

Research Paper

Growth & Instability of International Trade of Sugar in India

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ABSTRACT

India is the largest producer of sugar in the world. But, international trade doesn't show such a scene. Hence, the study was undertaken on India's international trade of sugar. The study is based on secondary data for a period of 20 years (1999-2018). To assess the periodic increase or decrease in international trade of sugar, the period was further divided into two sub-periods, and the exponential growth function was used to compute the growth trends and, further, Coppock's Instability Index (CII) was used to know the instability in the sugar trade. The results of the growth rate showed a negative trend in sugar export and a declining trend in sugar import while the sugar production exhibited an increasing trend in the overall period as well as in all the sub-periods under investigation. International trade of sugar was observed instable during the study period.

HIGHLIGHTS

- ❶ Negative trend in sugar export and a declining trend in sugar import was observed during the investigation
- ❷ The sugar production exhibited an increasing trend in the overall period as well as in all the sub-periods.
- ❸ International trade of sugar was observed unstable during the study period

Keywords: International trade, Exponential growth rate, Instability, Coppock's instability index

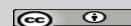
Sugar is produced mainly from sugarcane and sugar-beet. At present, there are about 110 countries that produce sugar either from sugarcane or sugar beet. On the other hand, eight countries produce sugar from both sugarcane and sugar beet. However, the primary source of sugar in India and at global level is sugarcane. On average, 80 percent of sugar is produced from sugarcane across the world. The top ten sugar-producing countries are India (355,905 million metric tonnes), Brazil (29,500 million metric tonnes), the European Union (17,731 million metric tonnes), Thailand (14,581 million metric tonnes), China (10,760 million metric tonnes), United States of America (8,159 million metric tonnes), Mexico (6,812 million metric tonnes), Russia (6,080 million metric tonnes) and Pakistan (5,540 million metric tonnes) (International Sugar Organization, 2018-19), collectively they account for 70 percent of the

total global production. After a long interval of 16 years, for the first time in 2018-19, India has left behind Brazil and stood at first position contributing approximately 19 percent of world's total sugar production. The leading sugar-producing states of India are Uttar Pradesh (35.65 percent), Maharashtra (33.33 percent), and Karnataka (13.36 percent) (Indian sugar, 2018-19). These three states account for approximately 82 percent of the country's total sugar production.

The world sugar consumption increased from 123.45 million metric tonnes in 2001-02 to 172.44 million tonnes in 2018-19 with an average annual growth

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rate of 2.01 percent. India is the largest consumer of sugar with 27,500 million metric tonnes, followed by the European Union (18,600 million metric tonnes), China (15,800 million metric tonnes), United States (10,982 million metric tonnes), Brazil (10,600 million metric tonnes), Russian Federation (6,115 million metric tonnes), Pakistan (5,600 million metric tonnes), Mexico (4,317 million metric tonnes) and Thailand (2,550 million metric tonnes) (International Sugar Organization, 2018-19).

The internationally traded sugar volume decreased to 61.78 million metric tonnes in 2018-19 from 65.75 million tonnes in 2017 (International Sugar Organisation, 2018-19). The leading sugar importing countries are China (4.25 million metric tonnes), Indonesia (4.12 million metric tonnes), USA (2.82 million metric tonnes), Bangladesh (2.17 million metric tonnes), Algeria (1.89 million metric tonnes), and Malaysia (1.78 million metric tonnes). Brazil is the leading exporter of sugar with 17.89 million metric tonnes of sugar exported, followed by Thailand (10.41 million metric tonnes) and India (4.02 million metric tonnes). India imported 1.49 million tons of sugar in 2018-19 (International Sugar Organisation, 2018-19).

It is said that India being the largest producer of sugar globally, fails to acquire the position in international trade. But, no such evidence through research has been found regarding it. Hence, to know the position of India in the international market, the study was carried out with the objective of growth and instability of sugar in international trade.

METHODOLOGY

The study is based on time series secondary data pertaining to production and export of sugar and collected from the official website of FAO-STAT for the period from 1998-99 to 2017-18. For analysis, the overall period was divided into two sub-periods-Period I (1998-99 to 2007-08) and Period II (2008-09 to 2017-18).

Compound annual growth rate (CAGR)

The growth trends in export, import, production, and unit price of Indian sugar were estimated by using the formula.

$$Y_t = AB^t \quad \dots(i)$$

Where,

Y_t = Quantity of export & import/Value of export and import/Production/unit price for the year 't.'

A = Constant

B = Growth coefficient

After transformation, the equation is of the following form:

$$\text{Log } Y_t = \text{Log } A + t \text{ Log } (B) \quad \dots(ii)$$

$$\text{Compound Annual Growth Rate (CAGR)} = \{\text{antilog } (b)-1\} * 100 \quad \dots(iii)$$

Where, $b = \log (B)$

Significance of regression coefficient was examined using the student's 't' test.

Instability in production, international trade and unit price of Indian sugar

The degree of instability was worked out by coefficient of variation (CV) and Coppock's instability index (CII).

Coppock's instability index (CII) was calculated by the formula:

$$\text{C.I.I} = [\text{Antilog } (\sqrt{V \log}) - 1] \times 100$$

Where,

$$V \log = \frac{\sum \left[\left(\frac{X_t}{X_{t-1}} \right) - m \right]^2}{N - 1}$$

Here, X_t = Production/export quantity/value and Unit price of sugar in the Year 't'

N = Number of Years

M = Arithmetic mean of the difference between the log of X_t , X_{t-1} and X_{t-2}

$V \log$ = logarithmic variance of the series

RESULTS AND DISCUSSION

Growth in Production and Export of Sugar

The growth rate of production of a crop, indicates as to how the production of a crop has increased or decreased over time. It shows the change in production of the crop over time and makes it

possible to make predictions about the production of the crop shortly. Similarly, growth in the export of sugar indicates changes in the export of sugar over time. To work out the growth rates of production and international trade of sugar, exponential function was applied, and accordingly, the results obtained are presented in Table 1.

Table 1: Growth rates of production and export of Indian sugar (1999-2018)

Particulars	CGR (%)	t-value
Production		
Period I	1.45	0.48
Period II	2.23	1.38
Overall Period	2.74**	3.33
Export Quantity		
Period I	43.26*	2.45
Period II	-2.65	-0.18
Overall Period	7.59	1.32
Export Value		
Period I	46.66*	2.77
Period II	-6.12	-0.42
Overall Period	12.09	2.07
Unit Price		
Period I	2.38	1.09
Period II	-3.57	-1.77
Overall Period	4.19**	4.05

Note: *- denotes significant at 5%, **- denotes significant at 1%.

A perusal of the table indicated that the production of sugar increased at the rate of 2.74 percent per annum during the overall period, which was statistically significant at a 1 percent level of probability. Growth of sugar production was found to be positive in the two sub-periods i.e. Period I and Period II, but was non-significant. The table gave a clear signal that the sugar production consistently increased overtime during the period under study. The probable reason for this positive growth in sugar production may be due to the weakening of gur prices during the year 2009-10 that lowered the diversion of cane for the production of alternative sweeteners (Khandsari and Gur). (India's Sugar Industry: Analyzing Domestic Demand and Recent Trends, 2010-11).

From the table 1, it may be observed that the quantum of sugar exported increased at a moderate rate of 7.59 per cent per annum in the overall period,

which was statistically insignificant. On the other hand, the quantity of sugar exported during period II showed a declining trend. It decreased at the rate of 2.65 percent per annum, which was statistically non-significant. However, during period I, the quantity of sugar exported increased at the rate of 43.26 percent per annum, which was statistically significant at a 5 percent level of probability. The increased positive sugar export during the period I may be due to the Government allowance for export of sugar with export incentives sustained after the year 2010-11 that led to the discouragement of the export after that. (India's Sugar Industry: Analysing Domestic Demand and Recent Trends, 2010-11).

The monetary value of exported sugar during period I, Period II, and Overall period -exhibited almost a similar trend to that of export quantity. The value of exported sugar had a positive but insignificant rate of 12.09 percent per annum during the overall period. However, it showed a negative but insignificant growth of 6.12 percent per annum during period II. In contrast, the value of exported sugar increased significantly during the period I. The value grew at the rate of 46.66 percent per annum, which was statistically significant at 5 percent level of probability. It may be because during the period I of sugar was exported, which resulted in lower export value.

The table further revealed that the unit price of sugar increased at the rate of 4.19 percent per annum during the overall period, which was statistically significant at a 1 percent level of probability. It increased at a positive but statistically insignificant growth rate of 2.38 percent per annum during the period I. In contrast, it registered a negative growth rate of 3.57 percent per annum during period II, which was statistically insignificant. Significant positive growth during the overall period may be due to the optimum production by mills and accordingly export of the sugar, while the unit price declined in period II due to the overproduction of sugar, which led to the dumping of sugar in international market.

Growth rates of Import of Sugar

Over and above, sometimes, laws related to international trade compel a country to import. Sometimes, when the supply of sugar in the country

is not sufficient to meet the domestic requirements of sugar, the country has to resort to sugar import. The growth in import of sugar for period I, period II, and overall period was computed, and the results have been placed in Table 2.

Table 2: Growth rates of Import of Sugar in India

Particulars	CGR (%)	t-value
Import Quantity		
Period I	29.38	1.42
Period II	16.89	1.47
Overall Period	19.13**	3.51
Import Value		
Period I	38.13	1.65
Period II	11.86	1.15
Overall Period	24.56**	4.16
Unit Price		
Period I	6.76*	2.71
Period II	-4.31*	-2.42
Overall Period	4.56**	4.19

It is evident from the table that the quantum of imported sugar increased at the rate of 19.13 percent per annum during the overall period, which was significant at 1 percent level of probability. It was mainly because during this period Government of India relaxed import restrictions for some time to augment the domestic supply of sugar in the face of increasing domestic demand for sugar. And with the sugar prices easing, there was increasing pressure from local industry to re-impose the import duties so it reverted to the old import policy regime. Hence, it might be the reason that the import of sugar showed positive figures in period II (16.89 percent per annum) and period I (29.38 percent per annum); nevertheless, it was not significant.

The value of imported sugar exhibited an almost similar drift to the value of imported sugar in monetary terms. The registered growth for the period I, period II, and overall period were 38.13, 11.86, and 24.56 percent per annum, respectively. Where the overall period was significant at 1 percent level of probability.

The table revealed that the unit price of sugar imports increased at a significantly rate of 4.56 percent per annum during the overall period. However, the price of imported sugar declined at a significant rate of 4.31 percent per annum during

period II. In contrast, the price of imported sugar significantly increased by 6.76 per cent per annum during period I. It might be due to the devaluation of the Indian rupee and the increased import duty to 27.5 percent during the study period. The negative decline of the unit price of imported sugar during period II might be due to the devaluation of the Indian rupee during that period and the increased import duty to 27.5 percent in the same period.

Instability in Production and International trade of sugar

An attempt was made to study the instability in the production and international trade of Indian sugar. To assess the degree of volatility in the production and international trade of sugar, along with the coefficient of variation (CV%), Coppock's Instability Index (CII) was also used. The findings of instability analysis in sugar export are presented in Table 3 and sugar import in Table 4.

Table 3: Instability index of production and export of Sugar from India

Particulars	CV (%)	CII
Production		
Period I	26.81	13.59
Period II	14.99	12.39
Overall Period	24.32	13.04
Export Quantity		
Period I	139.93	56.86
Period II	96.21	41.69
Overall Period	116.60	48.05
Export Value		
Period I	137.36	52.94
Period II	103.45	43.89
Overall Period	118.22	51.40
Unit Price		
Period I	20.43	12.16
Period II	20.54	12.46
Overall Period	35.12	12.62

The table revealed that during the overall period, the quantum of exported sugar registered a high instability of 116.60 and 48.05 percent of CV and CII, respectively. The reason behind this high instability may be due to fluctuations in the exported quantity of sugar due to the frequent change in policies made by the government during the period. The CV and

CII showed an almost similar trend in the period I and period II.

The monetary value of exported sugar exhibited high instability score of CV and CII in the overall period, period I, and period II as in the case of quantum if exported sugar.

On the other hand, instability indices of production of sugar in the overall period, period I and period II were relatively low, which indicated that there was not much variation in production of sugar, and it remained relatively stable during all the periods under consideration. Even the instability score in production was low. Still, whatever instability showed by sugar production might be due to the higher dependence and sensitivity of production cyclical movement of the sugar economy in the country.

The lower value of instability indices of the unit price of sugar in all the periods under consideration also indicated that there was not much variation in the price of sugar in all the periods under consideration. The unit international prices of sugar were kept fixed over the period, and only for some period were below the floor price, which might have created the variation in the unit price of sugar exported.

Yogi *et al.* (2015), Chand and Raju (2009) used the instability index for assessing the extent of instability in Indian sugar production and came out with similar outcomes.

Table 4: Instability index of Sugar import in India

Particulars	CV(%)	CII
Import Quantity		
Period I	82.61	96.91
Period II	51.36	30.46
Overall Period	81.33	61.89
Import Value		
Period I	115.62	115.53
Period II	51.71	32.22
Overall Period	91.70	66.86
Unit Price		
Period I	47.61	12.88
Period II	14.37	11.31
Overall Period	42.14	12.23

The table exhibited that the quantum of sugar and monetary value of sugar imported reported

a high instability score during the period under consideration. The insufficiency of domestic production and increasing demand made the Government of India to impose zero duty on the import of sugar, which led to a sudden increase in the import of sugar; this might be the reason for higher instability in the import of sugar in India.

The unit price of sugar imported registered a lower instability score than that of import quantity and value showing less variation and stability in the prices of imported sugar. But, the obtained instability score may be due to the devaluation of the Indian currency during the period under consideration.

CONCLUSION

The study had clearly shown that the growth of sugar production had a positive growth, but the export had a negative trend. At the same time, the import of sugar had positive growth. The production, export quantity, and value had high fluctuations. Similarly, the import of sugar in all terms was highly unstable. Whereas the unit price of export found to be stable during the study period. There is a need to increase the production of sugar by encouraging policies and subsidies to sugar millers. Technology plays a vital role in the subsidization of factor inputs to have a more competitive and cost-effective production of sugar in India. Sugar producers should be encouraged for efficient use of resources in sugar production.

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