## By Contribution

# Competitiveness of Major Rice Exporting Nations

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*The present study analyses the impact of WTO on rice export competitiveness by using Blassa's Revealed Comparative Advantage Index and White's Revealed Competitive Advantage Index in respect of Agricultural Trade and Merchandise Trade in the changing scenario of liberalization, privatization and globalization. A new technique has also been developed for the measurement of competitiveness ranking on the basis of the dictum that competitiveness is a zero sum game. The study concludes that the increasing competitiveness of Indian and Pakistani rice exports is a result of WTO implementation.*

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### Introduction

Being a staple food, rice is traded all over the world. Thailand (9.047 million tons), Vietnam 6.734 (million tons), Pakistan (4.0 million tons), USA (3.514 million tons), India (1.9 million tons), Italy (0.781 million tons), Egypt (0.705 million tons), China (0.650 million tons) and Myanmar (0.445 million tons) are the top exporters of rice in 2009-10 (FAO, 2010). China (136.6 million tons), India (81.1 million tons), Indonesia (36.4 million tons), Bangladesh (31.0 million tons), Vietnam (25 million tons), Thailand (20.3 million tons), Myanmar (10.6 million tons), Philippines (9.8 million tons) Brazil (7.7 million tons), Japan (7.7 million tons), USA (7.1 million tons) and Pakistan (6.8 million tons) are the top producers of rice. The stock after domestic consumption, implications of government policies (Peter, 1996) and comparative advantage (Ricardo, 1817) are the basic factors that govern international trade. There are three interrelated factors here (Peter, 1996) i.e. competitive potential (the ability of efficient use of input capacity), competitive performance (the ability to produce a profit oriented product) and the management process (the ability of management to take competitive decisions).

There should be competitive ability, an ability in supplying (potential of export) of a product or service on a sustainable (long-term) and viable (profitable) basis. Porter (2008) believed that competitive success is underpinned by the possession of a specific advantage over the rivals. But after the emergence of WTO, the world trade has been facing stiff competition due to the liberalized policies of the governments and openness of the world market. Increasing demand, new technologies, liberalization, privatization and globalization have enhanced the business opportunities, but these also increase competition from the new entrants.

## Objectives of the Study

- To examine the competitiveness of major rice exporting countries with the help of Blassa's Revealed Comparative Advantage Index and White's Revealed Competitive Advantage Index.
- To analyze the impact of WTO on rice export competitiveness of China, India, Pakistan, Thailand, USA and Vietnam.
- To rank rice exporting countries according to their competitiveness positions

## Methodology

Ricardo (1817) pointed out that international trade takes place because of efficiency to produce an exported product. A country will export products that use their abundant and cheap factor(s) of production and import product (s) that use its scarce factor(s). Heckscher (1919) and later Ohlin (1933) explained the comparative advantage as the ability to produce at lower marginal or opportunity cost. Ricardian comparative advantage arises due to technology differences across the countries while Heckscher-Ohlin argued that when technology remains the same comparative advantage arises as a result of the cost differences. Both the theories are based on a 2x2x2 model (2 countries, 2 products and 2 factors of production). Ricardian theory assumed that the comparative advantage takes place due to differences in technology and labor cost differences whereas H-O theory claimed the capital and labor costs leading to comparative advantage.

**A country is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any rival.**

Porter (1985) has developed a model of competition strategies to create high-quality goods to sell at high price in the market. A country is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any rival. Competitive advantage is the ability to stay ahead of present or potential competition, thus superior performance reached through competitive advantage will ensure market leadership. Competitive advantage grows fundamentally from the value a country is able to create. Value is what buyers are willing to pay,

and superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset higher prices. Competitive advantage encapsulates the comparative advantage because comparative advantage arises due to cost and competitive advantage arises due to lower price and equal profit. He advocated three strategies for competitive advantage i.e. cost leadership, differentiation and focus.

Revealed Comparative Advantage Index of Blassa (1965) and Revealed Competitive Advantage Index of White (1987) and Vollrath (1987) explained elaborately the concept of competitiveness. The Revealed Comparative Advantage Index was put forward by Blassa (1965 & 1977) because of the view that cost comparisons by Hecksher-Ohlin (neo-classical) theory and Ricardian (classical) theory were an inadequate surrogate for comparative advantage index to measure the competitiveness. Blassa (1965) mentioned that the use of export and import ratio would account for the imported immediate goods used for production of export commodity and thus reveal the real comparative advantage of a nation. Later, Vollrath (1987) and White (1987) advocated that competitive advantage is more appropriate to measure the export competitiveness. They argued that revealed comparative advantage use the export data only. Since import also is a part of international trade they used the import data to measure the revealed competitive advantage as an extension of Revealed Comparative Advantage.

**Past Studies**

The above indices have been used for the analysis of competitiveness in several past studies. Chen (1995) has applied the Revealed Comparative Advantage and Revealed Competitive Advantage to test the competitiveness among major rice exporting countries. Ferto (2002) investigated the competitiveness of Hungarian agriculture in relation to that of the EU employing Revealed Comparative Advantage Index for the period of 1992 to 1998. Utkulu et al. (2004) analyzed the competitiveness and the pattern of trade flows/trade specialization from Turkey to the EU by the use of Blassa's Revealed Comparative Advantage Index only. Mohammad (2004) analyzed the export competitiveness of non-agricultural production sectors by using the Revealed Comparative and Revealed Competitive Advantage Indices. Batra (2005) used the Revealed Comparative Advantage to analyze the competitiveness of India and China in agricultural trade. Khorchurklang (2005) had examined the export competitiveness in dairy products of Australia with other major competing countries by the use of Blassa's Revealed Comparative Advantage and Vollrath's Revealed Competitive Advantage indices. Bhat et al. (2006) analyzed a report of Institute for Studies in Industrial Development, in which, he applied Blassa's Comparative Advantage Index for the measurement of competitiveness of the external sector (export and import) of China and India. He pointed out that India has advantage over its competitors in primary products, natural resource based or low technology manu-

facturing products in Chinese market. Siggel (2007) has used the Ricardian principles of comparative advantage in the context of policy reforms in India, Mali, Kenya and Uganda. Shinoj and Mathure (2008) ascertained the changes in comparative advantage status of India's major agricultural export vis-à-vis other Asian countries since 1991 by using Revealed Comparative Advantage Index. Burange & Chadha (2008) assessed India's Revealed Comparative Advantage (RCA) in merchandise trade and evaluated the structure of comparative advantage in India and the change in the scene over the 10-year period from 1996 to 2005. Russu (2011) analyzed the competitiveness between the manufacturing industries of European Union and Romania, in the globalization context with the aim to highlight the strength and weakness of latter and to offer view on industrial sectors' competitiveness with the use of Revealed Comparative and Revealed Competitive Advantage Indices. Bhattacharya (2011) analyzed the competitiveness of Indian horticulture sector with its rivals by using Revealed Comparative and Revealed Competitive Advantage Indices. Taneja (2011) analyzed specialization with comparative advantage in pruning sensitive list under SAFTA.

(i) *Blassa's Revealed Comparative Advantage (BRCA) Index* is a ratio of a country's export share of a commodity in world's export of that commodity with the country's total export share in total world export. If the value of index is greater than 1, than the country has comparative advantage. It is an indicator of competitiveness (Siggel, 2007).

$$CA_i = (\frac{E_{ij}}{E_{nj}}) / (\frac{E_{it}}{E_{nt}})$$

E= Export, i= country, j= commodity (rice), t= set of commodity (total), n= set of countries (total world). The Index has been applied into two categories in the present study i.e. agriculture and merchandize. Rice export is a part of agricultural export and also a part of total merchandize export.

(a) Revealed Comparative Advantage in respect of Agricultural Trade (CAA)

$$CAA_i = (\frac{E_{ij}}{E_{nj}}) / (\frac{E_{iA}}{E_{nA}}) \text{ or}$$

$$= \frac{\text{Share of Country's commodity export(ij) in world's export of that commodity (nj)}}{\text{Share of Country's Agricultural export (iA) in world's total Agricultural export (nj)}}$$

(b) Revealed Comparative Advantage in respect of Total Merchandize Trade (CAM):

$$CAM_i = (\frac{E_{ij}}{E_{nj}}) / (\frac{E_{iM}}{E_{nM}}) \text{ or}$$

$$= \frac{\text{Share of Country's commodity export(ij) in world's export of that commodity (nj)}}{\text{Share of Country's Merchandise export (iM) in world's total Merchandise export (nj)}}$$

*(ii) White's Revealed ompetitive Advantage Index (WRCA)* is an extensive form of BRCA. Import data of specific commodity of a country has been taken into account for the calculation of WRCA. It is also a net comparative advantage (export share – import share). If the value of

WRCA is positive (>0), it has competitive advantage.

$$CE_i = (\frac{E_{ij}}{E_{nj}} / \frac{E_{it}}{E_{nt}}) - (\frac{I_{ij}}{I_{nj}} / \frac{I_{it}}{I_{nt}})$$

E= Export, I= Import, i= country, j= commodity (rice), t= set of commodity (total), n= set of countries (total world)

Further, the revealed competitive advantage index is divided into two parts as above BRCA's division.

(a) Revealed Competitive Advantage Index in respect of Agricultural Trade (CEA):

$$CEA_i = (\frac{E_{ij}}{E_{nj}} / \frac{E_{iA}}{E_{nA}}) - (\frac{I_{ij}}{I_{nj}} / \frac{I_{iA}}{I_{nA}})$$

A= Agricultural Trade data

(a) Revealed Competitive Advantage Index in respect of Merchandize Trade (CEM):

$$CEM_i = (\frac{E_{ij}}{E_{nj}} / \frac{E_{iM}}{E_{nM}}) - (\frac{I_{ij}}{I_{nj}} / \frac{I_{iM}}{I_{nM}})$$

Where M= Merchandize Trade data

**Test of Significance & Hypotheses**

The t-test has been applied to test the significance of mean differences as:

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE}$$

Where $SE = \sqrt{\frac{\sum d^2 - (d)^2 * n}{n-1}}$,

$\overline{X_1}$ = *first* mean, $\overline{X_2}$ = second mean

(i) Test of Means differences between country-to-country (Table 1):

a) $CAA_i$ to $CAA_k$

$H_0^a$ : $CAA_i = CAA_k$

b) $CEA_i$ to $CEA_k$

$H_0^b$ : $CEA_i = CEA_k$

c) $CAM_i$ to $CAM_k$

$H_0^c$ : $CAM_i = CAM_k$

d) $CEM_i$ to $CEM_k$

$H_0^d$ : $CEM_i = CEM_k$

i= 1, 2, 3, 4, 5 and 6; k = 2, 3, 4, 5 and 6.

In addition, test of the significance of differences between countries has been used for the purpose of competitiveness ranking analysis. On the basis of the statement of Porter et al (2008), competitiveness is a zero sum game. In other words, if one country is to increase its competitiveness, another must decrease its own. A model has been developed from Table 1 for determination of the ranking position of competitiveness of rice exporting countries (Annexures 1, 2 and 3). It does not show the effect of any one factor such as WTO implementation because the ranking position is determined between the countries (i.e. the total effect is zero). One (1) point is given to the significant value of each measure (agricultural or merchandise trade) for having comparative and competitive advantages. These results have been shown in a double effect table ('of' and 'over'). Here 'of' implies that the advantage 'of' a particular country

'over' another country. The sum of 'of' values considered advantage (positive) and 'over' values disadvantage (negative). Finally, the competitiveness ranking is analyzed with the net values (sum of 'of' and 'over'). In other words, 1 is given to the gainer and -1 is given to the loser. Hence the competitiveness is a zero sum game.

(ii) To test the impact of WTO on world rice exports, the mean differences of 'Before WTO Origin' and 'After WTO Origin' are considered for t-test (Table 2). The positive and significant value implies positive effect of WTO implementation on a particular country's rice export competitiveness and vice-versa. The insignificant result shows that there is no effect of WTO on the competitiveness of rice exports of a particular country.

a) $CAA_{ib}$ to $CAA_{ia}$

$H_0^a : CAA_{ai} - CAA_{bi} = 0$

b) $CEA_{ib}$ to $CEA_{ia}$

$H_0^b : CEA_{ai} - CEA_{bi} = 0$

c) $CAM_{ib}$ to $CAM_{ia}$

$H_0^c : CAM_{ai} - CAM_{bi} = 0$

d) $CEM_{ib}$ to $CEM_{ia}$

$H_0^d : CEM_{ai} - CEM_{bi} = 0$

i = 1, 2, 3, 4, 5 and 6. (country)

Here b= Before WTO Origin (BWO) and a= After WTO Origin (AWO)

The calculated (absolute) value of t-ratio is compared with the critical (table) value at 5% level. If the absolute value is greater than the critical value, $H_0$ is rejected and we conclude that there is difference between means, which is significant at the given degree of freedom. Here the meaning of significant is competitiveness of a country or among countries or the impact of WTO implementation.

## Results & Discussion

In Annexure 4, Thailand and USA have highest share in world rice exports. But according to Illyas et al. (2006), it is not an indication of comparative advantage or competitive advantage of a country. The country's competitiveness implies that Revealed Comparative Advantage Indices (CAA & CAM) are greater than one and Revealed Competitive Advantage Indices (CEA & CEM) are greater than zero. In Annexure 5 and Annexure 6, the values of CAA and CAM are greater than one (>1) in most of the years, which indicate that the specific country has comparative advantage in the export of rice. And, in Annexure 7 and Annexure 8 the values CEA and CEM are greater than zero (>0) in most of the years, which indicate that the specific country has competitive advantage in the export of rice.

As seen in Annexures 5, 6, 7 & 8 that Thailand had greatest comparative and competitive advantage in rice exports in merchandize trade and Pakistan in agricultural trade on an average basis during the period of 'Before WTO Origin'. But after the implementation WTO, Pakistan has stood in first place. The com-

**Table 1 t-ratios of Mean Differences of Revealed Comparative and Revealed Competitive Advantage between Major Rice Exporters**

| Country | Before WTO (1980-81 to 1994-95) | | | | After WTO (1995-96 to 2009-10) | | | | Overall (1980-81 to 2009-10) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Agricultural Trade | | Merchandise Trade | | Agricultural Trade | | Merchandise Trade | | Agricultural Trade | | Merchandise Trade | |
| | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM |
| China-India | -5.495* | -3.138* | -6.007* | -5.015* | -12.163* | -11.419* | -11.932* | -10.978* | -2.467* | -7.196* | -9.768* | -8.863* |
| China-Pakistan | -20.710* | -22.256* | -12.092* | -12.201* | -21.553* | -14.936* | -22.155* | -15.358* | -19.640* | -20.184* | -18.990* | -19.345* |
| China-Thailand | -19.086* | -18.322* | -11.992* | -12.058* | -40.768* | -35.996* | -38.805* | -35.231* | -32.512* | -31.470* | -11.763* | -11.863* |
| China-USA | 2.625* | 1.326 | 3.792* | 2.335* | 1.871 | -0.721 | 0.925 | -1.919 | 3.231* | 1.629 | 2.630* | 1.141 |
| China-Vietnam | -3.531* | -0.643 | -3.703* | -2.509* | -21.934* | -10.674* | -21.957* | -10.588* | -8.399* | -3.718* | -7.429* | -.765* |
| India-Pakistan | -13.593* | -15.317* | -8.839* | -8.831* | -13.468* | -7.950* | -13.464* | -7.934* | -17.066* | -19.072* | -12.017* | -11.960* |
| India-Thailand | -13.105* | -9.210* | -8.555* | -8.452* | -4.127* | -4.347* | -4.109* | -4.353* | -7.944* | -6.853* | -5.990* | -5.925* |
| India-USA | 9.296* | 3.879* | 11.270* | 7.764* | 14.206* | 10.985* | 14.740* | 11.145* | 11.897* | 8.129* | 12.930* | 11.034* |
| India-Vietnam | -2.681* | -0.135 | -3.143* | -2.039 | -9.838* | -7.956* | -9.734* | -7.940* | -5.751* | -1.977 | -5.716* | -4.320* |
| Pakistan-Thailand | 5.624* | 5.616* | -0.019 | -0.027 | 13.499* | 8.287* | 13.472* | 8.263* | 8.936* | 8.925* | 4.151* | 4.141* |
| Pakistan-USA | 20.476* | 20.542* | 11.811* | 11.827* | 24.197* | 15.438* | 24.234* | 15.415* | 20.864* | 20.819* | 19.135* | 19.139* |
| Pakistan-Vietnam | 2.131 | 2.966* | 0.412 | 0.934 | 6.818* | 0.811 | 6.844* | 0.807 | 4.776* | 4.735* | 0.750 | 1.198 |
| Thailand-USA | 28.000* | 27.745* | 11.790* | 11.839* | 49.771* | 43.552* | 51.068* | 43.871* | 42.813* | 43.738* | 11.174* | 11.248* |
| Thailand-Vietnam | 0.296 | 1.884 | 0.412 | 0.931 | -8.600* | -5.346* | -8.652* | -5.340* | -1.718 | 0.468 | -1.111 | -0.450 |
| USA-Vietnam | -3.950* | -0.743 | -4.046* | -2.707* | -24.333* | -10395* | -24.970* | -10454* | -9.194 | -3.927* | -7.834* | -6.022* |

*Significant at 5% Level

parative and competitive advantages of Pakistan, India and Vietnam in rice export have been increasing since WTO origin where as of China, USA and Thailand have been decreasing. The overall analysis of CAA, CEA, CAM and CEM depicts that rice export of Pakistan has the highest competitiveness and Indian ranks 4th in the competitiveness of rice exports (Annexure 3).

## Competitiveness between Major Rice Exporting Countries

Table 1 depicts the result of t-ratio of mean differences of country-to-country CAA, CEA, CAM and CEM. It determines whether the measure of competitiveness (agricultural trade/merchandize trade) for one country is significantly different from the same measure of another country (e.g. CAA of China and CAA of India). There are 15 pairs each for 'Before WTO Origin', 'After WTO Origin' and overall. In this analysis, significant implies the competitiveness test between pair countries. The positive significant value indicates the advantage of first paired country on second paired country in comparative or competitive advantage while the negative significant value indicates that the second paired country has an advantage over first paired country. On the other hand, insignificant value indicates that paired countries are close competitors in the export of rice.

### China

In Table 1 the t- values of the mean differences of CAA, CEA, CAM and CEM paired with China (i.e. China-India, China-Pakistan and China-Thailand) are negative and significant during the period of 'Before WTO Origin', 'After WTO Origin' and overall analysis. It is concluded that India, Pakistan and Thailand have comparative and competitive advantages over China. But in the case of China-USA, the t-values of CAA (2.625*), CAM (3.792*) and CEM (2.335*) and CEA (1.326) before the implementation of WTO conclude that China has comparative advantage in agricultural trade only and competitive advantage in both agricultural and merchandise trade over USA, but both are close rice export competitors in agricultural trade. After the implementation of WTO**,** the insignificant t-values reveal USA and China as close competitors. In the overall analysis, the t-values of CAA (3.231*) and CAM (2.630*) point out that China has comparative advantage over USA. But the t-values of CEA (1.629) and CEM (1.141) are insignificant and both are close rice export competitors in merchandise trade. But in the case of Vietnam-China, the t-values of mean differences depict that Vietnam has both competitive and comparative advantages over China during the three periods except CEA (-0.643) before the WTO implementation. Finally, it is concluded that Chinese rice has been facing tough competition from rest of the world.

### India

In comparisons of India with China (Table 1) Pakistan, USA, Thailand and Vietnam are taken for consideration. The t-values of mean differences of CAA, CEA, CAM and CEM of India-Pakistan

and India-Thailand are negative and significant during the period of 'Before WTO Origin', 'After WTO Origin' and overall analysis. It indicates that Thailand and Pakistan have comparative and competitive advantages over India in export of rice. But in the case of USA, the t-values of CAA, CEA, CAM and CEM are positive and significant. Thus, it is concluded that India has comparative and competitive advantage over USA in rice export during the three analysis periods.

The t-values of the mean differences of India-Vietnam of CAA (-2.681*) and CAM (-3.143*) show the comparative advantage in rice agricultural exports as well as merchandise exports of Vietnam over India but CEA (-0.135) and CEM (-2.039) before WTO implementation show the close competition between them. After the implementation of WTO, all t-values are favorable (negative and significant) for Vietnam. But in overall analysis, the t-values of CAA (-5.751*), CAM (-5.716*) and CEM (-4.141*) are significant and favorable for Vietnam's competitiveness of rice export against India. Finally, it is concluded that Vietnam is more competitive in comparison to India in the export of rice.

**Vietnam is more competitive in comparison to India in the export of rice.**

**Pakistan**

Pakistan has both comparative and competitive advantages over China and India during the three periods of analysis (Table 1). Further, the analysis of Thailand with Pakistan reveals that almost all the values of t-ratio are positive and significant during the three periods of analysis except CAM (0.019) and CEM (-0.027) before WTO implementation. However, it is concluded that the export of Pakistani rice has comparative and competitive advantage over Thailand.

The positive and significant t-values depict strong comparative and competitive advantages of Pakistan over USA during the three periods of analysis. But the t-value of Vietnam-Pakistan provides a different picture of competitiveness. The t-values of CAA (2.131), CAM (0.412) and CEM (0.934) are insignificant and CEA (2.966*) is significant. It is clear that Pakistan has only competitive advantage in the export of rice in agricultural trade before the implementation of WTO. But after the implementation of WTO, Pakistan has improved its competitive advantage in agricultural trade (6.818*) and merchandize trade (6.844) over Vietnam. The insignificant t-values of CEA (0.811) and CEM (0.807) reveal the close competition between Pakistan and Vietnam. The overall analysis regarding Pakistan-Vietnam shows that Pakistan has comparative (4.776*) and competitive (4.735*) advantages in the export of rice in agricultural trade over Vietnam. Pakistan is more competitive in comparison to Vietnam in the export of rice.

**Thailand**

Thailand has both comparative and competitive advantage over China and

India in the export of rice during the three periods of the analysis. But Pakistan has comparative and competitive advantage over Thailand in the export of rice. Pakistan has both comparative and competitive advantage over USA in agricultural trade as well as merchandise trade during the three analysis periods. The insignificant t-values of CAA, CEA, CAM and CEM of Thailand-Vietnam indicate that Thailand and Vietnam are close competitors before WTO implementation and in the overall analysis. But after the WTO implementation, Thailand has increased its competitiveness over Vietnam [CAA (-8.600*), CEA (-5.346*), CAM (-8.652*) and CEM (-5.340*)].

**USA**

The competitiveness relationship of USA is very weak with China, India, Pakistan and Thailand. It has no advantage against these countries in the export of rice. Vietnam also has advantage over USA in export of rice. The significant t-values of CAA (-3.950*), CAM (-4.046*) and CEM (-2.707*) before the implementation of WTO indicate that Vietnam has comparative advantage in agricultural and merchandise trade and competitive advantage in merchandise trade over USA. But the insignificant t-value of CEA (-0.743) shows that they are close competitors in rice trade. After the implementation of WTO and overall analysis depict that the t-values of USA-Vietnam are negative and significant. Therefore, Vietnam is a high competitor against USA in the export of rice.

**Vietnam**

Vietnam has comparative and competitive advantages over China, India and USA and is a close competitor of Pakistan and Thailand in the export of rice.

**Competitiveness Ranking**

The competitiveness ranking positions of major rice exporters are given in Annexure 1, 2 and 3. Pakistan is the top ranked rice exporter in competitiveness during the three analysis periods with net score of 15 (15-0), 18 (18-0) and 18 (18-0) respectively. Before WTO implementation Thailand is in second place with score of 10 (12-2) and Vietnam is in third with score of 7 (8-1). But after the implementation of WTO and in overall analysis, Vietnam (score of 14 and 4) has captured the second position from Thailand (score of 4 and 8). India is on fourth place with score of -2 (8-10), -4 (8-12) and -3 (8-11) during the three analysis periods. China and USA are on fifth and sixth place respectively in competitiveness ranking in rice exporting.

**Impact of WTO**

In Table 2, the insignificant t-values of China's CAA (-1.513) and CEA (-1.329); Vietnam's CAA (1.822), CAM (0.149) and CEM (0.722); and Pakistan's CAM (0.302) and CEM (0.292) show that there is no effect of WTO implementation on particular competitive areas in these countries. It is clear from the t-values of India that it is the only country which has a positive impact of WTO on both competitive and compara-

tive advantages in agricultural and merchandise trade. Pakistan has positive impact of WTO only in agricultural trade. In case of Thailand (CAA, -3.647; CEA,-3.707; and CAM & CEM, -6.303) and USA (CAA, -4.925; CEA, -6.232; CAM, -3.954; and CEM, -4.580) and China (CAM, -4.773 and CEM, -3.549), the rice exports have negative effect of WTO.

**Table 2 Impact of WTO on Rice Exporting Countries**

| Country | Agricultural Trade CAA | CEA | Merchandise Trade CAM | CEM |
|---|---|---|---|---|
| | t-value | t-value | t-value | t-value |
| China | -1.513 | -1.329 | -4.773* | -3.549* |
| India | 4.918* | 5.139* | 3.101* | 3.601* |
| Pakistan | 5.939* | 5.914* | 0.302 | 0.292 |
| Thailand | -3.647* | -3.707* | -6.303* | -6.303* |
| USA | -4.925* | -6.232* | -3.954* | -4.580* |
| Vietnam | 1.822 | 2.854* | 0.149 | 0.722 |

(*) – indicates 5% level of significance

**India is the only country which has a positive impact of WTO on both competitive and comparative advantages in agricultural and merchandise trade.**

## Conclusion

The present study shows that there may not be a positive relationship between competitiveness and market share or production (i.e. large export share or large production does not mean a greater competitiveness). Thailand is the largest rice exporter whereas Pakistan is on fourth place in the export of rice. But the competitiveness position is different for these two countries. Almost all countries have both competitive (>0) and comparative (>1) advantages. It is also argued here that revealed competitive advantage is more important and relevant for the measurement of competitiveness than revealed comparative advantage because positive value of revealed competitive advantage indices (>0) have positive effect on balance of payment leading to economic development.

Pakistan has both comparative and competitive advantages over rest of the five countries whereas USA has been facing a tough situation of disadvantage. India has comparative and competitive advantages over China and USA. Similarly, Vietnam is facing competition from Thailand and Pakistan in the export of rice. The analysis of competitiveness between countries concludes that Pakistan is number one having highest points in competitiveness ranking. Vietnam captures the second position from Thailand after the implementation of WTO and India has remained on fourth position. India has an enormous positive impact of WTO while Pakistan and Vietnam has also improved their competitiveness after the implementation of WTO. On the other hand, the competitiveness in the export of rice of Thailand and USA has been affected negatively by the implementation of WTO whereas China and Vietnam have no effect of WTO implementation on rice export competitiveness. Thus, the rice of Pakistan and Thailand seems to complement all other rice exporters, while the rice of China and USA have become the inferior products. It appears that any expansion in world rice trade may occur to Thailand and Pakistan (Hui & Turay, 1995).

## References


Balassa, B. (1965), "Trade Liberalization and Revealed Comparative Advantage", *The Manchester School of Economics and Social Studies*, (33): 99-117.

Balassa, Bela (1977), "Revealed Comparative Advantage Revisited", *The Manchester School*, 45: 327-44.

Balassa, Bela (1989), "Comparative Advantage, Trade Policy and Economic Development", Harvester Wheatsheaf, New York.

Batra, Amita (2005), "Revealed Comparative Advantage: An Analysis for India and China", Working Research Paper-168, Indian Council for Research on International Economic Relations, New Delhi.

Bhatt, T.P., Guha, A. & Paul, M. (2006), "India and China in WTO: Building Complementarities and Competitiveness in the External Trade Sector", A Report of Institute for Studies in Industrial Development, Delhi.

Bhattachrya, R. (2011), "Revealed Comparative Advantage and Competitiveness: A Case Study for India in Horticultural Products", Paper presented at the International Conference in Applied Economics, organized by Department of International Trade-Technological Institute of Western Macedonia and Department of Economics and Food Sciences, University of Perugia, from 25th to 27th August, 2011 at Perugia, Italy.

Burange, L.G. & Chadha, S. J. (2008), "India's Revealed Comparative Advantage in Merchandise Trade", Working Paper-UDE 28/6/2008, University of Mumbai. www.mu.ac.in/arts/social_science/eco/pdfs/depart/dwp51.pdf.

Chen, Jin (1995), "An Empirical Test of Competitiveness among Major Rice Exporting Countries", M. Sc. Dissertation, Michigan State University, USA.

Ferto, Imre & Hubbard, Lionel J. (2002), "Revealed Comparative Advantage and Competitiveness in Hungarian Agri-Food Sectors", Hungarian Academy of Sciences, Budapest.

Food & Agriculture Organization (FAO) (2010), 1980-81 to 2010-11, FAO Trade Yearbook, Rome. (http://faostat3.fao.org/home/index.html#SEARCH_DATA)

Heckscher, E. (1919), "The Effects of Foreign Trade on the Distribution of Income", The MIT Press, Massachusetts.

Hui, Jianguo & Turay, Abdul M. (1995), "An Empirical Investigation of Market Structures and Price Competition in the World Rice Market", *International Journal of Food & Agribusiness Marketing*. 7 (1): 1-12.

Khorchurklang, S. (2005), **"**Factors Influencing Australia's Dairy Product Exports to Thailand: 1980-2002", Victoria University.

Mahmood, A. (2004), "Export Competitiveness and Comparative Advantage of Pakistan's Non-Agricultural Production Sectors: Trends & Analysis", *Pakistan Development Review*. 43: 4(II): 541-61.

Ohlin, B. (1933), "Interregional and International Trade"' Cambridge, Mass.: Harvard University Press, 1966

Buckley, Peter J., Pass, C. L. & Prescott, K. (1992), "Servicing International Markets: Competitive Strategies of Firms", London: Blackwell Publishers: 1-39.

Porter, Michael E. (1985), "Competitive Advantage", Free Press, New York.

Porter, Michael E., Ketels, C. & Delgado, M. (2008), "The Microeconomic Foundations of Prosperity: Findings from the Business Competitiveness Index", The Global Competitiveness Report 2007-2008, Geneva.

Ricardo, D. (1817), "The Principles of Political Economy and Taxation", University of Cambridge, London.

Russu, C. (2011), "Revealed Competitive Advantage of the European Union and Romania Manufacturing Industries**",** *Economic Sciences Series,* LXIII (3).

Shinoj, P. & Mathure, V.C. (2008), "Comparative Advantage of India in Agricultural Export vis-à-vis Asia: A Post Reforms Analysis", *Agricultural Economic Research Review.* 21(1).

Siggel, Eckhard (2007), "International Competitiveness and Comparative Advantage: A survey and a Proposal for Measurement", paper presented at CESifo Venice Summer Institute (dated 20-21July), Venice International University.

Taneja, Nisha; Roy, Saon; Kaushal, Neekita & Chowdhary, Devjit Roy (2011), "Enhancing Intra-SAARC Trade: Pruning India's Sensitive List under SAFTA", Working Research Paper-255 , Indian Council for Research on International Economic Relations, New Delhi

Tiwari, R. S. (2007), "Export Competitiveness in India and USA: A Comparative Analysis", *The Indian Journal of Economics.* LXXXVII (347), Part 4 (April).

Utkulu, U., Seymen, D. & Arý, A. (2004), "Export Supply and Trade Reform: The Turkish Evidence", paper presented at the International Conference on Policy Modeling, Paris June 30-July 2.

Vollrath, T. L. (1987), "Revealed Comparative Advantage for Wheat, U.S. Competitiveness in the World Wheat Market", Proceedings of a Research Conference. Washington, D.C. USDA, ERS, International Economics Division.

Vollrath, T. L. (1991), "A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative Advantage",

**ANNEXURE 1 Competitiveness Ranking Before WTO Implementation**

| | Competitive and Comparative advantage of | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | China | | | | India | | | | Pakistan | | | | Thailand | | | | USA | | | | Vietnam | | | | | | | | |
| **Over** | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | **Loss** |
| **China** | | | | | * | * | * | * | * | * | * | * | * | * | * | * | | | | | | | | | * | X | * | * | -15 |
| **India** | | | | | | | | | * | * | * | * | * | * | * | * | | | | | | | | | * | X | * | X | -10 |
| **Pakistan** | | | | | | | | | | | | | | | | X | X | | | | | | | | | | | | 0 |
| **Thailand** | | | | | | | | | | * | * | | | | | | | | | | | | | | | | | | -2 |
| **USA** | * | X | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | | | | | | | * | X | * | * | -18 |
| **Vietnam** | | | | | | | | | X | * | X | X | X | X | X | X | | | | | | | | | | | | | -1 |
| | 1 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 4 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 2 | | | | | -46 |
| **Gain** | | 3 | | | | 8 | | | | 15 | | | | 12 | | | | 0 | | | | 8 | | | | | | | 46 |
| **NET (Competitiveness)** | | -12 | | | | -2 | | | | 15 | | | | 10 | | | | -18 | | | | 7 | | | | | | | 0 |

* - Indicates significant score 1
X – Indicates insignificant score 0

**ANNEXURE 2 Competiveness Ranking After WTO Implementation**

| | Competitive and Comparative advantage of | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | China | | | | India | | | | Pakistan | | | | Thailand | | | | USA | | | | Vietnam | | | | | | |
| **Over** | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | **Loss** |
| **China** | | | | | * | * | * | * | * | * | * | * | * | * | * | * | X | | X | | * | * | * | * | -16 |
| **India** | | | | | | | | | * | * | * | * | * | * | * | * | | | | | * | * | * | * | -12 |
| **Pakistan** | | | | | | | | | | | | | | | | | | | | | | | | | 0 |
| **Thailand** | | | | | | | | | | * | * | * | * | | | | | | | | * | * | * | * | 8 |
| **USA** | | X | | X | * | * | * | * | * | * | * | * | * | * | * | * | | | | | * | * | * | * | -16 |
| **Vietnam** | | | | | | | | | * | X | * | X | | | | | | | | | | | | | -2 |
| | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 4 | -36 |
| **Gain** | | 0 | | | | 8 | | | | 18 | | | | 12 | | | | 0 | | | | 16 | | | 36 |
| NET **(Competitiveness)** | | -16 | | | | -4 | | | | 18 | | | | 4 | | | | -16 | | | | 14 | | | 0 |

* - Indicates significant score 1

X - Indicates insignificant score 0

**ANNEXURE 3 Competitiveness Ranking (1980/81- 2009/10)**

| | Competitive and Comparative advantage of | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | China | | | | India | | | | Pakistan | | | | Thailand | | | | USA | | | | Vietnam | | | | |
| **Over** | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | CAA | CEA | CAM | CEM | **Loss** |
| **China** | | | | | * | * | * | * | * | * | * | * | * | * | * | * | | | | | * | * | * | * | -16 |
| **India** | | | | | | | | | * | * | * | * | * | * | * | * | | | | | * | X | * | * | -11 |
| **Pakistan** | | | | | | | | | | | | | | | | | | | | | | | | | 0 |
| **Thailand** | | | | | | | | | | * | * | * | * | | | | | | | | X | | X | X | -4 |
| **USA** | * | X | * | X | * | * | * | * | * | * | * | * | * | * | * | * | | | | | * | * | * | * | -18 |
| **Vietnam** | | | | | | | | | * | * | X | X | | X | | | | | | | | | | | -2 |
| | 1 | 0 | 1 | 0 | 2 | 2 | 2 | 2 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 3 | 2 | 3 | 3 | -51 |
| **Gain** | | 2 | | | | 8 | | | | 18 | | | | 12 | | | | 0 | | | | 11 | | | 51 |
| **NET (Competitiveness)** | | -14 | | | | -3 | | | | 18 | | | | 8 | | | | -18 | | | | 9 | | | 0 |

* - Indicates significant score 1

X - Indicates insignificant score 0

**ANNEXURE 4 Share of Major Rice Exporters in World Rice Exports (1980-81 to 2009-10)**

| Year | China | India | Pakistan | Thailand | USA | Vietnam | Total |
|---|---|---|---|---|---|---|---|
| 1980-81 | 10.17 | 3.46 | 8.42 | 19.01 | 25.64 | 0.20 | 66.91 |
| 1981-82 | 4.47 | 7.56 | 9.69 | 20.75 | 26.16 | 0.05 | 68.68 |
| 1982-83 | 5.56 | 6.37 | 9.32 | 23.25 | 23.70 | 0.14 | 68.33 |
| 1983-84 | 7.12 | 3.70 | 8.00 | 24.10 | 25.45 | 0.77 | 69.15 |
| 1984-85 | 8.14 | 2.91 | 10.82 | 28.28 | 21.73 | 0.57 | 72.45 |
| 1985-86 | 7.05 | 5.70 | 6.67 | 25.12 | 20.13 | 0.45 | 65.13 |
| 1986-87 | 6.41 | 4.64 | 10.39 | 23.44 | 18.87 | 0.66 | 64.40 |
| 1987-88 | 6.43 | 7.61 | 8.69 | 25.73 | 16.82 | 0.50 | 65.78 |
| 1988-89 | 5.03 | 5.64 | 9.00 | 33.80 | 19.78 | 0.67 | 73.93 |
| 1989-90 | 2.25 | 5.17 | 6.26 | 35.68 | 19.82 | 5.85 | 75.03 |
| 1990-91 | 2.37 | 6.25 | 5.84 | 26.26 | 19.43 | 7.36 | 67.51 |
| 1991-92 | 4.06 | 6.93 | 7.72 | 26.74 | 16.91 | 5.24 | 67.60 |
| 1992-93 | 4.37 | 6.95 | 7.73 | 26.75 | 13.79 | 7.84 | 67.43 |
| 1993-94 | 5.15 | 7.96 | 6.20 | 25.17 | 14.90 | 7.02 | 66.40 |
| 1994-95 | 8.53 | 6.18 | 3.87 | 24.94 | 16.25 | 6.80 | 66.56 |
| 1995-96 | 0.76 | 18.98 | 6.20 | 26.16 | 13.36 | 7.10 | 72.57 |
| 1996-97 | 1.78 | 11.57 | 6.70 | 26.03 | 13.42 | 11.13 | 70.63 |
| 1997-98 | 3.57 | 11.69 | 6.16 | 27.70 | 11.97 | 11.18 | 72.28 |
| 1998-99 | 9.80 | 15.78 | 5.94 | 21.96 | 12.65 | 10.67 | 76.81 |
| 1999-00 | 8.55 | 9.21 | 7.49 | 24.73 | 11.99 | 13.00 | 74.97 |
| 2000-01 | 8.89 | 10.08 | 8.20 | 25.19 | 12.86 | 10.25 | 75.47 |
| 2001-02 | 5.02 | 10.09 | 7.44 | 22.54 | 10.25 | 8.92 | 64.25 |
| 2002-03 | 5.89 | 18.22 | 6.92 | 24.52 | 11.65 | 10.90 | 78.10 |
| 2003-04 | 6.94 | 12.55 | 7.88 | 25.64 | 14.46 | 10.09 | 77.55 |
| 2004-05 | 2.59 | 16.47 | 6.99 | 30.04 | 13.02 | 10.59 | 79.70 |
| 2005-06 | 2.34 | 14.69 | 9.69 | 24.24 | 13.44 | 14.65 | 79.06 |
| 2006-07 | 3.89 | 14.75 | 10.92 | 24.47 | 12.18 | 12.11 | 78.32 |
| 2007-08 | 3.49 | 20.75 | 8.19 | 25.28 | 10.17 | 10.85 | 78.73 |
| 2008-09 | 2.44 | 12.94 | 8.43 | 30.61 | 11.09 | 14.51 | 80.02 |
| 2009-10 | 2.94 | 13.02 | 10.60 | 28.25 | 12.24 | 9.07 | 76.12 |

Source: FAO statistics

**ANNEXURE 5 Revealed Comparative Advantage Indices in Agricultural Trade (CAA)**

| | | China | India | Pakistan | Thailand | USA | Vietnam |
|---|---|---|---|---|---|---|---|
| Before WTO (1980-81 to 1994-95) | 1980-81 | 5.2240 | 3.2725 | 21.0354 | 13.2939 | 1.3969 | 4.7698 |
| | 1981-82 | 2.3233 | 6.5308 | 17.9182 | 12.1252 | 1.3527 | 1.1857 |
| | 1982-83 | 2.5967 | 5.8738 | 23.4520 | 12.5392 | 1.3185 | 2.2449 |
| | 1983-84 | 3.0214 | 3.3240 | 20.9879 | 14.9100 | 1.4155 | 8.7026 |
| | 1984-85 | 3.1378 | 2.8429 | 30.3991 | 16.3538 | 1.2997 | 6.1878 |
| | 1985-86 | 2.3198 | 5.2532 | 19.8696 | 16.3646 | 1.3625 | 4.4600 |
| | 1986-87 | 1.8657 | 4.4699 | 22.6973 | 14.9236 | 1.5368 | 4.0221 |
| | 1987-88 | 1.7884 | 8.2260 | 23.7280 | 16.4635 | 1.3514 | 4.3038 |
| | 1988-89 | 1.3969 | 7.4132 | 20.7998 | 19.1953 | 1.3968 | 5.8007 |
| | 1989-90 | 0.6489 | 5.8726 | 12.6993 | 17.9331 | 1.3557 | 27.3447 |
| | 1990-91 | 0.7555 | 6.6160 | 19.2817 | 15.8678 | 1.3991 | 32.5103 |
| | 1991-92 | 1.1491 | 8.1400 | 24.5520 | 14.9440 | 1.2451 | 27.8907 |
| | 1992-93 | 1.2661 | 8.4325 | 22.3436 | 14.3264 | 1.0212 | 34.1281 |
| | 1993-94 | 1.4299 | 8.0340 | 24.1189 | 14.2330 | 1.0558 | 28.3800 |
| | 1994-95 | 2.2734 | 7.4051 | 21.9259 | 13.6050 | 1.2060 | 20.8229 |
| | *MEAN* | *2.0798* | *6.1138* | *21.7206* | *15.1386* | *1.3142* | *14.1836* |
| | *SE* | *0.2981* | *0.4953* | *0.9870* | *0.5012* | *0.0350* | *3.2368* |
| After WTO (1995-96 to 2009-10) | 1995-96 | 0.2335 | 15.3029 | 26.9991 | 12.8439 | 0.9502 | 18.7580 |
| | 1996-97 | 0.5791 | 9.2022 | 22.3225 | 12.7331 | 0.9432 | 25.7732 |
| | 1997-98 | 1.2144 | 9.4567 | 33.6827 | 14.5847 | 0.8760 | 22.5923 |
| | 1998-99 | 3.5432 | 13.2195 | 22.5528 | 13.5455 | 0.9655 | 19.4914 |
| | 1999-00 | 3.0301 | 8.2730 | 26.3019 | 14.4160 | 0.9491 | 22.0756 |
| | 2000-01 | 2.7939 | 8.3696 | 31.5207 | 14.2334 | 0.9355 | 18.3310 |
| | 2001-02 | 1.6008 | 7.9909 | 30.2166 | 12.5811 | 0.7486 | 18.2555 |
| | 2002-03 | 1.8025 | 14.6036 | 30.9534 | 13.3250 | 0.9276 | 22.8063 |
| | 2003-04 | 2.2094 | 10.1334 | 33.5147 | 13.0893 | 1.2184 | 21.3027 |
| | 2004-05 | 0.9184 | 14.1710 | 33.8393 | 15.1671 | 1.2377 | 19.3252 |
| | 2005-06 | 0.7463 | 10.6523 | 37.3259 | 12.9092 | 1.3448 | 26.5643 |
| | 2006-07 | 1.2497 | 9.4578 | 38.9131 | 11.7190 | 1.2322 | 20.3691 |
| | 2007-08 | 1.1010 | 10.8503 | 35.3215 | 12.3300 | 0.9588 | 16.8386 |
| | 2008-09 | 0.8552 | 7.9177 | 33.9513 | 13.6380 | 0.9933 | 20.00175 |
| | 2009-10 | 0.9411 | 7.8724 | 34.0873 | 13.0687 | 1.1464 | 14.9807 |
| | *MEAN* | *1.521* | *10.498* | *31.433* | *13.346* | *1.029* | *20.498* |
| | *SE* | *0.25051* | *0.6722* | *1.2798* | *0.2404* | *0.0428* | *0.8068* |
| | *MEAN (OVERALL)* | *1.8005* | *8.3060* | *26.5770* | *14.2421* | *1.1714* | *17.3409* |
| | *SE* | *0.1982* | *0.5773* | *1.2016* | *0.3198* | *0.0380* | *1.7406* |

**ANNEXURE 6 Revealed Comparative Advantage Indices in Merchandise Trade (CAM)**

| | | China | India | Pakistan | Thailand | USA | Vietnam |
|---|---|---|---|---|---|---|---|
| Before WTO (1980-81 to 1994-95) | 1980-81 | 11.4344 | 8.1943 | 65.4472 | 59.4500 | 2.3121 | 12.1811 |
| | 1981-82 | 4.0797 | 18.3127 | 67.5762 | 59.3213 | 2.2029 | 2.3615 |
| | 1982-83 | 4.6863 | 12.8103 | 73.1820 | 63.0352 | 2.0615 | 5.1025 |
| | 1983-84 | 5.9158 | 7.4788 | 47.9895 | 69.8546 | 2.2850 | 23.0715 |
| | 1984-85 | 6.0948 | 5.7340 | 82.7159 | 74.6317 | 1.8977 | 17.0403 |
| | 1985-86 | 5.0393 | 12.1880 | 47.5874 | 68.9196 | 1.7974 | 12.7122 |
| | 1986-87 | 4.4274 | 10.5505 | 65.6657 | 56.4762 | 1.7757 | 17.7708 |
| | 1987-88 | 4.1015 | 16.9362 | 52.4335 | 55.5556 | 1.6656 | 14.7010 |
| | 1988-89 | 3.0398 | 12.1403 | 57.1030 | 60.7885 | 1.7604 | 18.5303 |
| | 1989-90 | 1.3272 | 10.1003 | 41.1760 | 55.0601 | 1.6879 | 93.1379 |
| | 1990-91 | 1.3157 | 11.8763 | 35.8968 | 39.2622 | 1.7026 | 105.6490 |
| | 1991-92 | 1.9865 | 13.6255 | 41.3628 | 33.0611 | 1.4092 | 88.2917 |
| | 1992-93 | 1.9370 | 14.1286 | 39.6216 | 31.0188 | 1.1586 | 114.3419 |
| | 1993-94 | 2.1224 | 13.5424 | 34.8666 | 25.7543 | 1.2123 | 88.9464 |
| | 1994-95 | 3.0504 | 10.1459 | 22.5973 | 23.8365 | 1.3711 | 72.5832 |
| | *MEAN* | *4.0372* | *11.8509* | *51.6814* | *51.7350* | *1.7533* | *45.7614* |
| | *SE* | *0.6657* | *0.8660* | *4.2893* | *4.3147* | *0.0936* | *10.8042* |
| After WTO (1995-96 to 2009-10) | 1995-96 | 0.2628 | 30.8312 | 39.9049 | 23.9395 | 1.1797 | 67.3305 |
| | 1996-97 | 0.6383 | 18.6694 | 38.6271 | 25.2422 | 1.1603 | 82.8916 |
| | 1997-98 | 1.0915 | 18.6672 | 39.3314 | 26.9980 | 0.9414 | 68.0754 |
| | 1998-99 | 2.9342 | 26.1312 | 38.3965 | 22.1852 | 1.0201 | 62.7382 |
| | 1999-00 | 2.5062 | 14.2798 | 50.8181 | 24.1701 | 0.9841 | 64.3258 |
| | 2000-01 | 2.3036 | 14.6026 | 58.6443 | 23.5534 | 1.0614 | 45.6967 |
| | 2001-02 | 1.1689 | 14.2580 | 49.8426 | 21.4758 | 0.8699 | 36.7479 |
| | 2002-03 | 1.1751 | 22.4322 | 45.3045 | 23.3711 | 1.0910 | 42.3597 |
| | 2003-04 | 1.2007 | 14.9150 | 50.0800 | 24.2112 | 1.5131 | 38.0015 |
| | 2004-05 | 0.4026 | 18.1728 | 48.1514 | 28.7718 | 1.4729 | 36.8525 |
| | 2005-06 | 0.3226 | 14.9591 | 63.3708 | 22.9297 | 1.5653 | 47.3960 |
| | 2006-07 | 0.4860 | 14.1413 | 78.1710 | 22.8610 | 1.4394 | 36.8652 |
| | 2007-08 | 0.4011 | 17.8445 | 64.3179 | 23.0181 | 1.2410 | 31.3165 |
| | 2008-09 | 0.2751 | 11.4191 | 66.8851 | 27.7759 | 1.3900 | 37.3439 |
| | 2009-10 | 0.3065 | 9.1282 | 75.8276 | 23.2216 | 1.4520 | 19.9104 |
| | *MEAN* | *1.0317* | *17.3634* | *53.8449* | *24.2483* | *1.2254* | *47.857* |
| | *SE* | *0.2281* | *1.4480* | *3.4423* | *0.5389* | *0.0595* | *4.4566* |
| | *MEAN (OVERALL)* | *2.5344* | *14.6072* | *52.7632* | *37.9917* | *1.4894* | *46.8091* |
| | *SE* | *0.4443* | *0.9742* | *2.7095* | *3.3282* | *0.0733* | *5.7453* |

**ANNEXURE 7 Revealed Competitive Advantage Indices in Agricultural Trade (CEA)**

| | | China | India | Pakistan | Thailand | USA | Vietnam |
|---|---|---|---|---|---|---|---|
| Before WTO (1980-81 to 1994-95) | 1980-81 | 4.9843 | 3.2330 | 21.0352 | 13.2947 | 1.3936 | -7.4841 |
| | 1981-82 | 1.8920 | 6.0272 | 17.9181 | 12.1252 | 1.3436 | 0.7719 |
| | 1982-83 | 2.2548 | 5.6788 | 23.4518 | 12.5392 | 1.2909 | -13.0514 |
| | 1983-84 | 2.9052 | 1.6378 | 20.9871 | 14.9100 | 1.3790 | 2.5851 |
| | 1984-85 | 2.9564 | -0.7179 | 30.3988 | 16.3538 | 1.1777 | -17.7879 |
| | 1985-86 | 1.8620 | 4.7266 | 19.8693 | 16.3646 | 1.2858 | -23.7034 |
| | 1986-87 | 1.2269 | 4.1470 | 22.6973 | 14.9236 | 1.4304 | -15.3113 |
| | 1987-88 | 0.9469 | 8.1510 | 23.7280 | 16.4635 | 1.2118 | -8.8559 |
| | 1988-89 | 0.8205 | 1.3321 | 20.7750 | 19.1952 | 1.1951 | -6.7378 |
| | 1989-90 | -1.0121 | -2.1014 | 12.6993 | 17.9331 | 1.1852 | 23.2448 |
| | 1990-91 | 0.6572 | 5.0900 | 19.2801 | 15.8677 | 1.1662 | 32.3509 |
| | 1991-92 | 0.8503 | 7.7245 | 24.5520 | 14.9440 | 1.0038 | 27.4981 |
| | 1992-93 | 1.0307 | 7.1045 | 22.3426 | 14.3264 | 0.7796 | 33.9836 |
| | 1993-94 | 1.1634 | 6.9779 | 24.1138 | 14.2330 | 0.7870 | 28.3255 |
| | 1994-95 | 1.6165 | 7.3345 | 21.7450 | 13.6050 | 0.9299 | 20.8229 |
| | *MEAN* | *1.6103* | *4.4230* | *21.7062* | *15.3686* | *1.1706* | *5.1101* |
| | *SE* | *0.3487* | *0.8150* | *0.9870* | *0.5011* | *0.0538* | *5.2610* |
| After WTO (1995-96 to 2009-10) | 1995-96 | -1.1554 | 15.3026 | 26.9983 | 12.8428 | 0.7069 | 18.5866 |
| | 1996-97 | -0.2972 | 9.2021 | 22.3172 | 12.7310 | 0.6923 | 25.7732 |
| | 1997-98 | 0.6968 | 9.4563 | 33.6794 | 14.5797 | 0.5352 | 22.5922 |
| | 1998-99 | 3.0949 | 13.2028 | 22.5421 | 13.5332 | 0.7261 | 19.4786 |
| | 1999-00 | 2.7393 | 8.1905 | 26.2867 | 14.3993 | 0.7129 | 22.0094 |
| | 2000-01 | 2.3495 | 8.2878 | 31.5103 | 14.2283 | 0.6580 | 18.3310 |
| | 2001-02 | 1.1869 | 7.9906 | 30.0602 | 12.5779 | 0.4511 | 18.2221 |
| | 2002-03 | 1.3465 | 14.5999 | 30.7913 | 13.3163 | 0.6867 | 22.5374 |
| | 2003-04 | 1.7828 | 10.1326 | 33.3871 | 13.0460 | 0.9080 | 21.2747 |
| | 2004-05 | 0.2716 | 14.1710 | 33.8307 | 15.1578 | 0.9190 | 19.3236 |
| | 2005-06 | 0.2963 | 10.6513 | 37.3259 | 12.8944 | 1.0734 | 26.5581 |
| | 2006-07 | 0.6471 | 9.4569 | 38.8927 | 11.7040 | 0.8877 | 20.3626 |
| | 2007-08 | 0.7096 | 10.8495 | 35.2970 | 12.3048 | 0.5987 | 16.8224 |
| | 2008-09 | 0.6786 | 7.9170 | 33.9392 | 13.5622 | 0.6370 | 20.0008 |
| | 2009-10 | 0.7052 | 7.8721 | 33.9998 | 12.9013 | 0.7124 | 14.9754 |
| | *MEAN* | *1.0035* | *10.4855* | *31.3905* | *13.3186* | *0.7270* | *20.4565* |
| | *SE* | *0.2915* | *0.2915* | *1.2787* | *0.2416* | *0.0415* | *0.8053* |
| | *MEAN (OVERALL)* | *1.3069* | *7.4543* | *26.5484* | *14.2286* | *0.9488* | *12.7833* |
| | *SE* | *0.2303* | *0.7657* | *1.1993* | *0.3213* | *0.053* | *2.9779* |

**ANNEXURE 8 Revealed Comparative Advantage Indices in Merchandise Trade (CEM)**

| | | China | India | Pakistan | Thailand | USA | Vietnam |
|---|---|---|---|---|---|---|---|
| Before WTO (1980-81 to 1994-95) | 1980-81 | 10.6520 | 8.1629 | 65.4469 | 59.4500 | 2.3102 | -12.6721 |
| | 1981-82 | 2.7725 | 17.9285 | 67.5761 | 59.3213 | 2.1979 | 1.6722 |
| | 1982-83 | 3.5311 | 12.6545 | 73.1818 | 63.0352 | 2.0463 | -12.1264 |
| | 1983-84 | 5.6217 | 5.8148 | 47.9885 | 69.8546 | 2.2639 | 18.8399 |
| | 1984-85 | 5.7734 | 1.9696 | 82.7154 | 74.6317 | 1.8747 | -6.0332 |
| | 1985-86 | 4.5803 | 11.7151 | 47.5869 | 68.9196 | 1.7538 | -10.2628 |
| | 1986-87 | 3.7118 | 10.3093 | 65.6657 | 56.4762 | 1.7158 | 0.0599 |
| | 1987-88 | 2.7322 | 16.8654 | 52.4335 | 55.5556 | 1.5920 | 1.9068 |
| | 1988-89 | 2.0738 | 6.3163 | 57.0646 | 60.7885 | 1.6577 | 5.7628 |
| | 1989-90 | -1.7146 | 6.0577 | 41.1760 | 55.0601 | 1.6019 | 89.6060 |
| | 1990-91 | 1.1336 | 11.1818 | 35.8938 | 39.2622 | 1.5793 | 105.5105 |
| | 1991-92 | 1.5321 | 13.4620 | 41.3628 | 33.0611 | 1.2790 | 87.9184 |
| | 1992-93 | 1.6125 | 13.3027 | 39.6201 | 31.0188 | 1.0338 | 114.2117 |
| | 1993-94 | 1.8829 | 13.0265 | 34.8565 | 25.7543 | 1.0723 | 88.9082 |
| | 1994-95 | 2.2761 | 10.0863 | 22.3085 | 23.8365 | 1.2353 | 72.5832 |
| | *MEAN* | *3.2114* | *10.5902* | *51.6585* | *51.7350* | *1.6809* | *36.3923* |
| | *SE* | *0.7181* | *1.1187* | *4.2986* | *4.3147* | *0.1059* | *12.7404* |
| After WTO (1995-96 to 2009-10) | 1995-96 | -1.9391 | 30.8310 | 39.9029 | 23.9395 | 1.0573 | 67.0601 |
| | 1996-97 | -0.6379 | 18.6693 | 38.5941 | 25.2422 | 1.0268 | 82.8916 |
| | 1997-98 | 0.3648 | 18.6669 | 39.3247 | 26.9980 | 0.7870 | 68.0754 |
| | 1998-99 | 2.4042 | 26.1124 | 38.3667 | 22.1852 | 0.8882 | 62.7232 |
| | 1999-00 | 2.2048 | 14.1918 | 50.7709 | 24.1701 | 0.8553 | 64.2348 |
| | 2000-01 | 1.8329 | 14.5304 | 58.6177 | 23.5534 | 0.9077 | 45.6967 |
| | 2001-02 | 0.7589 | 14.2577 | 49.5003 | 21.4758 | 0.7035 | 36.7083 |
| | 2002-03 | 0.8141 | 22.4287 | 44.9775 | 23.3711 | 0.9600 | 42.0899 |
| | 2003-04 | 0.8548 | 14.9142 | 49.8315 | 24.2112 | 1.3313 | 37.9775 |
| | 2004-05 | -0.1570 | 18.1728 | 48.1355 | 28.7718 | 1.2853 | 36.8510 |
| | 2005-06 | -0.0425 | 14.9586 | 63.3708 | 22.9297 | 1.4012 | 47.3896 |
| | 2006-07 | 0.0078 | 14.1408 | 78.1318 | 22.8610 | 1.2242 | 36.8576 |
| | 2007-08 | 0.0924 | 17.8441 | 64.2739 | 23.0181 | 1.0178 | 31.2980 |
| | 2008-09 | 0.1198 | 11.4187 | 66.8627 | 27.7759 | 1.1761 | 37.3368 |
| | 2009-10 | 0.1308 | 9.1280 | 75.6481 | 23.2216 | 1.1769 | 19.9045 |
| | *MEAN* | *0.4539* | *17.3510* | *53.7539* | *24.2483* | *1.0532* | *47.8063* |
| | *SE* | *0.2866* | *1.4490* | *3.4434* | *0.5389* | *0.0536* | *4.4522* |
| | *MEAN (OVERALL)* | *1.8327* | *13.9706* | *52.7062* | *37.9917* | *1.3671* | *42.0993* |
| | *SE* | *0.4581* | *1.0968* | *2.7129* | *3.3282* | *0.0824* | *6.7147* |