India's Comparative Advantage in Farm Trade in the Emerging Trade Order

Ramphul Ohlan, Institute of Management Studies and Research

Available at: https://works.bepress.com/ram-ohlan/7/
India’s Comparative Advantage in Farm Trade in the Emerging Trade Order

ARTICLE - JANUARY 2006
DOI: 10.1177/0015732515060202

1 AUTHOR:

Ramphul Ohlan
Maharshi Dayanand University
36 PUBLICATIONS  69 CITATIONS

All in-text references underlined in blue are linked to publications on ResearchGate, letting you access and read them immediately.
India’s Comparative Advantage in Farm Trade in the Emerging Trade Order

Ramphul and Ved Pal

The present study analyzes the competitiveness of Indian agriculture in the WTO regime. The efficiency indicators at exportable hypothesis indicate that in the emerging liberalized farm trade order, India’s export competitiveness is much better in commercial crops. The results of present study reflect that, at the margin, resources are more efficiently utilized in the cultivation of gram and rapeseed/mustard than in the cultivation of wheat at current levels of technologies and prices, and India has vast export potential provided that Agreement on Agriculture (AOA) remove developed countries trade barriers and withdraw domestic support to their agriculture. To generate adequate exportable surplus, India must maintain and enhance its production efficiency. The technology upgradation and infrastructure development are key domestic measures for enhancing competitiveness of Indian agriculture.

Introduction

The WTO agreement on agriculture (AOA) signed in 1994, and implemented since January 1995, strives to establish a fair and free market-oriented world trade in agricultural commodities. It is believed that in the emerging liberalized farm trade order, countries having comparative advantage in producing a commodity would dominate export in that commodity. The AOA of WTO in its Article XX incorporated the provision of continuing the process of negotiations to continue the process of opening up of world agricultural markets and reducing distortions. India, being a signatory to the AOA, to negotiate effectively in the future rounds, there is need to assess the capabilities of Indian farmers of becoming competitive producers of various agricultural commodities and analyze in what way AOA would affect the fortunes of Indian farmers. This necessitates investigating various factors, which determine export competitiveness of Indian agricultural commodities. The investigating of factors will lead to understand how the export competitiveness of Indian agriculture be enhanced and list
the domestic and international factors that influence competitiveness of Indian agriculture. For this, there is a need for intensive study to identify agricultural crops in which India has comparative advantage.

**Review of Literature**

There are few studies, who had tried in recent past to investigate the competitiveness of Indian agriculture, among them the prominent are given below. Sharma and Dutta (2001) studied competitiveness of Indian dairy products and found that there is a strong need for renegotiating India’s bound rates of duty for all dairy products, bringing it down to about 30-35 per cent. Gurudev and Asokan (2001) studied the impact of AOA on edible oilseeds sector and found that signing of AOA was unfavourable for Indian oilseeds sector and there is a need for renegotiation at WTO. Naik (2001) analyzed the competitiveness of Indian wheat and found that to encourage wheat production in relatively disadvantaged areas a bound price of 30 per cent may be negotiated. Jha (2001) tries to assess the competitiveness of some selected crops and found that India has no advantage in producing coarse cereals like maize and sorghum. In wheat and rice and in commercial crops like cotton and jute, the competitiveness is also at the margin and in most of horticulture items the India has lost its revealed comparative advantage. Chand (2005) tries to assess the competitiveness of some agriculture commodities (on the basis of projected cost cultivation data) and found that in case of wheat India has had no comparative advantage and rice is also price uncompetitive but has comparative advantage. India has comparative advantage in gur and both competitiveness and comparative advantage in groundnut. Bhalla (2005) analyzed the competitiveness of some selected field crops and found that Indian wheat, rice, oilseeds, coarse cereals and sugar are price uncompetitive, but have comparative advantage, while some other crops like cotton, tur and gram are price competitive. Gulati and Sharma (1997) worked out comparative advantage of agricultural commodities and found that India has no comparative advantage in producing oilseeds.

From these studies, it is observed that for estimating the Domestic Resources Cost, none of these studies adjusted their world reference prices of commodities for value of by-products and majority of these studies (except Bhalla) has used projected world reference prices of commodities, despite the availability of India’s actual CIF and FOB prices. The findings of most of these studies are contradictory in nature.
It demands for more evidence on comparative advantage. The present study is an attempt to analyze the competitiveness of India’s major farm products and draws suggestion for future negotiations on AOA. An attempt is also made to compare the export competitiveness of the India’s major agricultural commodities with respect to the other leading countries in agriculture export for same commodities.

**Objectives**

The objectives of our present study are:

(i) To assess the competitiveness of Indian agriculture.

(ii) To identify factors affecting the competitiveness of Indian agriculture.

**Methodology**

To achieve its objectives, the present study analyzed competitiveness of Indian agriculture on the basis of those field commodities, which have large share in agricultural trade during last decade. For measuring the competitiveness, we have used various standards tools in light of both importable and exportable hypothesis at state and all-India level. The standard techniques employed for analysis of the competitiveness of Indian agriculture are discussed as given below.

**Nominal Protection Coefficient (NPC)**

The NPC is the ratio of domestic to world reference prices of the commodity under consideration. NPC helps in measuring divergence of domestic prices from the world reference prices and thus determine the degree of domestic protection/disprotection of the commodity in question. This is defined as:

$$\text{NPC}_i = \frac{P_i^d}{P_i^b}$$

Where, NPC$_i$ is the Nominal Protection Coefficient of commodity $i$, $P_i^d$ is the domestic price of commodity $i$, adjusted for transportation, handling and marketing expenses and $P_i^b$ is the border price of commodity $i$, adjusted for transportation, handling and marketing expenses. If the Nominal Protection Coefficient (NPC) is greater (lesser) than one, then the commodity is protected (disprotected) compared to free trade scenario.
Effective Protection Coefficient

The EPC is the ratio of the value addition of commodity at domestic prices (i.e. domestic prices of a commodity minus the domestic value of all tradable inputs required to produce a unit of that commodity) to the value addition at world reference prices (i.e. border price equivalent minus value of all tradable inputs at border prices adjusted for transport, handling and marketing expenses). EPC is an improvement over NPC to the extent that it takes care of the distortions in domestic prices of tradable inputs. This is defined as:

$$\text{EPC}_i = \frac{\left( P_i^d - \sum_{j=1}^{k} A_{ij} P_j^d \right)}{\left( P_i^b - \sum_{j=1}^{k} A_{ij} P_j^b \right)}$$

Where, EPC$_i$ is the Effective Protection Coefficient of the commodity $i$, $P_i^d$ is the domestic price of the $i^{th}$ commodity, $A_{ij}$ is the quantity of the $j^{th}$ tradable input used to produce one unit of the $i^{th}$ commodity, $P_i^d$ is the domestic prices of the $j^{th}$ tradable input adjusted for transportation, handling and marketing expenses, $P_i^b$ is the border price of the $i^{th}$ commodity, $P_j^b$ is the border prices of the $j^{th}$ tradable input adjusted for transportation, handling and marketing expenses and $j$ is the all tradable inputs. The value of EPC greater than one indicates that the protection in input and output market provides incentive to produce the commodity and vice versa.

Effective Subsidy Coefficient (ESC)

The ESC is the ratio of value added at domestic prices adjusted for net subsidies (subsidy minus tax) on all inputs to the value added at border prices. The ESC is further an improvement over EPC as the latter is corrected by adjusting for the net subsidies on non-tradable inputs in domestic economy. It is defined as:

$$\text{ESC}_i = \frac{(\sum_{j=1}^{k} A_{ij} \bar{P}_j) + (\sum_{j=k+1}^{k} A_{ij} S_j - \sum_{j=k+1}^{k} A_{ij} T_j)}{\left( P_i^b - \sum_{j=1}^{k} A_{ij} P_j^b \right)}$$

Where, ESC$_i$ is the Effective Subsidy Coefficient for the commodity $i$, $S_j$ is the subsidy on the $j^{th}$ non-tradable input, $T_j$ is the tax on the $j^{th}$ non-
tradable input, while other expressions are same as mentioned for EPC. The value of ESC greater than one indicates that protection is accorded to the commodity in question, and less than one means that the commodity in question is competitive in world market.

**Domestic Resources Cost (DRC)**

The DRC is the value of domestic non-tradable factors of production needed to earn a unit of foreign exchange through export or save a unit of foreign exchange through import substitution by production of commodity under consideration. In other words, DRC is the ratio of the cost of domestic non-tradable resources (evaluated at shadow prices) to net foreign exchange earnings (i.e. value of output minus value of tradable inputs). DRC is defined as:

\[
\text{DRC}_i = \frac{\sum_{j=k+1}^{N} A_{ij} P_{ij}^s}{P_{iw} \left( \sum_{j=1}^{N} A_{iw} P_{iw} \right)}
\]

Where, \( A_{ij} \) is the requirement of \( j^{th} \) tradable input used to produce one unit of the \( i^{th} \) commodity, \( P_{ij}^s \) is the shadow price of \( j^{th} \) non-tradable input, \( P_{iw} \) is the world reference prices of the \( i^{th} \) commodity adjusted for by-product, transport, handling and marketing expenses and \( P_{iw} \) is the world reference prices of the \( j^{th} \) tradable input adjusted for transportation, handling and marketing expenses. The value of DRC greater than one means that the domestic resources can be put to better use in an alternative way and if less than one, then producing the commodity in question is a relatively sound use of resources.

**Export Performance Ratio (EPR)**

The EPR is defined as the ratio of the share of a particular commodity in the country's total exports to the share of that commodity in the world total exports. The export performance ratio of \( i^{th} \) commodity may be define as:

\[
\text{EPR}_i = \frac{E_i/CE}{W_i/WE}
\]

Where, EPR is the Export Performance Ratio of \( i^{th} \) commodity, \( E_i \) is the export of \( i^{th} \) commodity from the country, \( CE \) is the total exports of the
country in the reference year, \( W_i \) is the world total exports of the \( i^{th} \) commodity and \( WE \) is the world total exports in the reference year. The value of EPR greater than one indicates that country has comparative advantage in the exports of commodity and vice versa.

**Exportable and Importable Hypothesis**

The above-mentioned coefficients of competitiveness are calculated under exportable hypothesis and importable hypothesis depending upon whether the commodity under consideration is treated as an exportable or an importable item. Under importable hypothesis, the domestic commodity competes at a domestic consumption centre, while under exportable hypothesis the domestic commodity competes in foreign market. All the coefficients of competitiveness are calculated at state level except EPR which is calculated at national level. In India various states have large variation in agro-climate, infrastructure, resource endowments and other factors of production, so the comparative advantage in producing various agricultural commodities would differ from state-to-state. Hence, it becomes more appropriate to work out the export/import competitiveness of various agricultural commodities at state level. For some important agricultural commodities like horticulture and plantation crops cost of cultivation data is not available, so for these types of commodities EPR at national level is employed for measuring the revealed comparative advantage. For the rest of commodities other measures are employed. Keeping this in view, the four measures of competitiveness, namely NPC, EPC, ESC and DRC have been employed to work out the comparative advantage of various agricultural commodities at state level and for Revealed Comparative Advantage, the EPR has been worked out at national level. It is generally held that AOA is likely to result in large increase in Indian agricultural exports so, for the analysis of import competitiveness the only one measure is employed that is Nominal Protection Coefficient and for the analysis of export competitiveness all five measures are employed.

**Sources of Data**

For calculating the NPC, EPC, ESC and DRC, India’s CIF/FOB\(^1\) prices have been used as world reference prices and these are computed from the various issues of *Monthly Statistics of Foreign Trade of India*. Domestic prices referred to here, are the average wholesale prices obtained from various issues of *Agricultural Prices in India* and CACP.
Reports. The fertilizers, seed, insecticides/pesticides and fuel used in agricultural machinery have been treated as tradable inputs, while land, labour, manure and capital have been treated as primary non-tradable inputs. The 30 per cent of the total expenditure on agricultural machinery is used as expenditure on fuel for agricultural machinery. The international prices of fertilizers in nutrient form are obtained from Fertilizer Statistics, a publication of Fertilizers Association of India. The international prices of seeds are not available. In order to arrive at the international prices of seeds, difference in domestic and international prices of seeds have been assumed to be similar to their respective principal crops. Thus, international prices of seeds have been obtained by multiplying the domestic prices of seeds by the reverse of NPC of their output. For some commodities, namely rice, cotton and sugar cost of cultivation data is available for unprocessed commodities while they are traded in processed form, so on the basis of their recovery rate, processing cost and value of by-product, the cost of cultivation data of these crops is converted for processed commodity. Conversion factor for these crops is used as: for rice, 2/3 of paddy production; for cotton, 1/3 of kapas production and for sugar, 1/10 of cane crushed (ASAG 2004). For calculating ESC and DRC, three types of non-tradable inputs subsidies, namely credit subsidy, irrigation subsidy and power subsidy were estimated to take care of any market distortions. For crop specific allocation of the credit subsidy it is assumed that high value crops require more credit per hectare than low value crops. Thus the information of the credit subsidy for particular crops is retrieved on the basis of share of individual crop in total value of agricultural output in concerned state. The information on irrigation and power subsidy is retrieved based on percentage of area under each crop in the selected states. The per hectare irrigation and power subsidies is obtained by dividing the total subsidy on these two inputs by the gross irrigated area in selected state. The total subsidy on these two inputs going to a particular crop is obtained by multiplying the subsidy per hectare of irrigated area by the area under the irrigation for the crop. The per hectare subsidy for the crop is obtained by dividing the total subsidy for the crop by area under the crop. The freight rate used here is the railway freight for each commodity to the nearest port of embarkation/disembarkation obtained from various issues of Goods Tariffs (Vol. I & II), a publication of Ministry of Railways. The costs of production and inputs structure are obtained from the various issues of Reports of the Commission for Agricultural Costs and Prices (CACP). The EPR are computed on the basis of data available.
from various issues of FAO Trade Year Book. For DRC analysis, shadow price of land is taken as the net rent (i.e. rent minus land revenue paid to government) for that land prevalent in the locality. Because substantial disguised unemployment exists in the Indian agriculture, so shadow price of agricultural labour is taken as 80 per cent of the actual wage paid to labour, which is a standard parameter used by different studies and Planning Commission of India. The measures for computing the comparative advantage are computed for those states which are leading producers and consumers of concerned agricultural commodities. The list of states which are selected for this study is given in Table 1.

**TABLE 1**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>Haryana, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh, Delhi</td>
</tr>
<tr>
<td>Rice</td>
<td>Andhra Pradesh, Assam, Haryana, Madhya Pradesh, Orissa, Punjab, Uttar Pradesh, West Bengal</td>
</tr>
<tr>
<td>Maize</td>
<td>Andhra Pradesh, Madhya Pradesh, Rajasthan, Uttar Pradesh</td>
</tr>
<tr>
<td>Sorghum</td>
<td>Andhra Pradesh, Madhya Pradesh, Tamil Nadu</td>
</tr>
<tr>
<td>Gram</td>
<td>Delhi, Gujarat, Madhya Pradesh, Rajasthan, Uttar Pradesh</td>
</tr>
<tr>
<td>Tur</td>
<td>Andhra Pradesh, Gujarat, Madhya Pradesh, Uttar Pradesh, Delhi</td>
</tr>
<tr>
<td>Urad</td>
<td>Andhra Pradesh, Maharashtra, Uttar Pradesh, Tamil Nadu, Delhi</td>
</tr>
<tr>
<td>Moong</td>
<td>Andhra Pradesh, Gujarat, Madhya Pradesh, Tamil Nadu, Uttar Pradesh, Delhi</td>
</tr>
<tr>
<td>Groundnut</td>
<td>Andhra Pradesh, Gujarat, Tamil Nadu</td>
</tr>
<tr>
<td>Rapeseed/Mustard</td>
<td>Gujarat, Madhya Pradesh, Uttar Pradesh, Rajasthan, Haryana, Delhi</td>
</tr>
<tr>
<td>Cotton</td>
<td>Andhra Pradesh, Haryana, Gujarat, Maharashtra, Punjab, Karnataka</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>Andhra Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, Karnataka</td>
</tr>
</tbody>
</table>

The domestic wholesale prices are obtained from leading production and consumption centre in each selected state and for every commodity. For instance in case of Punjab, Ludhiana for wheat & rice and Abohar for cotton are selected for collecting wholesale prices. The time period for analysis of competitiveness of various agricultural commodities is selected on the basis of availability of essential latest data.

**Exportable Hypothesis**

It is generally held that AOA has provided an environment which will induce the Indian agricultural exports so, for the analysis of the export competitiveness all above-mentioned measures are employed. The NPC under exportable hypothesis for major agricultural
commodities having large share in India’s total agricultural export, for leading producing states are calculated by first taking the wholesale price of commodity at the production centre and adding to the freight charges up to nearest port of embarkation and handling charges including charges for loading the ship. It is then compared with actual free-on-board (FOB) price India charged for export of concerned commodity. The same FOB prices are used as the world reference prices for calculating the EPC and ESC, while calculating DRC the FOB prices are adjusted for the value of by-product. The EPR is calculated on the basis of data available from FAO Trade Year Book.

Results and Interpretation

The analysis of comparative advantage for various crops in different states in the light of information generated by different indicators of competitiveness is given below.

**Wheat:** In India the major producers of wheat are Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Bihar and Rajasthan. The NPC under exportable hypothesis reveals that during the years 1998-99 and 1999-2000, the domestic prices in all major producing states ruled lower than the FOB prices India charged for export implying wheat production in India during this period had been unprotected. But during the year 2000-01 and 2002-03, NPCs for all states are greater than one; it means that wheat produced in India during this period is highly protected. Here it is to be noted that wheat prices in the world market during the same period had been on the lower side. It is argued that fall in world prices of wheat was due to huge amount of subsidy given by the OECD countries to their wheat farmers. During the year 2004-05, gross farm receipts of wheat farmers in OECD countries were 49 per cent higher than what they would have been at world market prices without any support (OECD, 2005). The EPC and ESC coefficients have revealed the same results as by NPCs. The values of ESC are higher than EPCs for all states which reflect that Indian farmer received subsidy in the form of subsidized non-tradable inputs. But it is to be emphasized that the values of DRC for wheat remain less than one in all states during whole period under reference (except Madhya Pradesh during 2000-01 and 2001-02), but it has been fluctuated over the year [Table 2(a)].

**Rice:** The measures of export competitiveness for rice (common rice except parboiled) are calculated for Andhra Pradesh, Assam,
TABLE 2(a)
MEASURES OF COMPETITIVENESS OF WHEAT

<table>
<thead>
<tr>
<th>Year</th>
<th>Karnal (Haryana)</th>
<th>Indore (Madhya Pradesh)</th>
<th>Ludhiana (Punjab)</th>
<th>Jaipur (Rajasthan)</th>
<th>Hapur (Uttar Pradesh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPC</td>
<td>EPC</td>
<td>ESC</td>
<td>DRC</td>
<td>NPC</td>
</tr>
<tr>
<td>1998-99</td>
<td>0.870</td>
<td>0.935</td>
<td>0.987</td>
<td>0.453</td>
<td>0.974</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.855</td>
<td>0.841</td>
<td>0.899</td>
<td>0.464</td>
<td>1.022</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.285</td>
<td>1.344</td>
<td>1.439</td>
<td>0.947</td>
<td>1.733</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.303</td>
<td>1.377</td>
<td>1.474</td>
<td>0.911</td>
<td>1.611</td>
</tr>
<tr>
<td>2002-03</td>
<td>1.274</td>
<td>1.350</td>
<td>1.445</td>
<td>0.828</td>
<td>1.512</td>
</tr>
</tbody>
</table>

Haryana, Madhya Pradesh, Orissa, Punjab, Uttar Pradesh and West Bengal. The NPCs reveal that during the period 1998-99 to 2000-01, rice export was highly competitive in all states. But from the year 2001-02 onward due to decline in international prices rice export has become highly non-competitive in all states. Here it is to be noted that rice is the crop which is highly subsidized by OECD countries. During the year 2004-05, gross farm receipts of rice farmers in OECD countries were 296
per cent higher than what they would have been at world market prices without any support and NPC of rice was 3.76. This value of NPC shows that wholesale price of rice in OECD countries is 276 per cent higher than world market prices (OECD, 2005). The values of EPC and ESC imply that during the period 1998-99 to 2001-02 in domestic market there was not any protection to rice in any state. However, during the year 2001-02 and 2002-03 due to fall in international prices, rice in all states (except Orissa and West Bengal) had enjoyed net government protection. It is noted that the DRC for all states is less than one during the whole period under reference, but it has been moving towards one [Table 2(b)]. The DRC results indicate that it is highly paying for the country as a whole to promote export of rice, but during the year 2001-02 and 2002-03, individual private traders might not find it profitable to export due to fall in rice prices in world market.

**Maize:** Measures of export competitiveness of maize are calculated for Andhra Pradesh, Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. The computed values of NPC, EPC, ESC and DRC are on lowest side and below one for all these states during whole period under reference [Table 2(c)]. This means that domestic prices of maize in all states under investigation were significantly lower than the FOB prices India charged for export. It reveals that Indian maize is highly competitive. During the year 2004-05 the gross farm receipts of OECD countries maize farmers were 44 per cent higher than what they would have been at world market prices without any support, where NPC of maize in these countries was 1.20 (OECD, 2005).

**Jowar (Sorghum):** Jowar is grown mainly in Maharashtra, Karnataka, Madhya Pradesh and Andhra Pradesh. In the case of Jowar, NPC are less than one for all major producing states during whole period under reference (except Madhya Pradesh during 1998-99) [Table 2(d)]. EPC and ECS are also less than one (except 1996-97 for Andhra Pradesh and 1998-99 for Karnataka and Madhya Pradesh); the values of DRC have remained less than one for all states. All these measures indicate that Indian Jowar is highly competitive at exportable hypothesis.

**Gram and Tur:** Measures of export competitiveness of gram and tur are calculated for Andhra Pradesh, Madhya Pradesh, Rajasthan and Uttar Pradesh. Gram and tur are among those commodities for which NPC, EPC, ESC and DRC all are less than one for all states during whole period under reference [Tables 2(e, f)]. The problem of pulses is not its lack of
TABLE 2(b)
MEASURES OF COMPETITIVENESS OF RICE

<table>
<thead>
<tr>
<th>Year</th>
<th>Measures of Competitiveness under Export Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPC</td>
</tr>
<tr>
<td>Vizanagar (Andhra Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.761</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.606</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.547</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.200</td>
</tr>
<tr>
<td>Gauripur (Assam)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.896</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.653</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.520</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.045</td>
</tr>
<tr>
<td>Karnal (Haryana)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.851</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.643</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.540</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.141</td>
</tr>
<tr>
<td>Indore (Madhya Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.737</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.603</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.569</td>
</tr>
<tr>
<td>Sambalpur (Orissa)</td>
<td></td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.489</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.465</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.893</td>
</tr>
<tr>
<td>Ludhiana (Punjab)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.873</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.652</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.567</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.017</td>
</tr>
<tr>
<td>Hapur (Uttar Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.712</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.635</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.545</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.133</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.817</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.534</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.433</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.858</td>
</tr>
</tbody>
</table>
INDIA'S COMPARATIVE ADVANTAGE IN FARM TRADE

**TABLE 2(c)**

MEASURES OF COMPETITIVENESS OF MAIZE

<table>
<thead>
<tr>
<th>Year</th>
<th>NPC</th>
<th>EPC</th>
<th>ESC</th>
<th>DRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vizanagar (Andhra Pradesh)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996-97</td>
<td>0.7333</td>
<td>0.717</td>
<td>0.759</td>
<td>0.780</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.4756</td>
<td>0.414</td>
<td>0.452</td>
<td>0.581</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.6041</td>
<td>0.573</td>
<td>0.611</td>
<td>0.581</td>
</tr>
<tr>
<td>Jhabua (Madhya Pradesh)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.702</td>
<td>0.682</td>
<td>0.749</td>
<td>0.614</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.659</td>
<td>0.612</td>
<td>0.659</td>
<td>0.719</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.936</td>
<td>0.899</td>
<td>0.959</td>
<td>0.929</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.751</td>
<td>0.735</td>
<td>0.772</td>
<td>0.852</td>
</tr>
<tr>
<td>Udaypur (Rajasthan)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.724</td>
<td>0.727</td>
<td>0.765</td>
<td>0.665</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.567</td>
<td>0.543</td>
<td>0.580</td>
<td>0.628</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.674</td>
<td>0.645</td>
<td>0.697</td>
<td>0.850</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.772</td>
<td>0.804</td>
<td>0.843</td>
<td>0.924</td>
</tr>
<tr>
<td>Hapur (Uttar Pradesh)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.689</td>
<td>0.678</td>
<td>0.703</td>
<td>0.639</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.565</td>
<td>0.549</td>
<td>0.562</td>
<td>0.628</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.721</td>
<td>0.699</td>
<td>0.751</td>
<td>0.523</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.772</td>
<td>0.762</td>
<td>0.778</td>
<td>0.736</td>
</tr>
</tbody>
</table>

competitiveness but inadequate generation of exportable surpluses. It causes India to import large quantities of pulses every year (i.e. 1701 thousand tones during the year 2003-04).

**Rapeseed/Mustard:** Rapeseed is grown mainly in Rajasthan, Uttar Pradesh, Haryana and Gujarat. The NPC, EPC, ESC and DRC all are lowest and below one for all major producing states during the period under reference [Table 2(g)]. This means that, even if inputs subsidies are completely withdrawn mustard production remains export competitive in all major producing states. In 2002-03, DRC of mustard for Rajasthan is 0.5088. This indicates that to earn one rupee of foreign exchange through export of mustard, Rajasthan has to use its domestic resources only worth Rs. 0.50. Thus, DRC below one indicates that allocating more resources for mustard production to promote its export is socially desirable.

**Sugarcane/Sugar:** Sugarcane is grown mainly in Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh. The NPC,
### TABLE 2(d)

**MEASURES OF COMPETITIVENESS OF JOWAR (SORGHUM)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Nellore (Andhra Pradesh)</th>
<th>Bangalore (Karnataka)</th>
<th>Kolhapur (Maharashtra)</th>
<th>Chindwara (Madhya Pradesh)</th>
<th>Koimbatore (Tamil Nadu)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPC</td>
<td>EPC</td>
<td>ESC</td>
<td>NPC</td>
<td>EPC</td>
</tr>
<tr>
<td>1996-97</td>
<td>0.930</td>
<td>0.951</td>
<td>1.003</td>
<td>0.959</td>
<td>0.700</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.618</td>
<td>0.577</td>
<td>0.632</td>
<td>0.559</td>
<td>0.432</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.653</td>
<td>0.604</td>
<td>0.665</td>
<td>0.555</td>
<td>0.982</td>
</tr>
</tbody>
</table>

#### Nellore (Andhra Pradesh)
- 1996-97: NPC = 0.930, EPC = 0.951, ESC = 1.003, DRC = 0.828
- 2000-01: NPC = 0.618, EPC = 0.577, ESC = 0.632, DRC = 0.674
- 2001-02: NPC = 0.653, EPC = 0.604, ESC = 0.665, DRC = 0.674

#### Bangalore (Karnataka)
- 1998-99: NPC = 0.554, EPC = 0.498, ESC = 0.559, DRC = 0.700
- 1999-2000: NPC = 0.345, EPC = 0.292, ESC = 0.522, DRC = 0.432
- 2000-01: NPC = 0.486, EPC = 0.437, ESC = 0.502, DRC = 0.515
- 2001-02: NPC = 0.555, EPC = 0.505, ESC = 0.555, DRC = 0.982

#### Kolhapur (Maharashtra)
- 1998-99: NPC = 1.009, EPC = 1.038, ESC = 1.455, DRC = 0.581
- 1999-2000: NPC = 0.469, EPC = 0.465, ESC = 0.497, DRC = 0.339
- 2000-01: NPC = 0.566, EPC = 0.505, ESC = 0.542, DRC = 0.536
- 2001-02: NPC = 0.739, EPC = 0.724, ESC = 0.766, DRC = 0.832

#### Chindwara (Madhya Pradesh)
- 1998-99: NPC = 0.497, EPC = 0.478, ESC = 0.528, DRC = 0.603
- 1999-2000: NPC = 0.301, EPC = 0.288, ESC = 0.314, DRC = 0.389
- 2000-01: NPC = 0.766, EPC = 0.759, ESC = 0.813, DRC = 0.614
- 2001-02: NPC = 0.592, EPC = 0.564, ESC = 0.597, DRC = 0.872

#### Koimbatore (Tamil Nadu)
- 1998-99: NPC = 0.736, EPC = 0.713, ESC = 0.765, DRC = 0.529
- 1999-2000: NPC = 0.355, EPC = 0.337, ESC = 0.412, DRC = 0.415
- 2000-01: NPC = 0.549, EPC = 0.528, ESC = 0.582, DRC = 0.414
- 2001-02: NPC = 0.813, EPC = 0.810, ESC = 0.906, DRC = 0.661

EPC and ESC of sugar for all major producing states are greater than one during the whole period under reference [Table 2(h)]. This means that all states are non-competitive in sugar export. It is observed that world sugar market is highly volatile. The NPC of sugar for OECD countries during the year 2004-05 was 2.36. It means that domestic prices of sugar in OECD countries were 136 per cent higher than world market prices (OECD, 2005). The DRC for all major producing states in India are significantly less than one. DRC reveals that it is socially paying and beneficial proposition to devote resources to sugarcane production for export of sugar. During the year 2003-04, for every one rupee earned from value added in sugarcane production for export there was a cost of Rs. 0.46 in Karnataka and Rs 0.51 in Uttar Pradesh.
### TABLE 2(e)

**MEASURES OF COMPETITIVENESS OF GRAM**

<table>
<thead>
<tr>
<th>Year</th>
<th>Measures of Competitiveness under Export Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPC</td>
</tr>
<tr>
<td>Hosangabad (Madhya Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.552</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.730</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.621</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.545</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.695</td>
</tr>
<tr>
<td>Jaipur (Rajasthan)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.609</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.721</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.698</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.745</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.695</td>
</tr>
<tr>
<td>Allahabad (Uttar Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.679</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.749</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.841</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.795</td>
</tr>
</tbody>
</table>

### TABLE 2(f)

**MEASURES OF COMPETITIVENESS OF TUR**

<table>
<thead>
<tr>
<th>Year</th>
<th>Measures of Competitiveness under Exportable Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPC</td>
</tr>
<tr>
<td>Dohda (Gujarat)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.647</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.550</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.424</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.521</td>
</tr>
<tr>
<td>Sagar (Madhya Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.708</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.716</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.524</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.502</td>
</tr>
<tr>
<td>Hapur (Uttar Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.614</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.542</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.555</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.613</td>
</tr>
</tbody>
</table>
### TABLE 2(g)

**MEASURES OF COMPETITIVENESS OF RAPESEED & MUSTARD**

<table>
<thead>
<tr>
<th>Year</th>
<th>NPC</th>
<th>EPC</th>
<th>ESC</th>
<th>DRC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rajkot (Gujarat)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.535</td>
<td>0.511</td>
<td>0.570</td>
<td>0.382</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.636</td>
<td>0.609</td>
<td>0.658</td>
<td>0.426</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.398</td>
<td>0.370</td>
<td>0.469</td>
<td>0.361</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.540</td>
<td>0.501</td>
<td>0.614</td>
<td>0.559</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.700</td>
<td>0.680</td>
<td>0.826</td>
<td>0.573</td>
</tr>
<tr>
<td><strong>Rohtak (Haryana)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.876</td>
<td>0.867</td>
<td>0.921</td>
<td>0.482</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.738</td>
<td>0.727</td>
<td>0.778</td>
<td>0.418</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.451</td>
<td>0.434</td>
<td>0.465</td>
<td>0.322</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.659</td>
<td>0.642</td>
<td>0.685</td>
<td>0.456</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.849</td>
<td>0.831</td>
<td>0.904</td>
<td>0.669</td>
</tr>
<tr>
<td><strong>Ganganagar (Rajasthan)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.953</td>
<td>0.951</td>
<td>0.977</td>
<td>0.346</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.715</td>
<td>0.700</td>
<td>0.738</td>
<td>0.365</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.471</td>
<td>0.470</td>
<td>0.506</td>
<td>0.295</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.605</td>
<td>0.588</td>
<td>0.623</td>
<td>0.331</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.726</td>
<td>0.716</td>
<td>0.779</td>
<td>0.509</td>
</tr>
<tr>
<td><strong>Gorakhpur (Uttar Pradesh)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>0.729</td>
<td>0.712</td>
<td>0.749</td>
<td>0.382</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.764</td>
<td>0.754</td>
<td>0.769</td>
<td>0.426</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.445</td>
<td>0.427</td>
<td>0.437</td>
<td>0.323</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.629</td>
<td>0.609</td>
<td>0.623</td>
<td>0.420</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.711</td>
<td>0.707</td>
<td>0.725</td>
<td>0.608</td>
</tr>
</tbody>
</table>

**Cotton:** Cotton is one of the major commercial crops in the country. It is grown mainly in Maharashtra, Gujarat, Andhra Pradesh, Punjab, Haryana and Karnataka. The computed values of NPC, EPC and ESC are less than one for all states during whole period under reference (except the year 2000-01). DRCs of cotton for all states during whole period under reference (except the year 2000-01 for Gujarat) are less than one [Table 2(i)]. It implies the competitiveness of India in cotton. But during the period 1998-99 to 2002-03 cotton export has registered a major decline because of increase in its domestic demand.

In order to generate more evidence on comparative advantage, especially for horticulture and plantation crops, export performance
TABLE 2(h)
MEASURES OF COMPETITIVENESS OF SUGAR/SUGARCANE

<table>
<thead>
<tr>
<th>Year</th>
<th>Measures of Competitiveness under Export Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPC</td>
</tr>
<tr>
<td>Hyderabad (Andhra Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>1.147</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.408</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.182</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.243</td>
</tr>
<tr>
<td>Ahmednagar (Maharashtra)</td>
<td></td>
</tr>
<tr>
<td>1997-98</td>
<td>1.046</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.199</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.259</td>
</tr>
<tr>
<td>Chennai (Tamil Nadu)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>1.121</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.403</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.181</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.256</td>
</tr>
<tr>
<td>Kanpur (Uttar Pradesh)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>1.253</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.561</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.292</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.439</td>
</tr>
<tr>
<td>Shimoga (Karnataka)</td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>1.192</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.492</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.189</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.264</td>
</tr>
</tbody>
</table>

ratios are worked out. The values of EPR are computed for selected commodities as given in Table 3. As export of some of agricultural commodities has often been regulated, so EPR for some cereals, pulses and other similar commodities, in which export restrictions continued for most of the years, have not presented in Table 3. The EPRs reveal that India has comparative advantage in export of commercial agricultural commodities namely tea, coffee, pepper, pimento, tobacco, onions and selected oilseeds like groundnut, sesame seeds, castor oil and oilseed cake. In the WTO regime EPRs for some agricultural commodities, namely pepper, tea, coffee, oilseed cake, cotton lint, castor oil and grapes have been decelerating sharply, while the EPRs for commodities, namely sesame seed, natural rubber and oranges has been increasing. The EPR for rice is also greater than 10 during the whole period under reference but it has been fluctuating. The EPRs for wheat,
potato, cotton, sugar, banana, peers and apples are less than one and fluctuating over the years (Table 3).

**Importable Hypothesis**

**Net Protection Coefficient**

It is generally held that AOA is likely to promote the agricultural exports so, for import competitiveness, we have employed only one measure that is Nominal Protection Coefficient. The Net Protection Coefficient under importable hypothesis of major agricultural commodities for leading consuming states have been worked out by adding the CIF prices to the transportation and handling charges up to the main consumption center. It is then compared with the wholesale prices at the consumption centers. The transportation costs are railway freight for each commodity to the nearest port of disembarkation and wholesale prices are the average price for the year under reference. The main producing centers for the various agricultural commodities have been treated as main consuming center also.
## TABLE 3

**EXPORT PERFORMANCE RATIOS (EPRs) OF VARIOUS AGRICULTURAL COMMODITIES DURING THE PERIOD 1993-2003**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes</td>
<td>0.098</td>
<td>0.402</td>
<td>0.411</td>
<td>0.490</td>
<td>0.705</td>
<td>0.569</td>
<td>0.352</td>
<td>0.101</td>
<td>0.214</td>
<td>0.466</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>0.002</td>
<td>0.013</td>
<td>0.012</td>
<td>0.007</td>
<td>0.007</td>
<td>0.169</td>
<td>0.007</td>
<td>0.087</td>
<td>0.045</td>
<td></td>
</tr>
<tr>
<td>Oranges</td>
<td>0.066</td>
<td>0.110</td>
<td>0.063</td>
<td>0.196</td>
<td>0.217</td>
<td>0.234</td>
<td>0.261</td>
<td>0.299</td>
<td>0.194</td>
<td>0.331</td>
</tr>
<tr>
<td>Bananas</td>
<td>0.024</td>
<td>0.012</td>
<td>0.011</td>
<td>0.004</td>
<td>0.003</td>
<td>0.096</td>
<td>0.111</td>
<td>0.071</td>
<td>0.067</td>
<td></td>
</tr>
<tr>
<td>Apples</td>
<td>0.171</td>
<td>0.146</td>
<td>0.116</td>
<td>0.190</td>
<td>0.218</td>
<td>0.236</td>
<td>0.121</td>
<td>0.170</td>
<td>0.135</td>
<td>0.109</td>
</tr>
<tr>
<td>Grapes</td>
<td>1.096</td>
<td>1.145</td>
<td>1.298</td>
<td>1.172</td>
<td>0.590</td>
<td>0.521</td>
<td>0.865</td>
<td>0.714</td>
<td>0.997</td>
<td>0.931</td>
</tr>
<tr>
<td>Pears</td>
<td>0.134</td>
<td>0.005</td>
<td>0.005</td>
<td>0.000</td>
<td>0.000</td>
<td>0.002</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Pineapples</td>
<td>0.000</td>
<td>0.005</td>
<td>0.017</td>
<td>0.001</td>
<td>0.009</td>
<td>0.010</td>
<td>0.030</td>
<td>0.088</td>
<td>0.057</td>
<td>0.067</td>
</tr>
<tr>
<td>Natural rubber</td>
<td>0.008</td>
<td>0.079</td>
<td>0.100</td>
<td>0.113</td>
<td>0.140</td>
<td>0.195</td>
<td>0.052</td>
<td>0.142</td>
<td>0.820</td>
<td>1.169</td>
</tr>
<tr>
<td>Tobacco</td>
<td>1.268</td>
<td>0.631</td>
<td>0.783</td>
<td>1.469</td>
<td>0.640</td>
<td>1.261</td>
<td>1.641</td>
<td>1.178</td>
<td>1.243</td>
<td>1.432</td>
</tr>
<tr>
<td>Cotton lint</td>
<td>5.198</td>
<td>0.750</td>
<td>0.962</td>
<td>6.592</td>
<td>5.820</td>
<td>1.065</td>
<td>0.298</td>
<td>0.129</td>
<td>0.195</td>
<td>2.652</td>
</tr>
<tr>
<td>Castor Oil</td>
<td>118.216</td>
<td>124.479</td>
<td>141.625</td>
<td>139.817</td>
<td>130.864</td>
<td>133.973</td>
<td>134.158</td>
<td>106.400</td>
<td>91.239</td>
<td>97.197</td>
</tr>
<tr>
<td>Raw sugar</td>
<td>0.765</td>
<td>0.129</td>
<td>0.289</td>
<td>2.394</td>
<td>0.000</td>
<td>0.000</td>
<td>0.083</td>
<td>2.509</td>
<td>1.135</td>
<td>1.932</td>
</tr>
<tr>
<td>Refined sugar</td>
<td>1.281</td>
<td>0.557</td>
<td>4.641</td>
<td>3.731</td>
<td>1.636</td>
<td>0.149</td>
<td>0.035</td>
<td>7.395</td>
<td>6.419</td>
<td>4.335</td>
</tr>
<tr>
<td>Wheat</td>
<td>0.008</td>
<td>0.157</td>
<td>0.917</td>
<td>2.436</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>2.817</td>
<td>2.962</td>
<td>3.094</td>
</tr>
</tbody>
</table>
Cereals: In the case of wheat, the values of NPC at importable hypothesis are less than one till 2001-02 (except 1999-2000 for Uttar Pradesh, Madhya Pradesh, Bihar and Delhi and 2000-01 and 2001-02 for Madhya Pradesh) but with 2002-03 NPC of wheat has become greater than one. It reveals that Indian wheat has become price uncompetitive in recent years [Table 4(a)]. In case of rice, the results in Table 4(b) show that India has maintained its competitiveness in rice under the importable hypothesis in majority of the recent years with the values of NPC being less than one for all states for whole period under reference (except 1998-99 and 1999-2000 for some states). The higher value of NPC during 1998-2000, may be reasoned due to depressed prices of rice in the international market.²

### TABLE 4(a)
WHEAT NPC AT IMPORTABLE HYPOTHESIS

<table>
<thead>
<tr>
<th>Year</th>
<th>Ludhiana (Punjab)</th>
<th>Karnal (Haryana)</th>
<th>Hapur (UP)</th>
<th>Indore (MP)</th>
<th>Patna (Bihar)</th>
<th>Jaipur (Rajasthan)</th>
<th>Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>0.768</td>
<td>0.786</td>
<td>0.783</td>
<td>0.935</td>
<td>0.958</td>
<td>0.770</td>
<td>0.896</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.859</td>
<td>0.941</td>
<td>1.020</td>
<td>1.197</td>
<td>1.232</td>
<td>0.969</td>
<td>1.083</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.758</td>
<td>0.731</td>
<td>0.741</td>
<td>1.052</td>
<td>0.931</td>
<td>0.818</td>
<td>0.843</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.838</td>
<td>0.821</td>
<td>0.869</td>
<td>1.084</td>
<td>0.988</td>
<td>0.915</td>
<td>0.921</td>
</tr>
<tr>
<td>2002-03</td>
<td>1.229</td>
<td>1.264</td>
<td>1.291</td>
<td>1.567</td>
<td>1.520</td>
<td>1.530</td>
<td>1.511</td>
</tr>
<tr>
<td>2003-04</td>
<td>1.001</td>
<td>1.041</td>
<td>1.111</td>
<td>1.341</td>
<td>1.279</td>
<td>1.193</td>
<td>1.223</td>
</tr>
</tbody>
</table>

### TABLE 4(b)
RICE NPC AT IMPORTABLE HYPOTHESIS

<table>
<thead>
<tr>
<th>Year</th>
<th>Ludhiyana (Punjab)</th>
<th>Karnal (Haryana)</th>
<th>Hapur (UP)</th>
<th>Vizanagar (AP)</th>
<th>Shimoga (Karnataka)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>1.068</td>
<td>1.045</td>
<td>0.878</td>
<td>1.064</td>
<td>1.341</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.001</td>
<td>0.999</td>
<td>0.993</td>
<td>1.069</td>
<td>1.243</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.656</td>
<td>0.629</td>
<td>0.638</td>
<td>0.708</td>
<td>0.696</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.692</td>
<td>0.787</td>
<td>0.786</td>
<td>0.927</td>
<td>0.847</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.757</td>
<td>0.788</td>
<td>0.801</td>
<td>0.913</td>
<td>0.870</td>
</tr>
<tr>
<td>2003-04</td>
<td>0.354</td>
<td>0.401</td>
<td>0.351</td>
<td>0.468</td>
<td>0.399</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Chennai (Tamil Nadu)</th>
<th>Gauripur (Assam)</th>
<th>Sambalpur (Orissa)</th>
<th>Kolkata (W. Bengal)</th>
<th>Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>1.129</td>
<td>1.240</td>
<td>0.970</td>
<td>1.137</td>
<td>1.059</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.119</td>
<td>1.148</td>
<td>0.872</td>
<td>0.949</td>
<td>1.002</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.694</td>
<td>0.674</td>
<td>0.605</td>
<td>0.564</td>
<td>0.682</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.846</td>
<td>0.812</td>
<td>0.699</td>
<td>0.672</td>
<td>0.856</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.972</td>
<td>0.844</td>
<td>0.725</td>
<td>0.765</td>
<td>0.897</td>
</tr>
<tr>
<td>2003-04</td>
<td>0.448</td>
<td>0.373</td>
<td>0.321</td>
<td>0.357</td>
<td>0.443</td>
</tr>
</tbody>
</table>

Downloaded from fr.sagepub.com by SAGE Production (DO NOT CHANGE THE PASSWORD) on February 4, 2016
TABLE 4(c)

<table>
<thead>
<tr>
<th>Year</th>
<th>Patna (Bihar)</th>
<th>Jhabua (Madhya Pradesh)</th>
<th>Udaypur (Rajasthan)</th>
<th>Hapur (Uttar Pradesh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>1.023</td>
<td>0.944</td>
<td>0.927</td>
<td>0.873</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.024</td>
<td>0.965</td>
<td>0.786</td>
<td>0.775</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.812</td>
<td>1.080</td>
<td>0.820</td>
<td>0.872</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.709</td>
<td>0.648</td>
<td>0.566</td>
<td>0.631</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.269</td>
<td>0.255</td>
<td>0.243</td>
<td>0.226</td>
</tr>
<tr>
<td>2003-04</td>
<td>0.298</td>
<td>0.294</td>
<td>0.271</td>
<td>0.222</td>
</tr>
</tbody>
</table>

In the case of maize the value of NPC is less than one for all major producing states during whole period under reference (except 1998-99 and 1999-2000 for Bihar). During the year 2003-04, for Uttar Pradesh, the NPC of maize is 0.222 [Table 4(c)]. It reveals that domestic prices ruled in Uttar Pradesh were 77 per cent less than the CIF price India paid for import of maize.

Pulses and Oil Seeds: In the case of tur, the values of NPC are fluctuating over the period. For most of the period the values of NPC of tur remaining less than one show the existence of competitiveness of tur for Indian states. But the year 2003-04 witnessed the eroding of competitiveness in tur which is reflected in the form of greater than one values of NPCs for most of the states [Table 4(d)].

For Gram the values of NPC are less than one for most of the period which indicate the competitiveness of Indian gram [Table 4(e)].

In case of urad, the values of NPC are marginally exceeded one for most of the years [Table 4(f)]. It shows the uncompetitiveness of urad crop under importable hypothesis.

In case of moong for all major producing states, namely Andhra Pradesh, Madhya Pradesh, Gujarat, Tamil Nadu and Uttar Pradesh, the values of NPCs are less than one during whole period under reference (except Delhi during 2001-02) [Table 4(g)], reflecting the domination of India in producing moong at competitive price.

In case of oil seeds, for groundnut the value of NPC is less than one for all major producing states during whole period under reference [Table 4(h)]. It indicates that Indian groundnut is highly competitive.
### TABLE 4(d)
**TUR NPC AT IMPORTABLE HYPOTHESIS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Vizanagar (Andhra Pradesh)</th>
<th>Dodha (Gujarat)</th>
<th>Sagar (Madhya Pradesh)</th>
<th>Hapur (Uttar Pradesh)</th>
<th>Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>0.729</td>
<td>1.089</td>
<td>1.135</td>
<td>0.968</td>
<td>1.179</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.569</td>
<td>0.766</td>
<td>0.947</td>
<td>0.756</td>
<td>0.883</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.956</td>
<td>0.701</td>
<td>0.773</td>
<td>0.878</td>
<td>1.021</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.921</td>
<td>0.933</td>
<td>0.850</td>
<td>1.007</td>
<td>1.197</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.907</td>
<td>1.057</td>
<td>0.965</td>
<td>1.055</td>
<td>1.267</td>
</tr>
<tr>
<td>2003-04</td>
<td>0.950</td>
<td>1.017</td>
<td>1.040</td>
<td>1.140</td>
<td>1.466</td>
</tr>
</tbody>
</table>

### TABLE 4(e)
**GRAM NPC AT IMPORTABLE HYPOTHESIS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Dodha (Gujarat)</th>
<th>Ganganagar (Rajasthan)</th>
<th>Allahabad (Uttar Pradesh)</th>
<th>Hoshangabad (Madhya Pradesh)</th>
<th>Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>0.687</td>
<td>0.616</td>
<td>0.685</td>
<td>0.570</td>
<td>0.786</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.653</td>
<td>0.594</td>
<td>0.677</td>
<td>0.627</td>
<td>0.728</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.665</td>
<td>0.612</td>
<td>0.654</td>
<td>0.554</td>
<td>0.632</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.009</td>
<td>0.953</td>
<td>1.071</td>
<td>0.713</td>
<td>1.091</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.953</td>
<td>0.870</td>
<td>0.989</td>
<td>0.887</td>
<td>1.035</td>
</tr>
<tr>
<td>2003-04</td>
<td>0.882</td>
<td>0.901</td>
<td>0.923</td>
<td>0.884</td>
<td>0.975</td>
</tr>
</tbody>
</table>

### TABLE 4(f)
**URAD NPC AT IMPORTABLE HYPOTHESIS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Vizanagar (Andhra Pradesh)</th>
<th>Mumbai (Maharashtra)</th>
<th>Hapur (Uttar Pradesh)</th>
<th>Virudhunagar (Tamil Nadu)</th>
<th>Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>1.010</td>
<td>0.932</td>
<td>1.084</td>
<td>1.259</td>
<td>1.134</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.964</td>
<td>1.539</td>
<td>1.093</td>
<td>1.190</td>
<td>1.095</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.742</td>
<td>1.266</td>
<td>0.841</td>
<td>0.953</td>
<td>1.003</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.728</td>
<td>1.245</td>
<td>0.805</td>
<td>0.958</td>
<td>1.137</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.845</td>
<td>1.436</td>
<td>0.842</td>
<td>1.013</td>
<td>1.151</td>
</tr>
</tbody>
</table>

### TABLE 4(g)
**MOONG NPC AT IMPORTABLE HYPOTHESIS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Vizanagar (AP)</th>
<th>Dodha (Gujarat)</th>
<th>Chindwara (MP)</th>
<th>Chennai (Tamil Nadu)</th>
<th>Kanpur (UP)</th>
<th>Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>0.673</td>
<td>0.706</td>
<td>0.619</td>
<td>0.849</td>
<td>0.715</td>
<td>0.779</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.714</td>
<td>0.827</td>
<td>0.709</td>
<td>0.900</td>
<td>0.785</td>
<td>0.912</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.715</td>
<td>0.826</td>
<td>0.699</td>
<td>0.909</td>
<td>0.793</td>
<td>0.934</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.749</td>
<td>0.821</td>
<td>0.707</td>
<td>0.987</td>
<td>0.845</td>
<td>1.034</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.695</td>
<td>0.789</td>
<td>0.638</td>
<td>0.864</td>
<td>0.690</td>
<td>0.914</td>
</tr>
</tbody>
</table>
TABLE 4(h)
GROUNDNUT NPC AT IMPORTABLE HYPOTHESIS

<table>
<thead>
<tr>
<th>Year</th>
<th>Nandayal (Andhra Pradesh)</th>
<th>Rajkot (Gujarat)</th>
<th>Cheanni (Tamil Nadu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>0.677</td>
<td>0.689</td>
<td>0.657</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.462</td>
<td>0.449</td>
<td>0.375</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.327</td>
<td>0.315</td>
<td>0.328</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.455</td>
<td>0.471</td>
<td>0.487</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.455</td>
<td>0.471</td>
<td>0.487</td>
</tr>
</tbody>
</table>

TABLE 4(i)
RAPESEED/MUSTARD NPC AT IMPORTABLE HYPOTHESIS

<table>
<thead>
<tr>
<th>Year</th>
<th>Rajkot (Gujarat)</th>
<th>Gorakhpur (UP)</th>
<th>Ganganagar (Rajasthan)</th>
<th>Indore (MP)</th>
<th>Rohtak (Haryana)</th>
<th>Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>0.514</td>
<td>0.648</td>
<td>0.850</td>
<td>0.870</td>
<td>0.778</td>
<td>0.903</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.730</td>
<td>0.811</td>
<td>0.762</td>
<td>0.830</td>
<td>0.782</td>
<td>0.851</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.503</td>
<td>0.521</td>
<td>0.553</td>
<td>0.551</td>
<td>0.527</td>
<td>0.569</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.579</td>
<td>0.624</td>
<td>0.603</td>
<td>0.578</td>
<td>0.653</td>
<td>0.649</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.680</td>
<td>0.645</td>
<td>0.662</td>
<td>0.741</td>
<td>0.766</td>
<td>0.719</td>
</tr>
</tbody>
</table>

TABLE 4(j)
COTTON NPC AT IMPORTABLE HYPOTHESIS

<table>
<thead>
<tr>
<th>Year</th>
<th>Mumbai (Maharashtra)</th>
<th>Patna (Bihar)</th>
<th>Nandayal (AP)</th>
<th>Kaithal (Haryana)</th>
<th>Abohar (Punjab)</th>
<th>Hubali (Karnataka)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>0.499</td>
<td>0.523</td>
<td>0.712</td>
<td>0.498</td>
<td>0.591</td>
<td>0.518</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.797</td>
<td>0.721</td>
<td>0.761</td>
<td>0.539</td>
<td>0.543</td>
<td>0.703</td>
</tr>
<tr>
<td>2001-02</td>
<td>0.823</td>
<td>0.649</td>
<td>0.721</td>
<td>0.200</td>
<td>0.731</td>
<td>0.684</td>
</tr>
</tbody>
</table>

TABLE 4(k)
SUGARCANE/SUGAR NPC AT IMPORTABLE HYPOTHESIS

<table>
<thead>
<tr>
<th>Year</th>
<th>Kanpur (UP)</th>
<th>Ahmednagar (Maharashtra)</th>
<th>Shimoga (Karnataka)</th>
<th>Chennai (Tamil Nadu)</th>
<th>Hyderabad (AP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>1.063</td>
<td>1.131</td>
<td>1.116</td>
<td>1.066</td>
<td>1.089</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1.362</td>
<td>1.441</td>
<td>1.486</td>
<td>1.403</td>
<td>1.408</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.261</td>
<td>1.331</td>
<td>1.319</td>
<td>1.312</td>
<td>1.313</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.065</td>
<td>1.047</td>
<td>1.051</td>
<td>1.046</td>
<td>1.034</td>
</tr>
<tr>
<td>2002-03</td>
<td>1.385</td>
<td>1.434</td>
<td>1.440</td>
<td>1.448</td>
<td>1.403</td>
</tr>
<tr>
<td>2003-04</td>
<td>1.563</td>
<td>1.609</td>
<td>1.579</td>
<td>1.600</td>
<td>1.533</td>
</tr>
</tbody>
</table>
In case of rapeseed/mustard, the domestic prices in all states during the whole period under reference were ruled lower than the CIF prices India paid for import of mustard. This indicates that India is an efficient producer of mustard [Table 4(i)].

Cotton is one of the crops in which all the major producing states in India have retained their competitive edge during the whole period under reference [Table 4(j)].

Finally, for sugar, it is found uncompetitive during the whole period under reference [Table 4(k)]. Here it is observed that world sugar market is highly volatile. For the year 2004-05 gross receipts of OECD countries sugar farmers was 138 per cent higher than what they would have been at world market prices without any support and sugar prices in these countries were 136 per cent higher than the world market prices (OECD, 2005).

**Competitiveness of Indian Agriculture: Summing Up**

The competitiveness of India’s major agricultural commodities having large share in agricultural trade during last decade was analyzed in the light of both importable and exportable hypotheses at state and all-India level by employing standard techniques, namely DRC, NPC, EPC, ESC, and EPR. It is found that at importable hypothesis most of the crops except sugarcane, wheat and urad are marginally price competitive. It may be reasoned that the uncompetitiveness of some agricultural crops is due to the huge amount of domestic subsidies and export subsidies given by developed countries. It is evident by the facts that for the year 2003-04 OECD countries agricultural exports were 70 per cent of world’s total agricultural exports and prices received by farmers in OECD countries were on average 29 per cent higher than the world market prices. The gross farm receipts of their farmers were on average 44 per cent higher than what they would have been at world market prices without any support. The total OECD support to their agriculture was amounted US$349 billion, which was 47 per cent of the value of their agricultural output (FAO, 2003 and OECD, 2004). There are some other factors which may affect the competitiveness of Indian agriculture consisting of: *First*, the frequent hike in prices of agricultural inputs like diesel, lubricants, seeds, fertilizers, insecticides and agricultural implements/machinery (CACP, 2004-05), *second*, the low level of crops yield in comparison to other leading producing countries (CACP, 2004-05), *third*, the poor agricultural infrastructure like canals,
farm electric reticulation, markets, warehousing and agricultural research, and fourth, the lack of sufficient public investment, and inaccessible to new technology and genetically modified seeds (10th five year plan). The emerging import flood of various agricultural commodities can be checked by maintaining the agricultural tariffs rates at WTO final bound level (ASAG, 2004). It will also create fund for increase in public investment. In the forthcoming negotiation on AOA, if the developed countries are agreed to withdraw domestic subsidies to their agriculture, then India can easily withstand competition from abroad for imports of most of the crops even at the current level of tariffs without having a big wedge in terms of custom duty. As for export hypothesis is concerned, the results of efficiency indicators reflect that in the emerging liberalized farm trade order, India’s export competitiveness is much better in commercial crops. The results of the present study reveal that at the margin, resources are more efficiently utilized in the cultivation of gram and rapeseed/mustard than in the cultivation of wheat at current levels of technologies and prices. Furthermore, with the year 2000-01 India has lost its export competitiveness in wheat, due to fall in its international prices. But here it is being noted that in the terms of domestic resources cost, India has comparative advantage in all agricultural commodities under investigation during whole period under reference. It means that Indian agriculture is highly competitive, if developed countries do not provide agricultural support to their farmers. The results of this study clearly indicate that India has vast export potential provided WTO AOA is able to remove developed countries’ trade barriers and withdraw domestic support to their agriculture. To generate adequate exportable surplus India must maintain and enhance its production efficiency. The technology upgradation and infrastructure development are key domestic measures for enhancing competitiveness of Indian agriculture. To meet this Indian agriculture calls for increase in public investment. The prevalence of high-level domestic support in developed countries clearly and strongly indicates that the existing AOA is not able to generate fair and free world trade in agricultural commodities. The NPC at importable hypothesis reveals that without complete withdrawal of developed countries’ agricultural support, Indian agricultural commodities cannot survive in a free import regime and the values of DRC (even at exportable hypothesis) less than one for all major farm products reveal that it is not paying for country to import any agricultural commodity. The implications from this study suggest that India needs
to adopt an aggressive negotiating gesture during the WTO talks to safeguard the interests of its farmers.

NOTES

1. FOB means free on board and CIF means cost plus insurance plus freight.

2. For import and export of same commodity, India faces the different world prices during the same time period, for detail see DGCI&S (Directorate General of Commercial Intelligence & Statistics): Monthly Statistics of Foreign Trade of India: Vol. 1 & 2, various issues, Government of India.

REFERENCES


• Annual Report on the Working of the State Electricity Boards (SEBs) and Electricity Department, various issues, Planning Commission, New Delhi.


