Asian Resonance

Trade Performance of Indian Sugar

S. N. Amoolya
Student,
Dept. of Agricultural Economics
and Statistics,
College of Agriculture,
Nagpur, Maharashtra, India

Abstract

Sugar is one of the most important commodity produced and consumed around the world. The secondary time series data for the last 20 years i.e. (1997-2017) regarding export and import were collected from various websites were IndiaAgristat, FAO STAT and ISMA. The entire 20 years was equally divided into two periods i.e. period I (1997-2007) and period II (2007-2017). The following specific objective was considered to accomplish the study: Growth and instability in export and import of Indian sugar, export competitiveness of sugar in India and factors influencing sugar export from India. The study indicates that the export of sugar has shown a positive and significant growth for the entire study period.The import of sugar has shown a positive and significant only for import quantity of period II (69.97 per cent per year). The CGR of import quantity and value for period I (-27.93 per cent per annum and -24.52 per cent per annum) was negative and non-significant. High instability was found in import than in export of sugar during the whole study period. The NPC value of sugar was found greater than unity (1.14) indicates that the sugar is protected and effective incentives were given to producers, which shows sugar is not competitive. Sugar export was observed to be affected by two factors i.e. export price and exchange rate.

Keywords: Growth Rate, Instability, Competitiveness.

Introduction

Sugar is derived mainly from sugarcane and sugar beet. The simple, irrefutable fact is this: Sugar is an important part of a diet. Sweetness is one of the five "basic tastes" detected by sensory receptors in the oral cavity. Sugar is produced in over 130 countries worldwide but over 80 per cent of world sugar production is consumed domestically and the remaining is traded in the world. Since only a small proportion of world production is traded freely, sugar prices have been volatile in the world market. India is the second largest producer of sugar in the world also largest consumer of sugar. (Source: ISMA-Indian Sugar Mills Association, New Delhi). Sugarcane in India is processed in to sugar, jaggery and khandsari. The method of manufacturing this value added consumable products are different. Around 80 per cent of sugar is derived from sugar cane and is largely grown in tropical countries. The remaining 20 per cent comes from sugar beet grown mainly in the temperate zones in the North. In general, the costs of producing sugar from sugar cane are lower than that for sugar beet. A single ton of sugarcane produces 100 kg of sugar, 110 litres of ethanol and 100 kilowatt hour of electricity.

Review of Literature

Sugar export is heavily concentrated in a handful of countries with Brazil dominating the group. Other leading sugar exporters are Thailand, Australia and Mexico. World consumption of sugar was 1.21 MT. World production showed an 170.80 MT. (Source: FAO- Food and Agricultural Organization). India has been known as the original home of sugar. India is the second largest producer of sugar in the world (3484.48 thousand tonnes) after Brazil (7686.78 thousand tonnes) in 2016-17 (Source: Food and Agriculture Organization (FAO)). Maharashtra and Uttar Pradesh account for almost 45.79 per cent of the total sugar produced in India. Uttar Pradesh is the highest sugarcane producing state in India having growing area about 216 thousand hectares with the production of 1401.69 lakh tonnes whereas Maharashtra is the first largest sugarcane growing area state covering about 6.33 lakh hectares with production 522.62 lakh tonnes India has exported 25.44 lakh tonnes of sugar in the year 2016-17 but import 21.46 lakh tonnes of sugar in 2016-17 (Source: National federation of cooperative sugar factories (NFCSF)). India having 49.27 lakh hectare area and 3060.69 lakh tonnes sugar production in 2016-17.India is having 18 per cent share in world production (Source: https://www.indiaagristat.com).

N.V. Shende
Professor,
Dept. of Agricultural Economics
and Statistics,
College of Agriculture,
Nagpur, Maharashtra, India

Asian Resonance

Objectives of the Study

1. To estimate the growth and instability in export and import of Indian sugar.
2. To study the export competitiveness of sugar in India.
3. To assess the factors influencing sugar export from India.

Methodology

The nature of the present study is mainly based on secondary data. In order to attain the objectives of the study, relevant secondary data for a period of 20 years, i.e., from 1997-98 to 2016-17 have been taken for analysis. The relevant data have been analyzed by using the Compound Growth Rate (CGR) and Instability of export and import of sugar, NPC and Cob-Douglas was to make an in depth analysis.

Compound growth rate

The growth rate will be estimated using following model

$$Y = a.b^t$$ .... (1)

Where,

Y = Depended variable for which growth rate is to be estimated (i.e. Quantity exported / export value / import quantity/import Value)

a = Intercept

b = Regression Coefficient

t = Time Variable

This equation will be estimated after transforming (1) as follows,

$$Log\ y = log\ a + t\ Log\ b$$ .... (2)

Then the percent compound growth rate (g) will be computed using the relationship.

CGR (g) = (antilog (log b) – 1) × 100 .... (3)

The significance of the regression coefficient was tested using the student't' test.

b. Instability analysis

In order to study the variability in the export of sugar Coefficient of Variation (CV) was used

$$CV\ (\%) = \frac{standard\ deviation}{mean} \times 100$$

Export Competitiveness of sugar

The competitiveness of sugar in India was measured by Nominal Protection Coefficient (NPC). It is calculated as the ratio between the domestic prices to the international prices of a comparable grade of commodity. A decision criterion is if NPC is less than one, than the commodity is competitive that is worth exporting the commodity. If NPC is greater than one, the commodity is not competitive that is not worth exporting.

It was estimated by using following formula

Symbolically,

NPC = $\frac{P_d}{P_r}$

Where,

NPC = Nominal Protection coefficient.

P_d = Domestic prices of the sugar.

P_r = World reference price of sugar.

Factors influencing the export of sugar

For estimating the factors influencing export of sugar from India, the Cob-Douglas type of production function was used. The quantity export was considered as a dependant variable.

$$Y = aX_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6}$$

Where,

Y = India's export (T)

X_1 = Export price (Rs. /Kg)

X_2 = India's share in world production (%)

X_3 = Total world import (T)

X_4 = Ratio of domestic consumption to production

X_5 = Exchange rate (Rs. /US dollar)

X_6 = Ratio of domestic price to world export price

a = Intercept

b_1 to b_6 = Regression coefficient of the concerned independent variables.

Results and Discussion

Growth rates for export of sugar

The exponential growth function was used for estimation of compound growth rates in export quantity and export value.

The export performance of sugar from India with respect to export quantity and export value of sugar was evaluated by the total study period (1997-98 to 2016-17) of twenty year. It was divided into three periods namely, period I (1997-98 to 2006-07), period II (2007-08 to 2016-17) and overall period (1997-98 to 2016-17) and the results are presented in the table 1.

Table 1 Compound growth rates of sugar export

Particulars	CGR	SE	t-value
Export Quantity			
Period I (1997-98 to 2006-07)	42.02	0.70	1.95
Period II (2007-08 to 2016-17)	3.00	0.39	0.29
Overall Period (1997-98 to 2016-17)	22.79**	0.58	3.95
Export Value			
Period I (1997-98 to 2006-07)	44.99*	0.67	2.17
Period II (2007-08 to 2016-17)	-4.98	0.53	-0.38
Overall Period (1997-98 to 2016-17)	16.72*	0.64	2.72

Note: * = significant at 5 per cent level.

** = significant at 1 per cent level.

Table 1 revealed that, during the period I, the compound growth rate for sugar export in terms of quantity and value were 42.02 and 44.99 per cent per annum respectively and found statistically significant at five per cent level. In the period II, the export quantity were 3.00 per cent per annum and export value was negative and statistically non-significant i.e. -4.98 per cent per annum.The overall 20 years compound growth rate of export quantity of sugar in

Asian Resonance

India was highly significant at 22.79per cent per annum at one per cent level and export value of sugar in India and was at 16.72 per cent per annum respectively and significant at five per cent level.The export of sugar has shown a positive and significant growth for the entire study period for export quantity and value expect period II of export value has shown negative growth and it is statistically non-significant.

Growth rates for import of sugar

Table 2: Compound growth rates of sugar import

Particulars	CGR	SE	t-value
Import Quantity			
Period I (1997-98 to 2006-07)	-27.93	0.93	-1.39
Period II (2007-08 to 2016-17)	69.97*	0.94	2.22
Overall Period (1997-98 to 2016-17)	13.99	1.04	1.40
Import Value			
Period I (1997-98 to 2006-07)	-24.52	0.85	-1.31
Period II (2007-08 to 2016-17)	30.76	0.88	1.19
Overall Period (1997-98 to 2016-17)	10.17	0.9	1.19

Note: * = significant at 5 per cent level.

Table 2 revealed that, during the period I, sugar import in term of quantity and value has non-significant growth rate i.e. -27.93 and -24.52 per cent per annum respectively. On the other hand, in the period II, sugars in term of import quantity were statistically significant at the rate of 69.97 per cent per annum at five per cent level and for value 30.76 per cent per annum.However, the overall 20 years compound growth rate of sugar import in India was 13.99 and 10.17 per cent per annumfor quantity and value term respectively. The import of sugar has shown a positive and significant for period II of import quantity at five per cent level. The compound growth rate of period I for import quantity has shown negative growth and it is statistically non-significant. Also, the compound growth rate of period I for import value is negative and statistically non-significant.

Degree of instability in export of sugar

The coefficient of the variation function used for estimation of degree of Instability in export quantity and export value

In order to study the degree of instability of sugar from India with respect to export quantity and export value of sugar was evaluated by the total study period (1997-98 to 2016-17) was divided into three periods namely, period I (1997-98 to 2006-07), period II (2007-08 to 2016-17) and overall period (1997-98 to 2016-17) and the results are presented in the table 3.

Table 3 Instability index forexport quantity and export value of Indian sugar

	Particular	
	Export Quantity	**Export Value**
Period I (1997-98 to 2006-07)		
Mean	703551.60	940.06
SD	722973.10	1055.36
CV	102.76	112.27
Period II (2007-08 to 2016-17)		
Mean	2692965.00	2505.92
SD	1305037.00	1975.46
CV	48.46	78.83
Overall Period (1997-98 to 2016-17)		
Mean	1698258.30	1722.99
SD	1447704.72	1738.21
CV	85.25	100.88

Note: SD- Standard Deviation and CV- Coefficient of Variation

Table 3 revealed that the export quantity of sugar exhibited highest variation of 102.76 per cent in period I and less variation of 48.46 per cent in period II and the overall period with co-efficient of variation at 85.25 per cent. As regard the export value of sugar it was found to be high in the first period of 112.27 per cent and low in the second period of 78.83 per cent, on the whole it was 100.88 per cent. The result showed that the coefficient of variation was found to be less in case of export quantity compare to export value.

Degree of instability in import of sugar

Table 4 Instability index forimport quantity and import value of Indian sugar

	Particular	
	Import Quantity	**Import Value**
Period I (1997-98 to 2006-07)		
Mean	409397.10	448.29
SD	452415.60	478.99
CV	110.50	106.85
Period II (2007-08 to 2016-17)		
Mean	1351241.00	1237.44
SD	1262928.00	1393.69
CV	93.46	112.63
Overall Period (1997-98 to 2016-17)		
Mean	880319.20	842.87
SD	1042072.00	1092.07
CV	118.37	129.57

Note: SD- Standard Deviation and CV- Coefficient of Variation

Table 4 revealed that the import quantity of sugar exhibited highest variation in overall period of 118.37 per cent and in period I and period II was 110.50 per cent and 93.46 per cent. As regard the import value of sugar it was found to be high in overall period of 129.57 per cent and in period I and period II was 106.85 per cent and 112.63 per cent. The coefficient of variation was found to be highest in case of overall period of import value 129.57 (1997-98 to 2016-17).

Export Competitiveness of Sugar

The export competitiveness of sugar was analyzed using Nominal Protection Coefficient and it is presented in Table 5.

Table 5 Nominal Protection Coefficient (NPC) of Indian sugar

Sr. No	Period	Year	Domestic Prices(Pd) (Rs./Kg)	International Prices(Pr) (Rs./Kg)	NPC
1	Period I (1997-98 to 2006-07)	1997-98	14820	14106.49	1.05
		1998-99	14240	13631.72	1.04
		1999-00	14630	13964.59	1.05
		2000-01	14460	12724.87	1.14
		2001-02	14040	11866.47	1.18
		2002-03	12730	10644.38	1.19
		2003-04	14850	10129.81	1.46
		2004-05	17580	13718.35	1.28
		2005-06	18890	17573.82	1.07
		2006-07	15030	18656.68	0.80
Average Period I (1997-98 to 2006-07)					**1.12**
2	Period II (2007-08 to 2016-17)	2007-08	15130	11644.43	1.29
		2008-09	22900	13275.43	1.72
		2009-10	31110	26450.20	1.18
		2010-11	28970	28850.70	1.00
		2011-12	31760	32520.50	0.98
		2012-13	33840	30696.60	1.10
		2013-14	32420	26538.85	1.22
		2014-15	28420	26910.00	1.06
		2015-16	28420	27810.00	1.02
		2016-17	26800	24335.33	1.10
Average Period II (2007-08 to 2016-17)					**1.16**
Average Overall period (1997-98 to 2016-17)					**1.14**

The Table 5 shows that, at an overall level, the NPC values of sugar was worked out to 1.14, its indicating non-competitive export competitiveness of sugar. When it was analyzed for the two different period in period I and period II, it was observed that the commodity was non- competitive during the period I with average NPC value 1.12 while the NPC value for the period II was worked out to 1.16.

Factor influencing the export for Indian sugar

It was intended to identify the factor affecting demand for export of sugar. For this purpose two type of demand functions, i.e. multiple linear and non-linear (Cobb-Douglas types) were used. Cobb-Douglas type function was found more appropriate as the value of R^2 was higher than the ones for multiple linear function. Secondly, step down method of detection of non-significant independent variables was used to obtain the most suitable function.

Table 6 Factors influencing export of Indian sugar

Sr. No	Particular	Coefficient	Standard error
1	Intercept	0.33	-
2	Export Price X_1	0.42**	1.25
3	India's share in world production X_2	-0.58	2.12
4	Total world import X_3	1.04	1.05
5	Ratio of domestic consumption to production X_4	-0.32	1.81
6	Exchange rate X_5	2.65**	1.64
7	Ratio of domestic price to world export price X_6	-0.43	1.20
8	R^2	0.94	

Note: ** = significant at 1 % level

It is seen from the Table 6 that the coefficient of determination i.e. R^2 was noticed for export of Indian sugar i.e. (0.94), which indicate the best fit of equation sugar export was observed to be influence by two factors i.e. export price and exchange rate.

Conclusions

The following conclusions were emerged from the present study

1. The compound growth rate for export quantity (22.79 per cent per annum) and export value (16.72 per cent per annum) was found to be positive and highly significant for overall period but in sugar import quantity and value is non-significant.
2. The study of instability index showed that there was stability in export quantity and value, import quantity and value of period II compared to period I. The highest instability was found in overall period of import value (129.57).
3. The NPC value of sugar showed that in period I with average NPC value as 1.12, NPC value for the period II was 1.16 while NPC value of overall period was 1.14 which indicates Indian sugar is protected and effective incentives were given to producers. It shows that sugar is not competitive.

Asian Resonance

4. The factors influencing export of sugar was analyzed by using Cobb-Douglas production function which concluded that there were two factors which influence the sugar export i.e. export price (0.42 per cent per annum) and exchange rate (2.65 per cent per annum).

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