Vol XXXVII
No. 3

ISSN 0019-5014

CONFERENCE
NUMBER

JULY-
SEPTEMBER
1982

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

enough scope to increase India's share in the world market as India has a very small share in the world export. But to accomplish this the country would have to increase the production of coffee and regulate its supply, may be through maintenance of buffer stocks. In the case of cashew kernels there seems to be a dark future. India is excessively relying on East Africa for the supply of raw nuts. It must be noted that these countries themselves have started processing their raw materials and in future the supply of raw nuts from this source will be less and less. Therefore, there is an urgent need to encourage domestic production. In the case of spices also efforts must be made to eliminate fluctuations in domestic production and work out a strategy for long-term expansion.

One set of policy implications for non-raw material agricultural exports is to remove the supply constraints in India and increase the size of exportable surplus. Other set of policy implications relates to the market performance. Since the mid 1950s, India got a secure and vast market of East European countries, particularly that of the Soviet Union. This led to a net expansion of India's exports of many agricultural commodities, which faced the problems of market at that time. Similar efforts are needed to secure new markets for Indian goods. Secondly, India must unite her efforts with other underdeveloped countries especially those which compete with her in the world market to eliminate price fluctuations in the market.

AN ECONOMETRIC ANALYSIS OF INDIAN EXPORT-SHARE OF CASHEW KERNELS IN THE WORLD TRADE*

H. K. Sandhu†

India is endowed with a potentially rich and suitable soil for efficient production of cashew. This resource had been once exploited fully when India had a unique and monopolistic position in production as well as export of cashew kernels in the world market. After the dawn of Independence in 1947, India should have taken measures to further strengthen its position in cashew trade, but the fact remains that whereas India was meeting almost the total world demand in 1947, its share had declined to half by 1980. The production of cashew kernels also fluctuated widely, varying from 13.5 per cent in 1972 to 50 per cent in 1955. The share of India in the world production of cashew was 31.6 per cent in 1947 and 36.9 per cent in 1980 (Table I).

* This analysis was done at Indian Institute of Management, Ahmedabad with Prof. C. D. Wadhwa in 1980-81. The author is thankful to him for his kind encouragement.

† Project Officer, Agricultural Finance Corporation Ltd., New Delhi.

Following studies may be referred to: "Study on Cashewnut in India", Committee on Natural Resources, Planning Commission, Government of India, New Delhi, 1969; "Export Trade in Cashew", Cashew Export Promotion Council, *Eastern Economist*, February 26, 1971, pp. 23-24; "Report of the Study Group on Financing of Cashew Industry", *Reserve Bank of India Bulletin*, May 1973; "Processing of Cashew for Greater Exports", Commodity Study Report, IIFT Commodity Series No. 8, Indian Institute of Foreign Trade, Delhi, 1975; "The Economic Times Special Survey", *(Contd.)*

TABLE I—INDIA'S SHARE OF EXPORTS AND PRODUCTION IN WORLD TRADE AND PRODUCTION OF CASHEW KERNELS

(in quantum)

Year	Percentage share in exports	Percentage share in production	Year	Percentage share in exports	Percentage share in production
(1)	(2)	(3)	(4)	(5)	(6)
1947	98·58	31·6	1973	59·11	16·0
1951	98·71	53·5	1974	61·63	16·5
1955	96·88	50·0	1975	61·66	26·1
1960	94·85	36·1	1976	59·44	35·9
1965	91·44	23·9	1977	54·94	36·2
1970	69·03	19·5	1978	36·65	36·4
1971	67·62	16·5	1979	51·79	36·5
1972	63·33	13·5	1980	50·10	36·9

Indian export of cashew kernels steeply fell since 1955. It touched the bottom in 1978 when it registered only 36.65 per cent of the total world trade. However, since then it started to recover. The year 1979 witnessed an impressive increase both in terms of quantity and value of cashew kernels exported. In 1980 there was a fall in the quantity exported by 26 per cent. The exports for the first six months during 1981 (April-September) did not indicate a sign of encouragement, as the downward trend in the volume of exports continued. This difficulty has been primarily due to keen competition in production technology and processing coupled with low unit values offered by the competing economies. For example, a country like Mozambique which was once a valuable source of supply of raw cashew for processing in India, had set up its own processing plants and had stopped supplying raw cashew to India.

India exported 73 per cent of its total volume to the U.S.S.R. and East European countries. The United States of America, Japan, Western Europe and Australia are the other once potential markets, where India has been losing its edge. The reversal of this trend is difficult unless Indian production technology is geared up resulting in a substantial decrease in production cost.

The Economic Times, January 7, 1981; Financial Express Research Bureau, *The Financial Express*, February 23, 1981; "Crisis in Cashew Exports", *The Economic Times*, March 17, 1982; D. Balasubramaniam, "Growing Cashew Export", *Gujarat Export Bulletin*, Vol. 9, No. 5, 1979, pp. 78-83; G. P. Casadio: Cashew Nut Growing, Processing and Marketing with special reference to Brazil, UNIDO, Vienna, 1971; "Conclusions and Recommendations of Seminar on Cashew Exports", Indian Institute of Foreign Trade held at Ernakulam, Kerala, 1964; "Conclusions and Recommendations of Seminar on Cashewnut-shell Liquid", Indian Institute of Foreign Trade held at Ernakulam, Kerala, 1969; M. Dattatreyulu, "Export Development of Cashews", *Foreign Trade Review*, Vol. XII, No. 2, 1977, pp. 229-240; D. C. Russel: Cashew Nut Processing, Food and Agriculture Organization of the United Nations, Rome, Italy, 1969; Sada Nand, "Place of Cashewnut in India's Export Trade", *AICC Economic Review*, December 1, 1967, pp. 25-28; UNCTAD/GATT: Cashew Marketing, International Trade Centre, Geneva, 1968; and UNCTAD/GATT: Major Markets for Edible Tree-nuts and Dried Fruits, International Trade Centre, Geneva, 1973.

Assuming uniform consumption habits, an effort has been made to work out the export demand, income and export market share elasticities in the important market segments for Indian exports, with the help of time-series data using double logarithmic function. An endeavoured exercise was done to snag exchange rate fluctuations, domestic inflationary trends, currency devaluations and other transistory trend effects by converting the unit value figures into SDR values. Structural and directional transformations have also been incorporated. Logarithmic regression analysis has been followed and the derived demand estimates of Indian cashew kernels have been classified as under:

1. Export demand and income elasticities in general (1950-51 to 1979-80).
2. Export demand and income elasticities in the U.S.S.R. market (1955-56 to 1979-80).
3. Export market share elasticities in international trade of U.S.A. in comparison to market share of Mozambique and Brazil (1954-55 to 1979-80).
4. Export market share elasticities in international trade of the world (1950-51 to 1979-80).

Exports of Cashew Kernels from India

The exports of cashew kernels accounted for 3.5 per cent of India's total exports when the annual gross foreign exchange earnings were Rs. 140 crores in 1980. The expansion of total exports of cashew kernels in the world had resulted in a remarkable increase in its per capita consumption in the importing countries. This had irradiated the problems which any exporting country has to face in a competitive market. Price resistance and quality competitiveness were identified as conspicuous factors for these countries to feel concerned. Considering the unit value figures with respect to India and Brazil and average per capita income in the world as independent factors influencing Indian exports over time, an estimate concerning Indian exports in double logarithmic linear equation is computed as follows:[1]

$$\begin{aligned} X_{CKI} = {} & 4.5118^{*} - \underset{(6.1203)}{} \quad 0.5115^{\dagger}\,UV_{IX} + 0.3314\,UV_{BX} + 0.3173\,Y_{W} \\ & \qquad\qquad (1.6364) \qquad\qquad (1.0158) \qquad\qquad (0.2468) \\ & + 0.3022\ t^{**} \\ & \quad (2.9264) \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \ldots\ (1) \end{aligned}$$

$$\bar{R}^{2} = 0.88, \quad D.W. = 2.6, \quad F = 33.1724.$$

1. Throughout this study, the figures given in brackets under the coefficients are 't' values and signs used for the levels of significance will be:

* indicates statistically significant at 0·1 per cent level,
** indicates statistically significant at 1 per cent level,
@ indicates statistically significant at 2 per cent level,
*** indicates statistically significant at 5 per cent level,
@* indicates statistically significant at 10 per cent level, and
† indicates statistically significant at 20 per cent level.

where X_{CKI} = log values for exports of cashew kernels from India in physical terms (thousand tonnes). The source of data is Cashew Export Promotion Council, Cochin, India.

UV_{IX}, UV_{BX} = log values for unit value of exports of cashew kernels from India and Brazil in SDR values. The exchange rate fluctuations were adjusted by taking data from International Financial Statistics, International Monetary Fund, Washington.

Y_W = log values for per capita income of the world which was adjusted with the trend, taken from UN Year Book of International Trade Statistics.

t = log value for the time counted in years for the period under study.

The estimated coefficients of the constant and elasticity for trend were positive and were also found to be significant at 0.1 and one per cent level of significance respectively. The Indian export price elasticity was found to be 0.5115 with negative sign, indicating an anticipated trend in respect of price resistance from Brazilian exports. But the coefficient of elasticity was found non-significant. A rise in per capita world income will support the demand even though consumption of cashew kernels had not appeared as an essential item of food.

Exports of Cashew Kernels to U.S.S.R.

For India, the U.S.S.R. is one of the high potential markets for cashew kernel consumption. The functional analysis carried out for this market is:

$$X_{CKI\ U.S.S.R.} = \underset{(5.5314)}{4.7624^{**}} - \underset{(1.4869)}{0.2861^{\dagger}} UV_{IX\ U.S.S.R.} + \underset{(0.3800)}{0.9981} GDP_{U.S.S.R.} + \underset{(2.8178)}{0.5935\ t^{**}} \quad \ldots\ (2)$$

$\bar{R}^2 = 0.8764$, D.W. = 2.63, F = 60.07

where $X_{CKI\ U.S.S.R.}$ = log values for exports of cashew kernels to U.S.S.R. from India in physical terms (thousand tonnes).

$UV_{IX\ U.S.S.R.}$ = log values for the unit values of exports of cashew kernels from India to U.S.S.R. in SDR values.

$GDP_{U.S.S.R.}$ = log values for U.S.S.R.'s gross domestic product in SDR values. The data were collected from the *Monthly Bulletin of Statistics*, United Nations and then converted into SDR values.

Analogous to the analysis for the overall Indian exports of cashew kernels, the coefficients of the constant and trend values were significant at one per cent level. Though the export price elasticity was low, yet it does indicate an important share of the market for Indian exports in the U.S.S.R. The positive income elasticity also demonstrated a favourale consumption behaviour of the inhabitants there.

It is inferred that the demand for cashew kernels in U.S.S.R. was neither price responsive nor income elastic. Instead, it had increased mainly institutionally on the basis of bilateral terms.

Export of Cashew Kernels to U.S.A.

The U.S.A. is the main market for cashew kernels in the world. India, Mozambique and Brazil are the three countries that influenced the consumer's behaviour in the U.S.A. through price, quality improvements, territorial controls, transport cost adjustments and shelters, etc. The export market share elasticities of these three economies in that market are as follows:

$$\frac{X_{CKI\ U.S.}}{I_{T\ U.S.}} = \underset{(11.2908)}{10.4721^{*}} - \underset{(1.2743)}{0.1792}\ \frac{UV_{IX\ U.S.}}{UV_{MX\ U.S.}} - \underset{(3.1492)}{0.4635^{**}}\ \frac{UV_{IX\ U.S.}}{UV_{BX\ U.S.}} + \underset{(13.5854)}{0.7627^{*}}\ Y_{U.S.A.} + \underset{(2.492)}{0.7466\ t^{@}} \quad \ldots\ (3)$$

$$\bar{R}^2 = 0.98, \quad D.W. = 3.32, \quad F = 247.99$$

$$\frac{X_{CKM\ U.S.}}{I_{T\ U.S.}} = \underset{(2.1754)}{14.3817^{***}} - \underset{(1.2682)}{2.2515}\ \frac{UV_{MX\ U.S.}}{UV_{IX\ U.S.}} + \underset{(2.2117)}{1.7081^{***}}\ Y_{U.S.A.} + \underset{(9.6225)}{3.8108\ t^{*}} \quad \ldots\ (4)$$

$$\bar{R}^2 = 0.93, \quad D.W. = 3.23, \quad F = 118.39$$

$$\frac{X_{CKB\ U.S.}}{I_{T\ U.S.}} = \underset{(3.0194)}{-9.8143^{**}} - \underset{(2.9457)}{0.8016^{**}}\ \frac{UV_{BX\ U.S.}}{UV_{IX\ U.S.}} + \underset{(5.5012)}{1.4441^{*}}\ Y^{*}_{U.S.A.} + \underset{(3.7643)}{0.5549\ t^{*}} \quad \ldots\ (5)$$

$$\bar{R}^2 = 0.9498, \quad D.W. = 2.97, \quad F = 158.88$$

where $I_{T\ U.S.}$ = log values for total imports of U.S.A. in physical terms (thousand tonnes).

$Y_{U.S.A.}$ = log values for per capita income of U.S.A. adjusted with the trend.

$UV_{MX\ U.S.}$, $UV_{BX\ U.S.}$ and $UV_{IX\ U.S.}$ are log values for unit values of exports of cashew kernels from Mozambique, Brazil and India to U.S.A. in SDR units.

$X_{CKI\ U.S.}$, $X_{CKM\ U.S.}$ and $X_{CKB\ U.S.}$ are long values for the exports of cashew kernels from India, Mozambique and Brazil to U.S.A. in physical terms (thousand tonnes).

The data for all these variables were collected from the Cashew Export Promotion Council, Cochin, India.

Equations (3) to (5) explain the market share price elasticities of the respective exporting countries for the U.S.A. market. India and Mozambique had been exporting cashew kernels to the U.S.A., since the Second World War period and it was only recently that Brazil had sought to increase her sales through under-cutting price and improving quality control measures. The price response elasticity in the case of Brazil's share to total imports in the U.S.A was found statistically significant. The price response elasticity in the case of Mozambique was found greater than unity though not statistically significant, which indicates a strong potential in this respect over time.

It explains the better bargaining position in favour of Brazilian and Mozambique exports in the American market. This leads to the need for intensive efforts on the part of India to undertake substantially effective measures to maintain and expand its market share. Brazil had controlled its international price, enjoyed locational advantage and as such is in a position to surpass the Indian exports to the U.S.A. Considering the overall situation, the trends are found encouraging in all the three cases. This implies a rising demand of cashew kernels in the U.S.A. The computed income elasticities are high and suggest that there is still more scope for expansion of demand for cashew kernels.

India's Export Market Share of Cashew Kernels in the World

The results of the least square fit taking log values for the dependent as also independent variables are as follows:

$$X(I/W) = \underset{(5.2884)}{9.3165^{*}} - \underset{(1.9707)}{0.7247^{***}} \frac{UV_{IX}}{UV_{WX}} + \underset{(4.5719)}{0.4809^{*}}\, Y_W + \underset{(1.7389)}{0.1454}\, t \quad \ldots\ldots (6)$$

$\bar{R}^2 = 0.89$, D. W. $= 2.9$, $F = 48.92$

where $X(I/W)$ = market share of Indian exports in the world market in physical terms (thousand tonnes).

$\frac{UV_{IX}}{UV_{WX}}$ = price ratio; export unit values of Indian cashew kernels deflated by export unit values of the world in SDR values.

Y_W = per capita income of the world adjusted with the trend. The figures were collected from the various issues of the UN Year Book of International Trade Statistics.

The export market share price elasticity was found significant at 5 per cent level with a magnitude of 0.7247, indicating competitive behaviour of Indian market share. The income elasticity of cashew kernels in the world was found significant at 0.1 per cent level and had explained a variation of 0.4809 per unit in demand for cashew kernels per unit increase in per capita income.

Conclusion

Cashew had been one of the important foreign exchange earners for India. The trend values estimated through the above econometric analysis suggests an average growth rate of 3.8 per cent (significant at 5 per cent level). It implies that if India is to maintain its existing market share or desires to improve itself in cashew kernel exports leading to the maintenance of a monopolistic status, it is high time that Indian policy makers should implement the following measures: (*a*) improve production technology resulting in low comparative domestic price which in addition offsets the locational advantage currently being enjoyed by competing countries; (*b*) improve processing technology aimed at minimization of domestic price of processed material; (*c*) provide export incentives in terms of taxes and custom duty; and (*d*) allow transport subsidy particularly when the produce is being transported from backward/tribal areas.