion US Dollars per year. (www.coopsugar.org). The country has indulged in the production of cane sugar rather than beet sugar as India's tropical weather conditions support sugarcane production. The consumption level of sugar in India has reached up to 18.5 million tons annually making India the largest consumer of sugar in the world. This demand and consumption level is still showing a rising trend. The sugar industry is controlled by the government and the prices fluctuate according to the government releases of sugar. (www.sugarindia.com).

There were totally 527 sugar companies operating in India during 2011-12. Nearly 50% of the sugar companies are co-operative followed by private sector and public sector companies. Cooperative sugar companies accounts for around 41% of the total production to the sugar industry followed by the private companies. The number of working days per factory was higher in Private sector companies and lowest in the government sector and also the private sugar companies have expanded their installed capacity (IC) much faster than the companies in other two sectors. After relicensing of the industry private entrepreneurs got incentives to expand their

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plant sizes. The number of sugar companies was found to be highest in Maharashtra followed by Uttar Pradesh, Karnataka and Tamil Nadu.

The sugar economy in India, like many other countries, is highly regulated, starting from sugarcane to the end product sugar ([www.agritrade.iift.ac.in](http://www.agritrade.iift.ac.in)). Indian sugar industry has been facing raw material, technology and financial resource as well as infrastructural problems. Most of sugar units in India utilize production capacity below 50%. They lack in inventory management, capacity utilization, adequacy of raw material, technology and the poor financial management practices. Mounting losses and decreasing net worth of sugar factories have been responsible for sickness of sugar industry. Financial sickness in sugar industry has reached to an alarming proportion. Low cash inflow due to piling stocks leads to serious financial crisis and finally to closure of sugar companies and also cane farmers have always grappled with issues like getting their cane fields surveyed, selling their produce to sugar companies, correct and timely measurement of cane, prompt payment etc. There was lack of transparency at each level and illiterate farmers faced many disadvantages. Companies also suffered at times, as due to these hassles many farmers had stopped cane cultivation or used to sell it to the local jaggery or 'khandsari' units leading to shortage of cane for sugar companies. The current study, therefore attempts to assess the market structure, Conduct and performance of the sugar companies located in the South zones of the country.

### **Objectives**

The overall objective of the study is to analyze the market structure and performance of the sugar companies in India.

### **Methodology**

Market based financial measures reflects the firms financial performance more accurately than accounting based measures. Seth (1990) suggested that market based measures are intrinsically different from accounting based financial measures because market based measures focus on the present value of future streams of income, where as accounting based measures focus on the past performance. Market based financial measures are more appropriate because they reflect the consensus of the market overall estimates of the firms' potential to create shareholder value. Furthermore, market measures are thought to be immune to the distortions introduced by the deceptive managerial practices and accounting conventions, under the assumptions that efficient markets can see through such distortions. Market based measures is calculated through Market structure, conduct and performance method.

Structure refers to market structure defined mainly by the concentration of market shares in the market. Conduct refers to behavior of firms - competitive or collusive. Performance mainly defined by extent of market power. The market structure should be first measured by defining

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its concentration. It can be calculated by Herfindahl – Hirschman index. The market structure of the sugar companies could be calculated in zone wise of India

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**Firm Concentration Ratio** is the cumulative share of the 10 largest firms in the market. It can be calculated by the following formula.

$$C = w_1 + w_2 + \dots + w_{10} \quad (w_1, w_2, \dots, w_{10} - \text{market share of the largest sugar companies})$$

**Herfindahl – Hirschman Index** - The Herfindahl Hirschman Index (HHI) is a measurement used to understand the level of competition that exists within a market or industry, as well as give an indication of how the distribution of market share occurs across the companies included in the index. Understanding the level of market competition can be important for strategic planning as well as when trying to establish pricing for a company's products or services. HHI will be calculated by summing the squared market shares of all the firms.

$$HHI = S1^2 + S2^2 + \dots + Sn^2$$

The HHI can have a theoretical value ranging from close to zero to 10,000. If there is a single market participant means market share the HHI would be 10,000. If there were a great number of market participants means, market share of HHI could be close to zero.

If the HHI value is less than 100 results highly competitive market.

If the HHI value is between 100 and 1000, the market is said to be not concentrated.

If the HHI value is between 1000 and 1800 results moderately concentrated market.

If the HHI value is above 1800, the market is said to be highly concentrated.

### Lerner Index

It was developed by an American economist Abba Lerner in 1934. It is a tool used in economic research and analysis and helps to measure the market power of an individual business or company. The value of Lerner index ranges between 0 and 1. Companies with a high degree of market power are often considered a monopoly. A pure monopoly firm that controlled the entire market for a product would receive a value of 1. A firm that operated within a purely competitive market would have a value closer to 0 and had little control over pricing. It's often used in conjunction with the Herfindahl-Hirschman index, which measures market concentration. By combining these two theories, economists are able to take advantage of the strengths of each one to gain the best possible understanding about how much any single firm controls the market. It is the ratio of profit to revenue. Lerner index can be calculated by two methods.

$$L = (\text{Price} - \text{Marginal cost}) / \text{Price}$$

$$L = \text{Profit of the firm } i / \text{Revenue of the firm } i$$

Relationship between Herfindahl – Hirschman index and Lerner index is calculated by using the following formula (Newbery, 2008)

$$\text{Price elasticity of market demand} = H/L$$

If market demand is very elastic, changes in concentration won't have very large effects on pricing. If demand is very inelastic, changes in concentration can have big effects.

### Sample size

Fifty eight sugar companies whose shares are traded in the Bombay Stock exchange (BSE) as on 2013 were considered for the conduct of the study. Among the 58 sugar companies, 40 actively traded sugar companies from zone wise were selected. Six year period from 2007 to 2012 was

considered for evaluating the SCP of sugar companies in India. The entire study profoundly relied on the secondary data from the published and unpublished reports of the Sugar companies. The secondary data such as liabilities and assets, income and expenditure, shareholders fund, valuation of shares, raw material details, and product details were collected from Centre for Monitoring Indian Economy (CMIE), PROWESS database, Mumbai. These data were consolidated for the purpose of analysis.

### Results and Discussion

The Structure Conduct Performance Approach (SCP) was formulated by an economist Mason (1949) together with his colleague Basin (1959). According to them, there was a direct and powerful relationship between market structure in an industry (market structure), business activities and behavior of market creators (market conduct), and the industry's performance (market performance). The sugar price will be announced by government based on the cost of production of sugarcane, sugar producers sell price and recovery rate. The sugar price will increase in the open market due to demand, quantity decided by the government in distribution system. If there is any change in the financial condition and production level of sugar among the large producers, the market structure and the market power will be affected. It can be analyzed through the structure conduct and performance analysis. Market structure and market power of the sugar companies in zone wise were calculated and the results are given in Table 1.

Table 1 showed the Herfindahl – Hirschman index and Lerner index of largest market share of the sugar companies. For the North zone of sugar market structure, the HHI value was found to be 26.76 which indicated that the market was highly competitive. From the lerner index, the market power of the North zone sugar companies was found to be 0.372 which indicated the less control over pricing because of number sugar companies were high.

For the East zone of sugar market structure, the HHI was found to be 356.41 which indicated that East zone market structure was concentrated and the Lerner index was found to be 0.514 which indicated these companies had less control over pricing implying less market power.

Sugar companies      Market share      HHI      Profit of the company (A)  
(B)      Lerner Index (A/B)      Revenue of the company

Sugar companies	Market share	HHI	Profit of the company (A)	Revenue of the company (B)	Lerner Index (A/B)
North zone					
Dhampur	3.70	13.69	2751.4	24171.5	0.113
Mawana	2.70	7.29	1202.2	19327.4	0.062
Dwarikesh	1.70	2.89	748.7	6180.1	0.121
Rana	1.70	2.89	604.5	7997.6	0.075
Total		26.76		Total	0.372
East zone					
Bajaj Hindusthan	17.2	295.84	9898.9	52034.9	0.190
Balrampur	6.40	40.96	2751.4	24171.5	0.113
Triveni	4.00	16.00	1395.3	19406.3	0.072
Simbhaoli	1.90	3.61	1953.7	14065.9	0.138
Total		356.41		Total	0.514
West zone					
Renuka	7.80	60.84	7399.7	64693	0.114
Oudh	2.30	5.29	952.2	10647	0.089
Parry	1.70	2.89	610.8	4845.1	0.126
Ugar	1.00	1.00	915.5	8164.2	0.112
Total		70.02		Total	0.442
South zone					
Sakthi	4.20	17.64	1385.3	11258.6	0.123
EID	3.30	10.89	2881.2	17619	0.163
Bannari amman	2.90	8.41	2311.9	12150.2	0.190
Dalmia	2.40	5.76	879.6	6943	0.126
Total		42.70		Total	0.599

Market based financial measures of sugar industry in india For West zone the market structure, HHI value was found to be 70.02 which indicated that the market was highly competitive. The lerner index of companies from West zone was 0.442 which indicated that these companies had little control over pricing implying less market power because of the presence of large number sugar companies in this area.

S.No Zone HHI Lerner Index H/L

1	North	26.76	0.372	71.94
2	East	356.41	0.514	693.40
3	West	70.02	0.442	158.42
4	South	42.70	0.599	71.29

For the South zone of sugar market structure, the HHI value was found to be 42.70 which indicated that the South market was highly competitive. South zone companies lerner index was 0.599 which reflected the oligopoly nature. The market power of the south zone showed better control over pricing.

Similar results were obtained by Muslim et.al (2008). They studied the SCP paradigm analysis of palm oil cooking prices in Indonesia and found that market structure of palm cooking oil industry in Indonesia is nearer to oligopoly in nature. There was a collusive behavior among some big companies in order to decide the price of palm cooking oil as a consequence of oligopoly market structure that can be identified by its performance with lerner index value of greater than zero. The relationship between the HHI index and Lerner index was analyzed and given in Table 2.

Table 2. Relationship between Herfindahl – Hirschman index and Lerner index optimum varietal mix to ensure higher sugar recovery. Large scale improvement in sugarcane crop yield with better sugar recoveries will be a right step to improve productivity of the sugar companies.

The profitability of the sugar companies could be improved by increasing sales by doing such things as improving marketing, introducing a new product etc., or decreasing cost of goods sold by doing such things as using cheaper suppliers, producing/ordering stock from offshore etc., or decreasing expenses by doing such things as improving efficiency Expansion of sugar companies operations (eg. cane crushed per day) and investment in new projects, diversification could be improved which will improve the shareholder value and also the share price value., lowering overtime rates, using assets over extended periods etc.

There was a little control over the pricing among the major sugar producing companies' shows the greater market power. The government has to extend the levy quota of the sugar companies in order to control the sugar supply in open market.

From the Table 2 it could be concluded that the price elasticity was calculated using HHI index and Lerner index. The results showed that the price elasticity of the all the zones were greater than one and it was very elastic in nature and hence changes in concentration would not have very large effects on pricing.

### Conclusion

To improve the productivity among the sugar companies, strategies could be implemented to focuses considerably on planning and management of cane development initiatives. These initiatives aim at increasing the intensity of the cane, enhancing the sugarcane yield and ensuring Applied Financial Economics 13: 565–571.

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