Comparative Advantage in Export of Major Agricultural Commodities in India: A Post-reforms Analysis

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Abstract

With the withering away of protectionist policies, the trade pattern of India is likely to march in the direction of its comparative advantage. The paper attempts to assess India's revealed Symmetric comparative advantage (RSCA) in export of major agricultural commodities. This study evaluates the structure of comparative advantage in India and the change in the scenario over a period of 21 years from 1991 to 2011. The present study has ascertained the changes in comparative advantage status of India's major agricultural exports vis-a-vis global players during the post-reforms period. It has been observed in the study that in exports of certain commodities like rice, tea, tobacco, spices, groundnuts and castor oil, India has been able to maintain its comparative advantage, but several other commodities like coffee, fresh fruits, fresh vegetables, cotton and sugar, etc. have been negatively affected. India has been found losing out its comparative advantage in export of some of the agricultural commodities to other global competitors during the period of post economic reforms.

Keywords: Agricultural commodities, agricultural exports, comparative advantage, and economic reforms.

Reduction of trade barriers creates competitive pressures and the potential for technology transfer to lead to productivity gains and restructuring of an economy toward its comparative advantage. India has undertaken a series of economic reforms towards opening up of the economy in the decade of the nineties. Notable among these has been the extensive effort to liberalize its international trade. Therefore, it is expected that trade liberalization in India would have led to changes in the composition of exports to reflect India's comparative advantage in the global economy. Further, a country's comparative advantage in international trade may be influence by differential rates of change in accumulation of production factors or due to the increased trade integration of other countries. Indian agricultural commodities have come to occupy a supreme position in the global market over the years. Today, India is a major supplier of several agricultural commodities like tea, coffee, rice, spices, castor oil, fresh fruits, fresh vegetables, cotton, sugar, meat and its preparations and marine products to the international market. However, the country faces fierce competition from other major players in the field, both the existing and new entrants in the fray. Ironically, the major challenge is from within Asia itself where

countries like China, Malaysia, Philippines, Thailand, Singapore and Indonesia among others pose a big threat to Indian agricultural products. The demand and supply situations in the Asian continent have undergone a rapid transformation due to the growth of the world economy and lowering of trade barriers (Aksoy and Beghin, 2005). An economic upheaval, which took place in most of the South-East Asian countries, has resulted in the creation of a huge supply potential in these economies along with an increase in their per capita income and a simultaneous increase in their trade potential.

Moreover, some recent developments in the international trade scenario, followed by the establishment of World Trade Organization (WTO) and subsequent liberalization of trade have resulted in the emergence of new powers like Vietnam and Turkey with substantial potential in agricultural trade. The formation of regional trading blocks like ASEAN Free Trade Area (AFTA), Bangkok Agreement, South Asia Free Trade Agreement (SAFTA), etc. has given rise to powerful associations with strong bargaining power and these can significantly influence the demand and supply factors in the global markets. Above all, the Indian economy in itself has undergone a rapid transformation after the inception of economic reforms in 1991. India's ratification of the Agreement on Agriculture (AoA) with WTO also had a major impact leading to redefining of its agricultural trade. During this time span, various agricultural commodities exported from India have responded differently and their levels of comparative advantage in the global markets have altered significantly. Hence, it is imperative to have a systematic and well structured analysis to find alterations in the comparative advantage of India vis-a-vis World. The present study was undertaken with the specific objective of determining India's comparative advantage in exports of major agricultural commodities with respect to global exports.

Data and Methodology

In the present study, export value of selected agricultural commodities of India and world to total agriculture commodities export was taken up. From the export value data, revealed symmetric comparative advantage has calculated by using the standard formulae for India and world. The major agricultural commodities/commodity groups were selected for the analysis, based on their major shares in India's total agricultural exports. The commodities considered were rice, tea, coffee, groundnut, cotton, tobacco, castor oil, fresh fruits, fresh vegetables, and sugar. During the period under study (1991 to 2011), these commodities together accounted for more than 50 per cent of India's total agricultural export earnings. The data on export of selected agricultural commodities for India and world total were collected from the official website of FAO. The selected commodities corresponded to the various codes of Standard International Trade Classification (SITC) and their export values were provided in US Dollars. Revealed Comparative Advantage (RCA) is a measure of international trade specialization (Balassa, 1965). It identifies the comparative advantage or disadvantage a country has for a commodity with respect to another country or group o f countries. It provides a ranking of commodities by degree of comparative advantage and identifies a binary type demarcation of commodities based on the comparative advantage (Balance *et al.,* 1987). Under the assumption that the commodity pattern of trade reflects the inter country differences in relative costs as well as non-price factors, the index is assumed to reveal the comparative advantage of the trading countries. The factors that contribute to movements in RCA are economic, structural, world demand and trade specialization. The advantage of using the comparative advantage index is that it considers the intrinsic advantage of a particular export commodity and is consistent with the changes in an economy's relative factor endowment and

productivity. The disadvantage, however, is that it cannot distinguish improvements in factor endowments and pursuit of appropriate trade policies by a country (Batra and Khan, 2005). The original index of RCA was first formulated by Balassa (1965) and can be written as per equation (1).

$$RCA_{ij} = (X_{ij}/X_{ik})/(X_{nj}/X_{nk}) \ldots (1)$$

Where,

X_{ij} = Exports of country 'i' of commodity 'j'

X_{ik} = Exports of country 'i' of a total agricultural commodities 'k'

X_{nj} = Exports of a world 'n' of commodity 'j', and

X_{nk} = Exports of a world 'n' of a total agricultural commodities 'k'

In the present study, country 'i' refers to India, commodity 'j' refers to any of the selected agricultural commodities, set of commodities 'k' refers to the total agricultural commodities and 'n' refers to World. When RCA assumed the value greater than unity for a given country in a given commodity, the country is said to have a revealed comparative advantage in that commodity. However, RCA suffers from the problem of asymmetry as pure RCA is basically not comparable on both sides of unity. It the index ranged from zero to one, a country is said not to be specialized in a given sector and if the value of the index ranged from one to infinity, the country is said to be specialized. The index is made symmetric, following the methodology suggested by Dalum *et al.* (1998) and the resultant index is called as Revealed Symmetric Comparative Advantage (RSCA). Mathematically, it can be expressed by the following equation (2).

$$RSCA = (RCA-1) / (RCA+1) \ldots (2)$$

This measure ranges between -1 and +1 and is free from the problem of skewness. A commodity is said to have comparative advantage in its exports if the corresponding RSCA value is positive and vice versa. In the present study, the RSCA was used to look into the comparative advantage of the selected commodities.

Results and Discussion

Indian agricultural commodities have come to occupy a supreme position in the global market after trade reforms. Today, India is a major supplier of several agricultural commodities like rice, tea, coffee, groundnut, cotton, tobacco, castor oil, fresh fruits, fresh vegetables, and sugar to the international market. However, the country faces fierce competition from other major players in the field, both by the existing and new entrants in the fray. Ironically, the major challenge is from within Asia itself from countries like China, Malaysia, Philippines, Thailand, Singapore and Indonesia, among others; pose a big threat to Indian agricultural products. During this time span, various agricultural commodities exported from India have responded differently and their levels of comparative advantage in the global markets have altered significantly. The results of Revealed Symmetric Comparative Advantage of the principal agricultural commodities are presented in Table 1 and the Figure 1-11 and total agriculture export value of India and world are presented in Appendix I.

Rice (Milled)

The RSCA values and rice exports from India and world are presented in Table 1 and Figure 1, which revealed that the India has comparative advantage in export of milled rice. Indian milled rice exports showed varying levels of comparative advantage in different years of the study period. In 1991, the estimated value of RSCA was 0.78, which slightly decline to 0.77 in 2011. Therefore, it can be concluded that India enjoyed in export of milled rice over the years at varying levels.

Table 1: Revealed Symmetric Comparative Advantage of Agricultural commodities

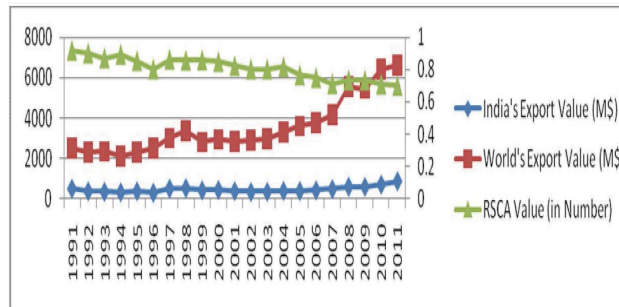| Year	Rice	Tea	Coffee (Green, Roasted and Extracts)	Tobacco (Manufactured and Unmanu-factured)	Spices	Groundnuts (shelled)	Castor oil	Fresh Fruits	Fresh Vegetables	Cotton (waste)	Sugar
1991	0.78	0.92	0.30	0.42	0.87	-0.39	0.97	0.21	-0.51	0.03	-0.26
1992	0.79	0.90	0.40	0.47	0.86	-0.27	0.97	0.22	-0.49	-0.85	0.23
1993	0.78	0.87	0.38	0.36	0.85	0.77	0.97	0.26	-0.47	-0.18	-0.23
1994	0.76	0.89	0.49	0.15	0.85	0.63	0.98	0.29	-0.26	0.41	-0.63
1995	0.88	0.85	0.40	0.22	0.80	0.72	0.97	0.17	-0.34	0.42	-0.14
1996	0.80	0.80	0.39	0.32	0.78	0.78	0.97	0.09	-0.47	0.71	0.18
1997	0.81	0.86	0.37	0.42	0.83	0.87	0.97	0.12	0.11	0.68	-0.40
1998	0.86	0.86	0.38	0.24	0.86	0.55	0.97	0.10	0.15	0.50	-0.95
1999	0.78	0.86	0.39	0.39	0.87	0.82	0.97	0.25	0.20	0.37	-0.93
2000	0.79	0.85	0.29	0.28	0.88	0.73	0.97	0.19	0.20	0.33	-0.05
2001	0.78	0.82	0.38	0.21	0.85	0.61	0.97	0.42	0.33	-0.54	0.48
2002	0.87	0.80	0.32	0.32	0.84	0.50	0.97	0.21	0.24	-0.78	0.49
2003	0.82	0.80	0.31	0.33	0.82	0.82	0.97	0.26	-0.17	-0.11	0.33
2004	0.87	0.82	0.24	0.38	0.80	0.77	0.97	0.18	-0.09	0.24	-0.61
2005	0.83	0.77	0.25	0.34	0.81	0.76	0.96	0.27	-0.13	0.32	-0.21
2006	0.81	0.75	0.21	0.37	0.79	0.83	0.96	0.29	0.11	0.43	0.38
2007	0.83	0.71	0.04	0.34	0.79	0.83	0.95	0.20	-0.13	0.57	0.58
2008	0.78	0.74	0.10	0.55	0.83	0.85	0.96	0.27	0.12	0.50	0.54
2009	0.76	0.73	0.03	0.56	0.83	0.87	0.96	0.16	0.21	0.68	-0.89
2010	0.73	0.71	0.02	0.50	0.83	0.88	0.96	-0.06	0.11	0.69	0.22
2011	0.77	0.70	-0.03	0.34	0.83	0.90	0.94	-0.04	0.02	0.61	0.39
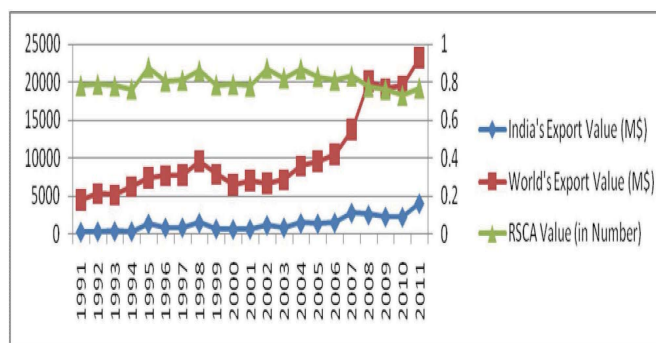
Fig. 1: SRCA values and rice exports from India and world

Tea

The values of RSCA and Tea exports from India and world are presented in Table 1 and Figure 2 from the period 1991 to 2011. India was found to have a comparative advantage in tea exports in all the years under consideration, as could be seen from the positive values of RSCA. But over the years, India's comparative advantage seemed to be deteriorating gradually.

In 1991, the value of RSCA was 0.92, which decreased to 0.70 by the year 2011, depicting a clear downward trend. The results showed that India had significant and far-reaching implications in the global market and direct impact on the Indian tea industry.

Fig. 2: RSCA values and Tea exports from India and world

Coffee (Green, Roasted and Extracts)

In coffee exports, Indonesia, Thailand and Vietnam are the major competitors to India. Because of large value, green, roasted and extracts values were combined as one commodity for coffee. The computed RSCA values for India were decling over the years. The RSCA value was 0.30 in year 1991 and it exhibited negative value in year 2011 (Table 1 and Figure 3), which indicated that India has greater threat in export of coffee due to increasing compitition among world.
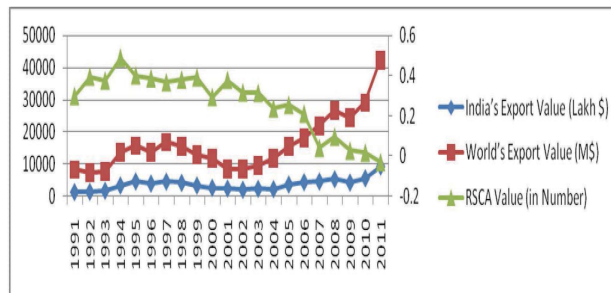
Fig. 3: RSCA values and Coffee (Green, Roasted and Extracts) exports from India and world

**Tobacco (Manufactured and Unmanufactured)**

In tobacco exports, US, Zimbabwe and Brazil are the major competitors to India. The computed RSCA values for India exhibits positive over the years and indicate its comparative advantage in Tobacco exports. The RSCA value was 0.42 in year 1991 and which was slightly decline to 0.44 in the 2011 (Table 1 and Figure 4), which means that India has scope to exports tobacco (manufactured and unmanufactured).
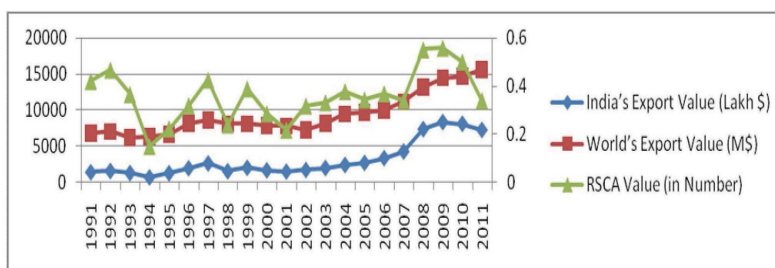
Fig. 4: RSCA values and Tobacco (Manufactured and Unmanufactured) exports from India and world

Spices

The RSCA values and exports value spices from India and world are presented in Table 1 and Figure 5, which shows that India enjoyed over the years of its comparative advantage in export of spices. The RSCA value was 0.87 in year 1991 and which was slightly decline to 0.83 in year 2011. During 1991 to 1996 export value of spices was stagnate and after that growing trend was observed.
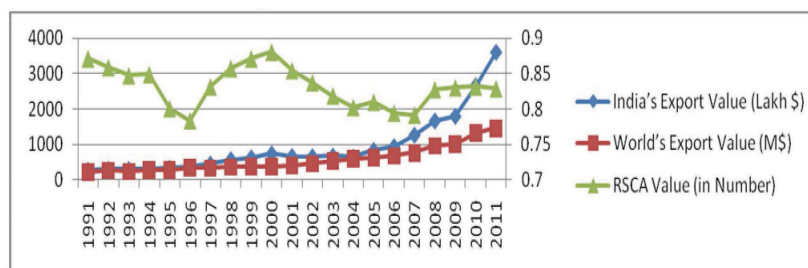
Fig. 5: RSCA values and Spices exports from India and world

Groundnuts (Shelled)

A brief perusal of the RSCA values and gruondnuts (shelled) exports from India and world (Table 1 and Figure 6), which revealed that the India has comparative advantage in exports of gruondnuts (shelled). Indian groundnuts (shelled) exports showed increasing levels of comparative advantage in different years of the study period. In 1991 and 1992, the estimated value of RSCA was negative which improved to 0.90 in year 2011.
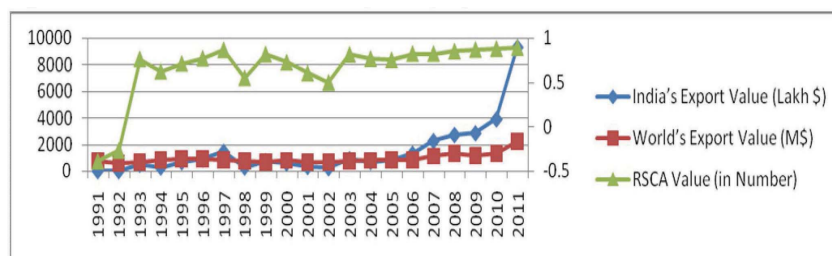

Fig. 6: RSCA values and Groundnuts (Shelled) exports from India and world

Castor Oil

The RSCA values was highly positive for export of castor oil from India. India enjoying over the years through compatative advantage in export of castor oil.
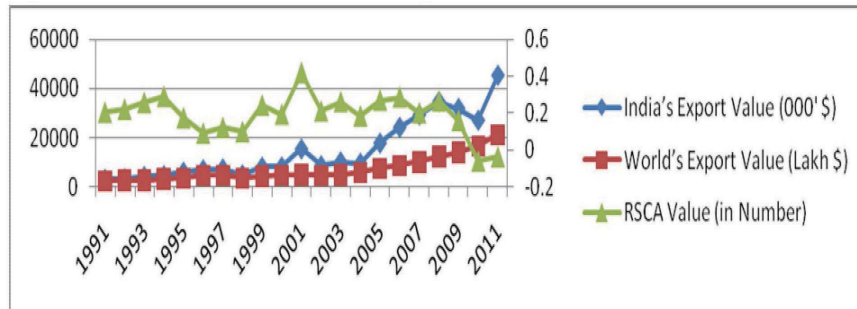
The RSCA value was 0.97 in year 1991 and it was slightly decline to 0.94 in year 2011 (Table 1 and Figure 7), which revealed that county has greater opporutiny in trade of castor oil.
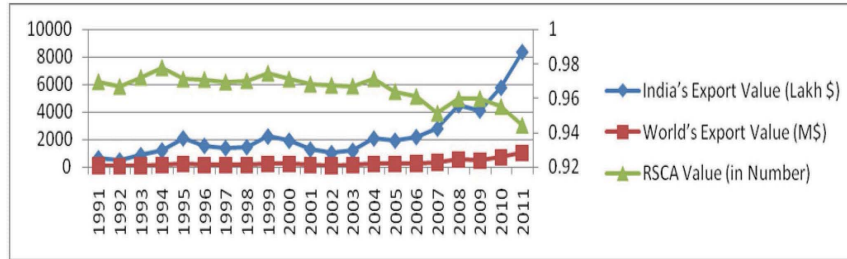
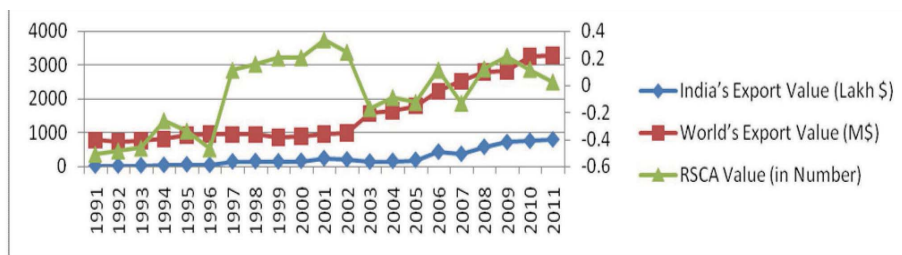**Fig. 7:** Castor Oil exports from India and world

Fresh Fruits

India's comparative advantage in export of Fresh Fruits seemed to dwindle during various years after post reforms. At the beginning period of reforms India maintained its comparative advantage till 2009 and lost its comparative acvantage from last two years. The RSCA value was 0.21 in year 1991 and came down to -0.04 in year 2011 (Table 1 and Figure 8), which indicate the comparative disadvantage in export of fresh fruits.

Fig. 8: RSCA values and Fresh Fruits exports from India and world

Fresh Vegetables

India's comparative advantage in export of fresh vegetables was very low over the years. The RSCA value was fluctuating over the years and it was -0.51 in year 1991 and recovered to 0.21 in year 2011(Table 1 and Figure 9). The export value of fresh vegetables is increasing in our county but still comparative advantage is low.

Fig. 9: RSCA values and Fresh Vegetables exports from India and world

Cotton (Waste)

India had fluctuating comparative advantage in export of cotton (waste) over the years and it was observed negative in mid years. After 2003, it was improved and positively increasing.

Morever, the RSCA value is incresing after year 2002 and achieved 0.61 in year 2011 (Table 1 and Figure 10). From the results, India improving its comparative advantage in export of cotton (waste).
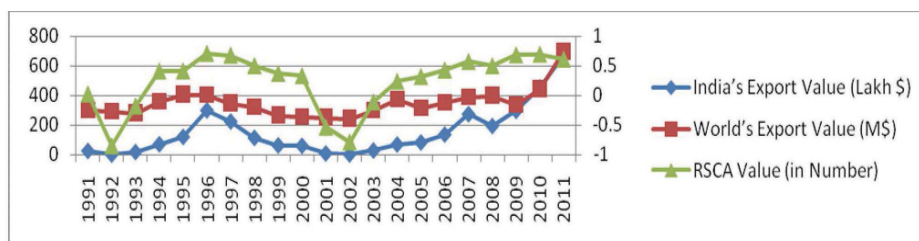
Fig. 10: RSCA values and Cotton (Waste) exports from India and world

Sugar

The RSCA values revealed that India has comparative disadvantage in export of sugar over the years. The RSCA value was found to be very low and even negative in most of the years, same result was found by Kanaka and Chinadurai (2012). At the begning stage of reforms the RSCA value was -0.26 and it was improved to 0.39 in the year 2011. From the figure 11, contry's export value was fluctuating continueously and it was getting better after year 2009.
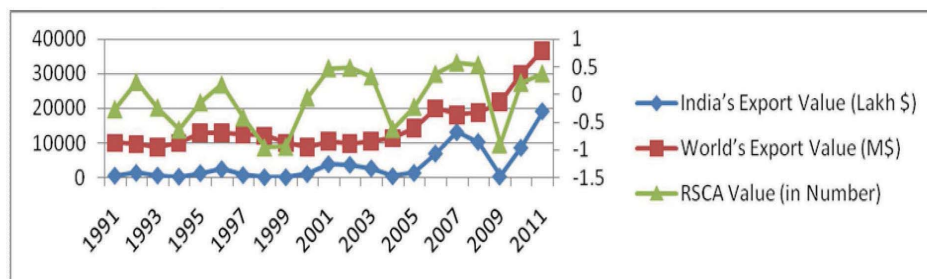
Fig. 11: Sugar exports from India and world

Conclusion

The study had shown that export of various agricultural commodities from India had responded differently in terms of comparative advantage during the post-reforms period. India had enjoyed a comparative advantage in milled rice exports and maintained it over the years. A similar pattern had been observed in tea tobacco and spices export also, where India had been found more comparative advantage in tea and spices export compare to tobacco. The comparative advantage is high in export of tea but trend is slightly decling, same result was found by Shinoj and Mathur (2008). Spices has more comparative advantage than tobacco, while both commodities declined slightly over the years. There was comparative disdvantage observed in early economic reform period and after that it recovered and revealed greater comparative advantage in export of groundnuts (shelled). Castor oil had larger comparative advantage and showed consistancy over the years. India had low comparative advantage in both fresh fruits and fresh vegatables compare to other agricultural commodities. Comparative advantage was not much good for cotton (waste) but recovered after year 2003. India's status in exports of cotton had not been very comfortable. Although cotton products dominate India's agricultural exports but it could not be attributed to comparative advantage in the global market. India had mostly comparative disadvantage in export of sugar over the years because of lower expoet value of sugar. India is enjoying its comparative advantage in most of the agricultural commodities except fresh fruit, fresh vegetable, cotton and sugar and need to maintain and improve it at global level.

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Appendix I:
Total Agriculture Export value of India and World for 1991 to 20011 (in '000$)

Year	India's Total Agriculture Export	World's Total Agriculture Export
1991	2796161	328659185
1992	2947061	357340483
1993	3357395	338737928
1994	3239464	388457665
1995	5493709	442901899
1996	5850742	465557247
1997	5655479	457582994
1998	5225313	437741809
1999	4642044	417168848
2000	4949613	410984483
2001	5233895	414356097
2002	5521562	442667343
2003	6504378	525210872
2004	7058321	607328780
2005	9019607	653297989
2006	11259030	721262546
2007	16708194	872861370
2008	17307299	1063734154
2009	15661552	950085842
2010	19933411	1077882284
2011	30288815	1313940192

Source: http://stat.wto.org/StatisticalProgram/WSDBViewData.aspx?Language=E