



Direction of trade of major Indian agricultural commodities among SAARC Countries

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ABSTRACT

The South Asian Association for Regional Cooperation is constituted by Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. Agriculture sector is still backbone of economy of all SAARC members. India exports different agricultural commodities to SAARC member countries under cereal, pulses, fruits and vegetables, processed food products, alcoholic and non-alcoholic beverages, planting materials, livestock products etc. major exportable agricultural commodities such as wheat, rice, mango and onion have been purposively selected for further analysis as these commodities are commonly exported from India to all other SAARC member countries. Markov chain analysis was used to analyze the direction of trade. Maldives is stable market for rice with high retention probability of 41.54 per cent among the SAARC countries for reference period. Bangladesh is most stable market for all four commodities such as rice, wheat, mango and onion as reflected by retention probabilities of 22.86, 45.40, 39.29 and 24.00 per cent, respectively among the SAARC member countries. It was observed that India was in a competitive position in rice, mango and onion with the NPCs values of 0.98, 0.975 and 0.893, respectively for the period of 2008-09.

Mhaske, Vaishali, Yeledhalli, R.A., Choudhary, Kuldeep and Patil, Chidanand (2011). Direction of trade of major Indian agricultural commodities among SAARC Countries. *Agric. Update*, 6(2): 17-20.

INTRODUCTION

The South Asian Association for Regional Cooperation is constituted by Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. Agriculture sector is still backbone of economy of all SAARC members. Rice and wheat are the staple food crops in the SAARC countries. Historically, SAARC countries have been trading similar types of agricultural products and the concentration of exports into limited agricultural product groups is a common phenomenon in many SAARC countries. India is the most diversified economy in terms of agricultural exports and the least diversified in imports. Agriculture including allied sector accounted for 17.1 per cent of GDP in 2008-09, has been declining over the years, its role remains critical as it accounts for about 52.1 per cent employment in the country. Agricultural sector contributes 12.2 per cent share of national exports in 2008-09 (Anonymous, 2009).

India exports different agricultural commodities to SAARC member countries

under cereal, pulses, fruits and vegetables, processed food products, alcoholic and non-alcoholic beverages, planting material, livestock products etc. Among all SAARC member countries trade between India – Bangladesh is higher.

All the other SAARC countries show less diversity in agricultural exports while imports show a wide diversity. The export and import concentrations indicate the potential for trade increase following the liberalization. In this respect, India could benefit more due to a higher diversity in exports (lesser diversity in imports) than other SAARC countries.

METHODOLOGY

Many agricultural commodities are commonly exported from India to SAARC members. It includes cereals, fruits and vegetables, pulses, livestock products such as milk and milk products, meat products, processed products such as pickle, chutney, jam, jellies etc. There are very few commodities which are commonly exported from India to

Key words :

Direction of trade,
SAARC
countries,
Retention, Stable
market

Received:

February, 2011;

Accepted :

March, 2011

all SAARC member countries. Thus as per the data availability of major exportable agricultural commodities such as wheat, rice, mango and onion have been purposively selected for further analysis as these commodities are commonly exported from India to all other SAARC member countries. The area under consideration for analyzing of rice, wheat, mango and onion whole of India was taken into consideration at aggregate level so as to facilitate data compilation and prices in the international market. The nature of data used for the study is entirely based on secondary source of data. The yearly data on export quantity, value and unit value were compiled from various published journals, periodicals and websites for the period of 8 years (2001-02 to 2008-09).

Analytical tool and techniques employed:

Markov chain analysis:

SAARC member countries viz., Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka were considered for all selected commodities. While rest of the world considered as ‘other’ countries. Central to Markov chain analysis is the estimation of the transitional probability matrix P. The elements P_{ij} of the matrix P indicates the probability that export will switch from country i to country j with the passage of time. The diagonal elements of the matrix measure the probability that the export share of a country will be retained. Hence, an examination of the diagonal elements indicates the loyalty of an importing country to a particular country’s exports.

The average exports to a particular country was considered to be a random variable which depends only on the past exports to that country, which can be denoted algebraically as

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

where,

E_{jt} = Exports from India to j^{th} country during the year t.

E_{it-1} = Exports to i^{th} country during the period t-1.

P_{ij} = Probability that the exports will shift from i^{th} country to j^{th} country.

e_{jt} = The error term which is statistically independent of E_{it-1} .

t = Number of years considered for the analysis

r = Number of importing countries

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

$$0 \leq P_{ij} \leq 1$$

$$\sum_{i=1}^n P_{ij} = 1 \text{ for all } i$$

Thus, the expected export shares of each country during period ‘t’ were obtained by multiplying the export to these countries in the previous period (t-1) with the transitional probability matrix.

There are several approaches to estimate the transitional probabilities of the Markov chain model such as un weighted restricted least squares, weighted restricted least squares, Bayesian maximum likelihood, unrestricted least squares, etc. In the present study, minimum absolute deviations (MAD) estimation procedure was employed to estimate the transitional probability, which minimizes the sum of absolute deviations. The conventional linear programming technique was used, as this satisfies the properties of transitional probabilities of non-negativity restrictions and row sum constraints in estimation. (Mandana *et al.*, 1998 and Hugar, 2002)

The linear programming formulation is stated as

Min $OP^* + Ie$

Subject to,

$XP^* + V = Y$

$z \quad GP^* = 1$

$P^* \geq 0$

where,

0- is the vector of zeroes.

P^* - is the vector in which probability P_{ij} are arranged.

I - is an apparently dimensioned vector of area.

E - is a vector of absolute error (1 U 1).

Y - is the vector of export to each country.

X - is the block diagonal matrix of lagged values of Y

V - is the vector of errors

G - is the grouping matrix to add the row elements of P arranged in P^* to unity.

RESULTS AND ANALYSIS

Table 1 indicates that other countries were a stable market for Indian rice as market compared to the SAARC member countries in the current period. Among the SAARC countries, Maldives and Bangladesh were more stable market while Afghanistan, Bhutan, Nepal, Pakistan and Sri Lanka were highly unstable as reflected by their low transition probability value. Other countries together retained 76.77 per cent of their previous market share. Maldives retained 41.54 per cent of their previous market share. Bangladesh retained 22.86 per cent of its previous market share. Afghanistan, Bhutan, Nepal, Pakistan and

Table 1 : Transitional probability matrix of commodity exports for rice

Country	Afghanistan	Bangladesh	Bhutan	Maldives	Nepal	Pakistan	Sri Lanka	Others
Afghanistan	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
Bangladesh	0.0000	0.2286	0.0072	0.0087	0.0000	0.0017	0.0662	0.6876
Bhutan	0.0000	0.0000	0.0000	0.0000	0.1269	0.0000	0.0000	0.8731
Maldives	0.0000	0.0000	0.0000	0.4154	0.0000	0.0000	0.0000	0.5846
Nepal	0.0000	0.0000	0.0123	0.0112	0.0000	0.0000	0.0000	0.9765
Pakistan	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
Sri Lanka	0.0000	0.0000	0.0000	0.0096	0.0000	0.0000	0.0000	0.9904
Others	0.0000	0.1901	0.0000	0.0000	0.0422	0.0000	0.0000	0.7677

Table 2 : Transitional probability matrix of wheat export from India

Country	Afghanistan	Bangladesh	Bhutan	Maldives	Nepal	Pakistan	Sri Lanka	Others
Afghanistan	Nil	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bangladesh	0.0000	0.4540	0.0082	0.0000	0.0000	0.0008	0.1361	0.4009
Bhutan	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
Maldives	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nepal	0.0000	0.1678	0.0000	0.0000	0.0937	0.0000	0.0000	0.7385
Pakistan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
Sri Lanka	0.0000	0.1048	0.0000	0.0000	0.8520	0.0000	0.0432	0.0000
Others	0.0000	0.3747	0.0000	0.0000	0.0000	0.0000	0.0003	0.6251

Sri Lanka were highly unstable importers of rice among SAARC countries retaining zero per cent of their previous market share. The increase export to other countries and retention by major countries could be due to increase in level of expectance and high export competitiveness of Indian rice.

It is evident from Table 2 that other countries were stable market for Indian wheat among the importing countries and compared with SAARC member countries in the reference period as indicated by high retention probability of 62.51 per cent. Bangladesh and Nepal were major market among the SAARC members. India could not retain the previous export share to Bhutan, Maldives and Pakistan. Bangladesh which retained their 45.40 per cent previous market share. Similar interpretation can be made for Nepal, with probability of retention of 9.37 per

cent, Sri Lanka with retention probability of 4.32 per cent. On the contrary, Bhutan, Maldives and Pakistan having probability retention of zero indicating that they were unstable importers of Indian wheat. There was no wheat export from India to Afghanistan during the reference period. Hence, its transitional probability is indicated as "Nil".

It is revealed from Table 3 that other countries and Bangladesh were most stable market for Indian mango among the importing countries as reflected by high retention probability of 42.82 and 39.29 per cent, respectively. This was reflected in fact that India's share in total import of mango by Bangladesh would be on increasing trend in the future years.

Nepal is major importer of Indian mango besides other countries and Bangladesh as its retention probability is

Table 3 : Transitional probability matrix of commodity exports for mango

Country	Afghanistan	Bangladesh	Bhutan	Maldives	Nepal	Pakistan	Sri Lanka	Others
Afghanistan	Nil	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bangladesh	0.0000	0.3929	0.0000	0.0000	0.0667	0.0000	0.0000	0.5405
Bhutan	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
Maldives	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
Nepal	0.0000	0.8875	0.0000	0.0000	0.1125	0.0000	0.0000	0.0000
Pakistan	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
Sri Lanka	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
Others	0.0000	0.5343	0.0000	0.0003	0.0372	0.0000	0.0000	0.4282

Table 4 : Transitional probability matrix of commodity exports for onion

Country	Afghanistan	Bangladesh	Bhutan	Maldives	Nepal	Pakistan	Sri Lanka	Others
Afghanistan	Nil	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bangladesh	0.000	0.240	0.000	0.002	0.051	0.114	0.113	0.480
Bhutan	0.000	0.000	Nil	0.000	0.000	0.000	0.000	0.000
Maldives	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Nepal	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Pakistan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Sri Lanka	0.000	0.311	0.000	0.000	0.000	0.000	0.000	0.689
Others	0.000	0.431	0.000	0.004	0.028	0.000	0.173	0.364

11.25 per cent. India could not retain the previous export share to Bhutan, Maldives, Pakistan and Sri Lanka. These are the highly unstable market for Indian mango as they are having probability of retention of zero. There was no mango export from India to Afghanistan during the reference period. Hence, its transitional probability is indicated as “Nil”.

It is observed from the Table 4 that other countries and Bangladesh were most stable market for Indian onion among the SAARC member countries as reflected by high retention probability of 36.4 and 24.0 per cent, respectively during the reference period. Maldives, Nepal, Pakistan and Sri Lanka were highly unstable market for Indian onion as their transitional probability is zero. During the reference period there was no export of onion from India to Bhutan and Afghanistan. Hence, their transitional probability values are indicated as “Nil”.

Thus, the critical evaluation of study revealed that India has an edge to export rice, wheat, mango and onion to Bangladesh, Nepal and Sri Lanka. There is poor performance reflected in the case of Bhutan, Maldives, Pakistan and Afghanistan. There is need to develop and implement policies to encourage higher production to take advantage of the situation.

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