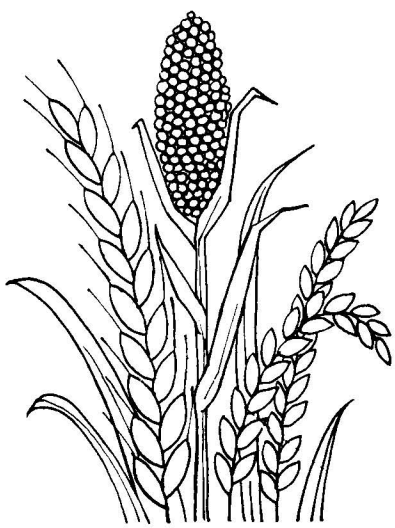
Vol. XLIX
No. 3

CONFERENCE
NUMBER

JULY -
SEPTEMBER
1994

ISSN 0019-5014

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS



INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

Ind. Jn. of Agri. Econ.
Vol. 49, No. 3, July-Sept. 1994

Changing Direction of Indian Coffee Exports

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Coffee is a major foreign exchange earner among the traditional items of export from India. It is mainly grown in three southern states, namely, Karnataka, Kerala and Tamil Nadu. The production performance of coffee has been remarkable in the last four decades. It has recorded a phenomenal growth from 19,000 tonnes in 1950-51 to a high of 2,20,000 tonnes in 1989-90. The international market for coffee is dominated by Brazil, followed by Colombia, Indonesia and Mexico. The world production of coffee increased from about 2.32 million tonnes in 1950-51 to 5.8 million tonnes in 1989-90, representing an annual rate of growth of 2.3 per cent (ICO, 1991). The export value of coffee from India increased from Rs. 1.3 crores in 1950-51 to Rs. 363.12 crores in 1989-90 (Garg and Bhushan, 1991), as a result of increased export to different countries, apart from the changes in composition of India's coffee exports to the various destinations. However, no effort has been made to enhance the dynamics of these changes. This paper is a modest attempt at quantifying the changing structure of Indian coffee exports so as to understand the dynamics of the changes.

METHODOLOGY

The structural change in the share of exports of a commodity can be analysed through a first order Markov model (Dent, 1967). This model is a stochastic process which describes the finite number of possible outcomes S_i (i=1, 2..., r) which is a discrete random variable X_t (t=1, 2, ..., T) and which assumes that (a) the probability of an outcome on the t-th trial depends only on the outcome of the preceding trial, and (b) this probability is constant for all time periods (Lee *et al.*,1970).

Central to Markov chain analysis is the estimation of the transitional probability matrix, 'P'. The element 'P_{ij}' of this matrix indicates the probability that exports will switch from country 'i' to country 'j' with the passage of time. The diagonal element 'P_{ij}' measures the probability that the export share of a country will be retained. An examination of this matrix will indicate the loyalty of an importing country to a particular country's exports (Atkin and Blandford, 1982).

In the context of the current application, there are seven major countries importing Indian coffee. They are U.S.A., erstwhile West Germany, erstwhile U.S.S.R., Italy, the Netherlands, Yugoslavia and other importers. To estimate the transitional probability matrix, Indian coffee annual export data for the period 1965 to 1990 were used. For convenience of analysis, the triennium averages of exports at five-yearly intervals were worked out to analyse the market shares in different markets and to compute the transitional probabilities. Further, the one period ahead projection, i.e., for 1995 was used to interpolate the estimated exports for each year from 1990 to 1993. These figures were compared with the actual figures available. This helps to know how the position of Indian coffee exports has been changing in different markets over the years.

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In the current application, the average export to a particular country was considered to be a random variable which depends only on its past exports to that country and following a first order Markov model, it can be denoted algebraically as:

$$E_{jt} = \sum_{i=1}^{r} E_{it-1} P_{ij} + e_{jt}$$

where E_{jt} = exports from India during the year 't' to j-th country,
E_{it-1} = exports to i-th country during the year t-1,
P_{ij} = the probability that exports will shift from i-th country to j-th country,
e_{jt} = the error term which is statistically independent of E_{it-1}, and
r = the number of importing countries.

The transitional probabilities P_{ij}, which can be arranged in a (c × r) matrix, have the following properties:

$$O \leq P_{ij} \leq 1$$

$$\sum_{i=1}^{r} P_{ij} = 1, \quad \text{for all} \quad i.$$

Thus the expected shares of each country during period 't' can be obtained by multiplying the exports to these countries in the previous period (t-1) with the transitional probability matrix. Similarly, the future export shares of each of the importing countries can also be estimated.

The transitional probability matrix was estimated in the Linear Programming (LP) framework by a method referred to as Minimisation of Mean Absolute Deviation. The LP formulation is stated as:

$$\text{Min } O.P^* + Ie$$

Subject to

$$XP^* + V = Y$$
$$GP^* = 1$$
$$P^* \geq 0$$

where P^* is a vector of the probabilities P_{ij},
0 is a vector of zeros,
I is an appropriately demonstrated identity matrix,
e is the vector of absolute errors (| U |),
Y is the vector of exports to each country,
X is a block diagonal matrix of lagged values of y,
V is the vector of absolute errors,
G is a grouping matrix to add the row elements of P arranged in P^*, to unity.

RESULTS AND DISCUSSION

The transitional probability matrix obtained through the procedure described in the previous section is presented in Table I. The table reveals that Indian export markets which have been stable are the U.S.S.R., West Germany and others. The U.S.S.R. has indeed been a growing market for Indian coffee. The high retention to this market is further reinforced by the high probability of transfer from the U.S.A. (0.7724) and West Germany (0.4960); however, there are small probabilities of loss to Italy (0.1496) and others (0.0281).

TABLE I. TRANSITIONAL PROBABILITY MATRIX OF INDIAN COFFEE EXPORTS (1965-1990)

Importing country (1)	U.S.A. (2)	West Germany (3)	U.S.S.R. (4)	Italy (5)	The Nether-lands (6)	Yugoslavia (7)	Others (8)
U.S.A.	0	0	0.7724	0	0.1161	0.1115	0
West Germany	0	0.3152	0.4960	0.0574	0.1314	0	0
U.S.S.R.	0	0	0.8220	0.1496	0	0	0.0281
Italy	1.0	0	0	0	0	0	0
The Netherlands	0	1.0	0	0	0	0	0
Yugoslavia	1.0	0	0	0	0	0	0
Others	0.4941	0	0	0	0	0	0.5059

Other importers also have a fairly high retention of 0.5059 and high transfer probability of 0.4941 to the U.S.A. They have gained from the U.S.S.R.'s share by (0.0281). West Germany has a moderate probability of retention of 0.3152 which is reinforced by the very high probability of transfer from the Netherlands (1.0). But there is a strong tendency to lose its market share to the U.S.S.R. (0.4960) and the Netherlands (0.1314).

The U.S.A., Italy, the Netherlands and Yugoslavia are not stable markets for Indian coffee. The U.S.A. has lost its share to the tune of 0.7724 to the U.S.S.R., 0.1161 to the Netherlands and 0.1115 to Yugoslavia. It has gained all of Yugoslavia's and Italy's market shares (1.00)and 0.4941 of others.

India's coffee exports to Italy exhibit a tendency to shift to the U.S.A., at the same time it has gained market shares of West Germany and the U.S.S.R. to the tune of 0.0574 and 0.1496 respectively.

Estimation of Indian Coffee Exports to Major Importing Countries

Using the transitional probability matrix, market shares of Indian coffee exports to major importing countries were projected upto 2000 A.D. Table II presents the actual and estimated quantities and percentages of Indian coffee exported to major importing countries. The actual export to the U.S.A. had decreased from 21.59 per cent to about 12 per cent of India's total coffee exports between 1965-67 and 1985-87, but the quantity exported had increased from 6,792 tonnes to 11,774 tonnes during this period. The estimates show a decline from 21.06 per cent to about 14 per cent during the same period. These estimates suggest that the quantum and share are slated to decline further to 12.98 per cent by 2000 A.D. This may be due to the declining US demand for coffee as a whole. Coffee consumption in the U.S.A. has been declining over the years on account of the competition from soft drinks and tea and it has declined from 35.7 gallons per capita in 1970 to 25.2 gallons per capita in 1990

TABLE II. INDIAN COFFEE EXPORTS TO MAJOR IMPORTING COUNTRIES

(metric tonnes)

Year	U.S.A.		West Germany		U.S.S.R.		Italy		The Netherlands		Yugoslavia		Others		Total	
	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1965-67	6,792	5,783	483	452	7,844	6,748	354	312	351	314	3,979	3,206	11,650	10,650	31,453	27,465
	(21.59)	(21.06)	(1.54)	(1.65)	(24.94)	(24.57)	(1.13)	(1.17)	(1.12)	(1.14)	(12.65)	(11.67)	(37.04)	(38.78)		
1970-72	18,112	8,792	2,674	3,074	12,983	11,972	3,123	2,082	1,807	1,972	2,804	1,988	17,213	16,213	58,716	46,093
	(30.84)	(19.07)	(14.55)	(6.67)	(22.11)	(25.97)	(5.31)	(4.52)	(13.07)	(4.28)	(4.78)	(4.31)	(29.31)	(35.17)		
1975-77	15,321	14,828	2,650	1,992	19,792	20,811	2,099	2,922	2,604	1,924	3,455	3,700	14,330	10,820	60,251	56,997
	(25.43)	(26.01)	(4.40)	(3.50)	(32.85)	(36.51)	(3.48)	(5.13)	(4.32)	(3.37)	(5.73)	(6.50)	(23.78)	(18.98)		
1980-82	10,009	11,220	6,317	5,840	29,766	32,000	3,188	3,642	2,127	2,520	1,708	2,560	20,957	9,870	74,072	67,652
	(13.51)	(16.60)	(8.52)	(8.64)	(40.18)	(47.34)	(4.30)	(5.39)	(2.87)	(3.73)	(2.30)	(5.48)	(28.29)	(14.60)		
1985-87	11,774	10,957	7,011	601	47,533	48,500	6,502	6,842	2,024	1,842	9,019	3,704	15,088	5,840	98,951	78,286
	(11.90)	(13.99)	(7.09)	(0.77)	(48.04)	(61.95)	(6.57)	(8.74)	(2.05)	(2.35)	(9.11)	(4.73)	(15.25)	(7.46)		
1990	11,525	9,961	7,935	5,740	61,493	48,286	7,989	6,972	885	1,562	1,984	2,804	12,036	4,882	103,847	80,207
	(11.09)	(12.42)	(7.64)	(7.15)	(58.59)	(60.20)	(7.69)	(8.70)	(0.85)	(1.94)	(1.91)	(3.15)	(11.59)	(6.08)		
1991	9,150	9,948	9,951	5,560	41,006	43,461	9,710	7,172	634	1,536	5,196	3,488	29,300	4,486	104,947	75,651
	(8.71)	(13.15)	(9.48)	(7.35)	(39.07)	(57.45)	(9.25)	(9.48)	(0.60)	(2.03)	(4.96)	(4.61)	(27.91)	(5.93)		
1992	3,676	9,969	17,089	5,372	22,733	48,636	15,900	7,177	1,115	1,562	903	2,127	56,212	4,082	117,628	78,925
	(3.12)	(12.63)	(14.53)	(6.81)	(19.33)	(61.62)	(13.52)	(9.10)	(0.95)	(1.98)	(0.77)	(2.70)	(47.79)	(5.77)		
1993	10,508	9,972	29,191	5,885	12,940	48,814	16,481	7,279	1,203	1,584	1,230	1,790	96,108	3,881	167,661	79,205
	(6.27)	(12.59)	(17.41)	(7.43)	(7.72)	(61.63)	(9.83)	(9.19)	(0.72)	(2.00)	(0.93)	(2.26)	(57.32)	(4.90)		
1994		9,977		2,004		48,986		7,383		1,607		1,450		3,282		74,689
		(13.35)		(2.68)		(65.58)		(9.88)		(2.15)		(1.94)		(4.39)		
1995		9,982		4,820		49,161		7,486		1,440		1,112		2,803		76,804
		(13.00)		(6.27)		(64.00)		(9.74)		(1.87)		(1.44)		(3.65)		
2000		9,987		4,900		49,185		7,491		1,435		1,113		2,789		76,900
		(12.98)		(6.37)		(63.95)		(9.74)		(1.86)		(1.45)		(3.62)		

Note: A = Actual values; E = Estimated/Projected values.
Figures in parentheses are percentages to the respective total.

whereas the consumption of soft drinks has gone up from 22.7 gallons to 47.5 gallons per capita during the same period. Similar is the trend for tea, its per capita consumption has increased from 5.2 gallons to 7.2 gallons during this period (ICO, 1991).

The share of Indian coffee exports to West Germany has increased from 1.54 per cent to 7.64 per cent between 1965 and 1990 with the estimated market share also showing a similar trend (1.65 per cent to 7.15 per cent). It is estimated that the export share of Indian coffee to West Germany would increase from 0.77 per cent in 1987 to 6.37 per cent by the turn of the century. The unification of East Germany and West Germany has not affected the proportion of exports of Indian coffee to Germany. After the unification in 1991, the consumption of coffee picked up even in East Germany from 5.4 kg per capita to 7.4 kg per capita (ICO, 1991).

The actuals and the projected, both in quantity and percentage terms, showed an increasing trend in the case of the U.S.S.R. from 24.94 per cent and 24.57 per cent in 1965 to 48 per cent and 62 per cent in 1987 respectively. The higher retention of market share coupled with continuous growth in market proportion to the U.S.S.R. is mainly due to this country's preference for Indian coffee. During the seventies and the eighties, the main supplier of coffee to the U.S.S.R. was India as per the bilateral agreement between the two countries. But at present, on account of economic and political changes shifting the centrally controlled system to liberalisation and disintegration into Commonwealth of Independent States (CIS), the economy of the U.S.S.R. has collapsed and their demand has drastically come down. Unless their economy is set right, India would not be able to retain its share to the U.S.S.R.

The actual and estimated market proportions of Indian coffee to Italy have indicated an increase from 1.13 and 1.17 per cent to 6.57 and 8.74 per cent from 1965 to 1987 respectively. The projections show that the market share would further increase to 9.74 per cent by 2000 A.D., as a result of increased coffee consumption in Italy. The real area of growth is Southern Italy where consumption has grown by 20 per cent annually in recent years. Italy prefers Indian strong Robusta.

Indian coffee exports to the Netherlands and Yugoslavia markets declined over the years in percentage terms. Even though the Netherland's coffee consumption has remained almost constant over the years, India's share has declined but the actual quantity exported has increased. Indian coffee exports - both actual and estimated market shares - to other importing countries have showed a declining trend between 1965 and 1987. This is due to the fact that India's coffee exports have increased significantly during the eighties to the U.S.S.R., West Germany and Italy.

The break-up of the 1990-93 forecast into annual figures through linear interpolation and comparison with the actual exports indicates a total departure from the past patterns where exports were controlled by the International Coffee Agreement (ICA). The present scenario characterised by greater freedom to the domestic producers to market their coffee coupled with the international developments like break down of ICA, collapse of the U.S.S.R. - the major importer of Indian coffee - and the unification of Germany has had a bearing on the structure of the Indian coffee exports. This is corroborated by the data for 1990 to 1993. The greatest change is observed in the case of the U.S.S.R. where the projected share for 1993 was 48,811 tonnes whereas the actual exports was only 12,940 tonnes. Germany's share which was projected at 7.43 per cent of India's coffee exports in reality approximated

to 17.41 per cent. Moderate changes were witnessed in the case of the U.S.A. and Italy; in the case of the former the actual quantum fell short of the projection by about 6.32 percentage points whereas in the case of the latter it was the other way round. The major import markets in recent years have shifted from the traditional markets considered in the analysis to the new markets captured under others. This is substantiated by an actual export share of 57.32 per cent during 1993 whereas the projection was only 4.90 per cent.

The foregoing analysis provides a strong argument to explore and develop new markets which have been thrown open to Indian coffee. The process is likely to be accelerated when the provisions of General Agreement on Tariffs and Trade (GATT) come into effect. This could also pose a threat to the Indian producers when there is a glut in the world market and the coffee prices crash. Insulation of the domestic producer under such circumstances will not be tenable. Hence, efforts to improve the efficiency of production and quality are the need of the hour.

CONCLUSION

The analysis of the direction of the changing situation of Indian coffee exports has shown that India could not retain its previous market share to the U.S.A., the Netherlands, Yugoslavia and Italy. But the actual quantity exported to all these countries has increased. This may be due to increased quantity of Indian coffee exports. India has retained its previous market share to the U.S.S.R., West Germany and others. West Germany and Italy prefer Indian coffee in the world market. The bulk of the coffee exported to the U.S.S.R. was under bilateral agreement. But the future is not bright for this segment of export in the light of the developments in the erstwhile U.S.S.R. The projections indicate that the proportion of Indian coffee exports to the U.S.A., Yugoslavia, the Netherlands and other importers shows a declining trend. This trend coupled with the disintegration of the U.S.S.R. calls for steps to sustain the total exports of coffee. This may be achieved by way of capturing the markets of the CIS (erstwhile U.S.S.R.) and finding new markets in the world, apart from sustaining the existing markets. This is not going to be an easy task in the light of the break down of ICA and cut throat competition from other coffee exporting countries.

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Summaries