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India's Trade Orientation with China: An Analysis of Intra Industry Trade

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Abstract: The present study examines the growth, share and Intra Industry Trade (IIT) of India-China during the period 1996-97 to 2019-2020 using two-digit level HS code data. The Grubel-Lloyd (GL) index is used to measure aggregate and weighted IIT between two countries. The findings reveal a gradual increase in IIT over the study period; however it remained below 30 percent and was accompanied by a persistent trade deficit. During 2019-2020, twenty-three products recorded with more than 50 percent IIT including nine agricultural and fourteen manufactured products. The analysis indicates the presence of India–China export oriented IIT in agriculture and allied products and manufactured products recorded in top five HS codes with more than 90 per cent GLi values in the year 2019-2020. The study highlights opportunities for expanding bilateral trade, particularly in agriculture and manufactured products and suggests promoting mineral products exports to China, which exhibit export-oriented IIT patterns.

Keywords: Grubel Lloyd Index, HS codes, Growth Rates, Trade Balance.

JEL Codes: F10, F14, N70.

I. INTRODUCTION

The emergence of the BRICS nations—Brazil, Russia, India, China, and South Africa—has significantly transformed the structure of the global economy during the last few decades. These countries have emerged as important drivers of economic growth, trade expansion and the engine of global recovery process. BRICS nations also play an important role in promoting international peace, ensuring global economic growth and establishing a united multipolar world centre. The 11th BRICS summit (held on

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13-14 November 2019) emphasized the need to strengthen the relations in trade, innovation, technology and cultural exchange among member nations. Under 12th BRICS, which was broadcast live online on 21-23 July 2020, discussed about terrorism, the Covid-19 pandemic, and the necessity for global reforms. Within this grouping, India and China occupy significant positions because of their demographic strength, rapid industrial transformation and expanding influence in international trade.

Although both India and China began as densely populated agrarian economies characterized by widespread poverty and labor surplus, their paths toward economic development differed considerably. China initiated its economic reforms and trade liberalization in 1978, focusing primarily on export-oriented industrialization and manufacturing-led growth. India, on the other hand, adopted economic liberalization gradually during the 1980s and accelerated reforms in the early 1990s, with greater emphasis on information technology and communication technology-based services. These structural differences shaped the trade patterns of the two economies and influenced the nature of bilateral trade between them. Trade liberalization has been linked with the expansion of Intra-Industry Trade (IIT) which involves the simultaneous occurrence of exports and imports within the same industry (Veeramani, 2002). The concept of IIT has gained substantial importance in international economics as it has been a key factor in trade growth in recent decades.

Intra Industry trade deals in products that belongs to same industry and produces extra gains from international trade, over and above those from comparative advantage. IIT is the result of gains through economies of scale from product differentiation (Grubel and Lloyd, 1975), allowing countries to specialize in the production of varieties of products. By producing fewer varieties, a country can produce each at larger scale, with higher productivity and lower costs. At the same time, consumers also benefit from the increased range of choice and increased market competition (Krugman and Obstfeld, 2009). IIT is found to be significant in India's international trade due to its high intensity with high income countries than with low- and medium-income countries (Veeramani, 2002). But presently, India's trade recorded a shift in favor of the developing nations. Within BRICS, China and India have emerged as world economic powers and for examining their innovative capacity, the study of their economic potential in long term is pertinent. Veeramani (2004) found that IIT grew significantly across the wide range of manufacturing industries in India during the post liberalization period but the trade liberalization may lead to extinction of domestic industries.

Bhat, *et al*. (2006) measured India–China bilateral trade from period 1996 to 2003 and confirm that Intra-industry trade plays a little role in India–China bilateral trade and hence the alternative is to increase the inter-industry trade and it highlights the need for diversification and expansion of trade complementarities between the two economies. Kumar and Ahmed (2014) demonstrated the extent of IIT between India-Bangladesh as well as its changing dimensions during the period 1975 to 2010. Textile, chemicals, electronics, agriculture, engineering, metals and minerals were recognized as major trade opportunities between two countries, indicating the relevance of sectoral specialization in regional trade integration. Dwesar and Kesharwani (2019) measured the marginal IIT between India and China for the period 1999 to 2018 and revealed that IIT expanded along with rise in trade but not its proportion and moreover, the proportion of IIT between India-China was inconsistent. Bagchi and Bhattacharyya (2021) revealed that five manufactured industry groups contributed significantly to IIT growth between India-China and India-USA but export earnings from these commodity groups are remained relatively inadequate. Agarwal and Beati (2021) analyzed and found India's IIT increases in recent year but India's trade with top 15 trading partners falls under the category of inter-industry trade patterns. Their study revealed that India displayed relatively higher IIT in resource-based manufactures but lower IIT in low technology intensive textiles. It indicates that while India–China trade has expanded rapidly, the nature and composition of IIT remain uneven and sector-specific.

Despite the growing literature on IIT, there remains limited comprehensive analysis of category-wise IIT between India and China. The objective of present study covers: i) the identification of category-wise India–China IIT in goods (i.e., agriculture, mineral and manufacture products), ii) analysis on the basis of India's top fifteen exports to and imports from China and India–China IIT results, and (iii) Identification of export/import oriented IIT for considered products. With this background, the present paper divided into following sections of Methodology, Results and Discussion; and Conclusions.

II. METHODOLOGY

1. Data Sources

The study is entirely based on the secondary data. Data for India's exports to and imports from China are collected from Export-Import Data Bank, Directorate General of Commercial Intelligence and Statistics (DGCIS), Ministry of Commerce

and Industry, Government of India. The paper uses 99 commodities at two-digit level HS code (Harmonized System Classification) data for the study period 1996-1997 to 2019-2020 provided in HS code List. The following methodology used in the study:

2. Shares and Trade Balance

The following shares are calculated in the form of percentages for the considered study period (1996-1997 to 2019-2020):

(i) BRICS countries shares in India's total trade, total export and total imports for the years 1996-1997, 2006-2007, 2016-2017 and 2019-2020.

(ii) China's shares in India's total exports and total imports for all the years of study period.

India's Trade Balance with China for all the years of study periodis also calculated.

3. Growth Rates

Growth rates refer to the amount of increase that a specific variable has gained within a specific period and context. In order to find out the Growth Rates of India's exports to and imports from China, the Compound Annual Growth Rate (CAGR) is worked out. The Growth Rates are calculated by fitting the exponential function of the type:

$$Y_t = ab^t e^u$$

Transforming the above equation into linear form:

$$\log Yt = \log a + t \times \log b + u \times \log e$$

Where, Y_t = value of dependent variable in the year t, T = trend variable, u = disturbance term, a & b = constants.

For the estimated value of regression coefficient 'b', the compound growth rate 'r' was calculated as following:

$$r = (\hat{b} - 1) \times 100$$

Where, b = estimated value of b

The Growth rates are calculated for whole of the study period i.e., 1996-1997 to 2019-2020 and also for various sub-periods: 1996-1997 to 2000-2001, 2000-2001 to 2019-2020, 2000-2001 to 2009-2010, 2010-2011 to 2019-2020, 1996-1997 to 2006-2007 and 2007-2008 to 2019-2020.

4. Intra Industry Trade in Goods

The paper uses Grubel-Lloyd (1975) index to calculateIntra-Industry Trade (IIT) between India and China over the time period 1996-1997 to 2019-2020. Grubel-Lloyd (1975) indexis given below:

$$GLi = \left[\frac{(Xi + Mi) - |Xi - Mi|}{(Xi + Mi)} \right] \times 100$$

Where GLi is the IIT index for commodity i, Xi and Mi are values of exports and imports respectively for commodity i. The value of GLi ranges from 0 to 100. If there is no IIT (i.e., Xi or Mi is zero), GLi takes the value zero. If all trade is IIT (i.e., Xi = Mi), GLi takes value of 100.

The paper uses weighted index to get figures for aggregate measure of IIT (Grubel and Lloyd, 1975) for allthe considered 2-digit HS codes.

$$GL = \left\{ \frac{\Sigma[(Xi + Mi) - |Xi - Mi|]}{\Sigma(Xi - Mi)} \right\} \times 100$$

Where, GL is weighted average for all commodities.

The paper also estimates the weighted index for agriculture and allied products (GL_a), weighted index for minerals (GL_m) and weighted index for manufactured products (GL_{mp}) for the considered study period (Veeramani, 2004).

III. RESULTS AND DISCUSSION

1. Shares and Trade Balance

Table 1 represents the percentage share in India's total trade, total exports and total imports with BRICS nations. Within BRICS nations, the share of China in India's total trade is not only the maximum (i.e., 1.88 per cent) for the year 1996-1997 but also for the year 2019-2020 (i.e., even after twenty-three years it is 10.37 percent). The same is the case for the percentage shares of India's exports to China (i.e.,5.30 per cent) in India's total exports and India's imports from China (i.e., 13.73 per cent) in India's total imports for the year 2019-2020 which are also recorded at highest level as compared to other BRICS nations.

Table 2 provides the percentage shares of India's exports and imports with China in its total exports and total imports respectively and also trade balance with China for the years 1996-1997 to 2019-2020. India's share of exports to China in its total exports was1.83 percent in the year 1996-1997 which increased continuously and

Table 1: Percentage Share in India's Total Trade, Total Exports and Total Imports

Countries/ Years	*Trade (%)*				*Exports (%)*				*Imports (%)*			
	1996-97	*2006-07*	*2016-17*	*2019-20*	*1996-97*	*2006-07*	*2016-17*	*2019-20*	*1996-97*	*2006-07*	*2016-17*	*2019-20*
Brazil	0.39	0.78	0.99	0.89	0.39	1.15	0.87	1.26	0.38	0.53	1.07	0.64
Russia	1.84	1.06	1.13	1.28	2.42	0.71	0.70	0.96	1.34	1.29	1.44	1.49
China	1.88	8.25	10.83	10.37	1.83	6.56	3.69	5.30	1.93	9.40	15.95	13.73
South Africa	0.87	1.51	1.42	1.40	0.94	1.77	1.29	1.31	0.82	1.33	1.52	1.47

Source: DGCIS, Ministry of Commerce and Industry, Government of India.

Table 2: China's Shares (in India's Total Exports and Total Imports) and Trade Balance

Years	*Total Export to China (in ₹ lakh)*	*% share in India's Total Export*	*Total Import from China (in ₹ lakh)*	*% share in India's Total Import*	*Trade Balance*
1996-97	218,254.23	1.83	268,703.14	1.93	-50448.91
1997-98	266,824.41	2.06	413,292.94	2.68	-146468.53
1998-99	179,708.82	1.29	461,392.99	2.59	-281684.17
1999-00	233,579.82	1.46	555,912.40	2.58	-322332.58
2000-01	379,775.76	1.87	686,269.56	2.97	-306493.8
2001-02	454,003.60	2.17	971,192.40	3.96	-517188.8
2002-03	956,039.13	3.75	1,351,215.18	4.55	-395176.05
2003-04	1,357,905.85	4.63	1,862,513.84	5.19	-504607.99
2004-05	2,523,296.90	6.72	3,189,230.68	6.36	-665933.78
2005-06	2,992,491.28	6.55	4,811,665.23	7.29	-1819173.95
2006-07	3,752,978.03	6.56	7,900,860.72	9.40	-4147882.69
2007-08	4,359,741.59	6.65	10,911,607.12	10.78	-6551865.53
2008-09	4,266,133.36	5.07	14,760,559.50	10.74	-10494426.14
2009-10	5,471,392.87	6.47	14,604,861.20	10.71	-9133468.33
2010-11	6,431,514.27	5.66	19,807,907.58	11.77	-13376393.31
2011-12	8,747,082.09	5.97	26,546,561.90	11.32	-17799479.81
2012-13	7,352,956.23	4.50	28,438,458.52	10.65	-21085502.29
2013-14	9,056,108.68	4.75	30,923,495.99	11.39	-21867387.31
2014-15	7,303,043.30	3.85	36,956,536.01	13.50	-29653492.71
2015-16	5,893,273.60	3.43	40,404,338.49	16.22	-34511064.89
2016-17	6,824,612.19	3.69	41,109,351.87	15.94	-34284739.68
2017-18	8,599,429.96	4.39	49,223,616.54	16.40	-40624186.58
2018-19	11,728,910.90	5.08	49,207,928.34	13.68	-37479017.44
2019-20	11,767,331.48	5.30	46,152,476.82	13.73	-34385145.34

Source: DGCIS, Ministry of Commerce and Industry, Government of India.

registered as 6.72 percent for the year 2004-2005. The share fluctuated between 5.07 per cent to 6.65 per cent up to the year 2011-2012, but for the year 2016-2017, the share of India's exports to China (in the total exports of India) declined to 3.69 per cent. Further, the share increased to 5.30 per cent in the year 2019-2020. The India's share of imports from China in its total imports was 1.93 per cent for the year 1996-1997 which continuously increased and registered as 6.36 per cent in the year 2004-2005 and increased to 16.22 per cent for the year 2015-2016. For the year 2016-2017, the share of India's imports from China (in the total imports of India) declined to 15.94 per cent and further declined to 13.73 per cent in the year 2019-2020.

It is noticeable that the share of imports from China in India's total imports is higher than the share of exports to China in India's total exports for whole of the study period except for the year 2004-2005. India experienced trade deficit with China for whole of the study period. The trade balance of India with china has been negative but recorded decline for years 2000-2001, 2002-2003, 2009-2010 and 2019-2020.These findings support Dwesar and Kesharwani (2019) who identified that rising trade imbalance and growing dependence on Chinese imports as major concerns in bilateral trade relations.

2. Growth Rate of India's Exports and Imports from China

The compound annual growth rates of India's exports to and imports from China for 2-digit HS Code commodities for whole of the study period and various sub periods are shown in Table 3. The CAGR of India's imports from China is recorded at higher level as compared to total trade and total exports of India with China for the study period and also almost for all sub periods. India's exports of 2-digit HS Code goods to China increased at the rate of 20.70 per cent and imports of 2-digit HS Code goods from China increased at the rate of 28.23 per cent whereas India's total trade with China also grew at the rate of 25.17 per cent for the study period 1996-1997 to 2019-2020. The growth rate of trade between India and China increased from 18.72 per cent during sub period 1996-1997 to 2000-2001 to 21.59 per cent during

Table 3: Compound Annual Growth Rate of India's Exports to and Imports to China (in %)

Years	*1996-97 to 2019-20*	*1996-97 to 2000-01*	*2000-01 to 2019-20*	*2000-01 to 2009-10*	*2010-11 to 2019-20*	*1996-97 to 2006-07*	*2007-08 to 2019-20*
Exports	20.70	10.23	14.67	35.80	4.46	39.04	6.93
Imports	28.23	24.25	24.21	45.39	9.92	38.23	13.36
Total Trade	25.17	18.72	21.59	42.27	9.73	38.44	11.13

Source: Author's calculations.

the sub period 2001-2002 to 2019-2020. After joining China as WTO member in 2001, India's exports to China grew from 10.23 per cent (1996-1997 to 2000-2001) to 14.67 per cent (2001-2002 to 2019-2020) whereas the imports from China grew at the same rate of 24 per cent.

To get the realistic view decade wise analysis and comparison have been done. During immediate sub-period 2000-2001 to 2009-2010 (after China became member of WTO), India's exports, imports and total trade with China recorded the highest growth rates i.e., 35.80 per cent, 45.39 per cent and 42.27 per cent respectively. Even it was noticeable that India's exports increased 3.5 times, imports grew more than 2 times and total trade with China increased by 1.8 times during 2000-2001 to 2009-2010 as compared to 1996-1997 to 2000-2001. But the decline in growth rate of India's exports, imports and trade with China (i.e., 4.46 per cent, 9.92 per cent and 9.73 per cent respectively) was recorded during sub-period 2010-2011 to 2019-2020. The slow-down in the trade of the economy was mainly due to European sovereign debt crisis in 2010.The growth of total trade of India with China declined from 38.44 per cent to 11.13 per cent for the sub periods 1996-1997 to 2006-2007 and 2007-2008 to 2019-2020 respectively. The growth rates of India's exports to China and India's imports from China registered a decline (i.e., 6.93 per cent and 13.36 percent respectively during 2007-2008 to 2019-2020) due to global financial crisis of 2007-2008 which impacted global trade (Economic survey, 2002 and 2009).

3. India's Top Fifteen Exports to and Imports from China

Table 4 provides information regarding India's top fifteen exports to and imports from China for all 2-digit HS Code commodities for the selected years 1996-1997, 2006-2007, 2016-2017 and 2019-2020.

The India's top fifteen exports to China (2 digit HS codes) for the year 2019-2020 include HS codes: 29, 26, 27, 03, 85, 39, 84, 52, 25, 72, 09, 15, 32, 74 and 67. In case of India's top fifteen imports from China for all 2 digit commodities for the year 2019-2020 include HS codes: 85, 84, 29, 39, 31, 73, 90, 87, 38, 72, 76, 94, 28, 70 and 32.

The comparison of India's top fifteen exports to and imports from China for the years 1996-1997 and 2019-2020 shows that exports related to HS codes: 26 (ores , slag and ash), 03 (fish and crustaceans, molluscs and other aquatic invertebrates), 72 (iron and steel), 52 (cotton), 29 (organic chemicals), 25 (salt, sulphur, earth and stone; plastering materials, lime and cement), 15 (animal or vegetables fats and

oils and their cleavage products; pre-edibales fats ;animals or vegetable waxes), 84 (nuclear reactors, boilers, machinery and mechanical appliances; parts thereof) and 85 (electrical machinery and equipment's and parts thereof) and the imports related to HS codes:29 (organic chemicals), 85 (electrical machinery and equipment's and parts thereof), 84 (nuclear reactors, boilers, machinery and mechanical appliances; parts thereof), 28 (inorganic chemicals), 73 (articles of iron and steel), 72 (iron and steel), 32 (Tanning or Dyeing Extracts; Pigments and Other Colouring Matter; Paints; Putty and other Mastics; Inks) and 76 (aluminum and articles thereof) are common for both the years 1996-1997 and 2019-2020 (Annexure I). For the year 2019-2020 as compared to 1996-97 i.e., even after 23 years, India's trade with China consists of nine common exportable and eight common importable (2-digit HS codes) products in top fifteen lists.

The comparison of India's top fifteen exports to and imports from China for the years 1996-97, 2006-2007, 2016-2017 and 2019-2020 shows that exports related to HS codes: 26,03,72,52,29,25,84 and 85 and the imports related to HS codes: 29,85,84,73 and 72 are common for the above given years. Out of these common HS codes, four manufactured commodities (HS codes: 29, 72, 84 and 85) are appearing as both exportable and importable, which further confirming the possibility of IIT. These finding strongly support the theoretical argument of Grubel and Llyod (1975), who argued that IIT arises due to product differentiation and economies of scale.

4. Degree of India-China Intra Industry Trade in goods

Table 5 gives the following recorded levels of IIT:

i) Individually for all two digit (HS codes) level commodities (GLi);

ii) Weighted average for all two-digit level commodities (i.e. GL) with HS codes: 01 to 99;

iii) Category – wise India-China Intra Industry Trade in goods: a) Weighted average for agriculture and allied products (i.e., GL_a) with HS codes: 01 to 24; b) Weighted average for mineral products (i.e., GL_m) with HS codes: 25, 26 and 27; c) Weighted average for manufactured products (i.e., GL_{mp}) with HS codes: 28 to 99 for the years 1996-1997, 2000-2001, 2004-2005 and 2008-2009 to 2019-2020.

(i) The analysis of IIT for considered groups reveals increase in GLi index for 62industry groups (with HS codes:05, 06, 07, 08, 10, 11, 12, 13, 14, 16, 17, 18, 19,

20, 22, 23, 24, 27, 29, 30, 32, 33, 36, 39, 40, 43, 44, 45, 46, 47, 48, 50, 52, 53, 55, 56, 57, 58, 59, 62, 63, 65,66, 67, 71, 72, 73, 74, 75, 76, 78, 79, 81, 86, 88, 89, 90, 91, 93, 94, 97 and 98)in 2019-2020 from that in 1996-1997. Within 62 industry groups, 10 commodities with HS codes: 05 (products of animal origin, not elsewhere specified or included), 07 (edible vegetables and certain roots and tubers), 08 (edible fruit and nuts; peel or citrus fruit or melons), 18 (cocoa and cocoa preparations), 19 (preparations of cereals, flour, starch or milk; pastry cooks products), 41 (raw hides and skins (other than fur skins) and leather), 53 (other vegetables textiles fibers; paper yarn and woven fabrics of paper yarn),78 (lead and articles thereof), 88 (aircraft, spacecraft, and parts thereof) and 97 (works of art collectors pieces and antiques) recorded more than 80 percent GLi values in the year 2019-2020. The analysis also reveals that 11 commodities with more than 50 per cent IIT in 1996-97 includes 2 agricultural, 1 mineral and 8 manufactured products and in the year 2019-2020 number of agricultural products increased to 9 and manufactured products increased to 14.

(ii) The weighted average (GL) of all products is 17.18 percent for the year 1996-1997, which increased to 28.65 percent for the year 2000-2001. The GL further declined to 22.39 percent for the year 2004-2005. The IIT kept on fluctuating between 13 to 17 percent for the years 2008-2009 to 2016-2017 and increased to 21.80 per cent in the year 2019-2020. The GL increased by 4.62 percent points in the year 2019-2020 (i.e. GL 21.80 per cent) as compared to 1996-1997 (i.e. GL 17.18per cent).

(iii) Category – wise India-China Intra Industry Trade in goods

(a) Out of total 24 Agriculture and allied products, 18 goods (i.e. HS codes: 03, 05, 06, 07, 08, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 22, 23 and 24) recorded an increase in GLi index in 2019-2020 as compared to 1996-1997 are shown in Table 5. Within 18goods, the commodities with significant increase in IIT (i.e. more than 80per cent increase in GLi values) in 2019-2020 as compared to 1996-1997 are HS codes: 05, 07, 08, 18 and 19. The IIT for all Agriculture and allied products or weighted average (GL_a) of Agriculture and allied products is 5.16per cent for the year 1996-1997, which increased to 19.27 per cent for the year 2008-2009 but GL_a declined to 14.86 per cent and further to 13.69 per cent for the years 2009-2010 and 2010-2011 respectively. GL_a kept on fluctuating between 22 to 25 percent for the years 2014-2015 to 2017-2018 and further GL_a declined to 11.01per cent in the year 2019-2020. There was 5.85 percent points increase in IIT for agriculture and allied products in 2019-2020 as compared to 1996-1997.

Table 4: India's Top Fifteen Exports to and Imports from China

Exports (in ₹ lakh)								*Imports (in ₹ lakh)*							
HS	*1996-97*	*HS*	*2006-07*	*HS*	*2016-17*	*HS*	*2019-20*	*HS*	*1996-97*	*HS*	*2006-07*	*HS*	*2016-17*	*HS*	*2019-20*
23	54,954.0	26	1,722,112.44	26	1,105,997.00	29	1,909,747.45	29	68,532.57	85	1,919,132.37	85	1,474,2871.0	85	13,521,953.76
26	41,809.34	52	339,400.49	52	903,809.4	26	1,671,930.73	27	36,537.04	84	1,470,445.99	84	7,459,571	84	9,419,624.08
03	26,235.42	74	241,149.30	29	591,200.1	27	1,505,773.57	50	21,608.75	29	773,651.49	29	3,767,774	29	5,636,247.88
72	25,344.09	29	234,689.05	27	529,223.4	03	946,984.51	85	20,190.61	27	569,341.97	39	1,239,726	39	1,919,183.94
52	23,731.02	72	216,200.22	74	471,026.8	85	612,318.36	84	17,375.24	73	455,136.48	89	978,072.3	31	1,287,558.13
29	10,499.61	39	194,459.49	25	374,651.1	39	596,158.86	28	15,480.23	72	320,238.08	72	904,656.1	73	1,122,233.82
25	6,801.85	28	159,219.85	84	356,485.9	84	570,460.67	74	11,033.90	98	225,633.26	90	885,750.3	90	948,356.89
15	5,063.30	25	93,402.80	85	265,317.8	52	552,161.66	73	7,699.15	39	172,733.63	31	838,973.4	87	901,280.78
28	4,475.11	84	70,595.46	72	231,316.3	25	435,396.28	98	6,210.25	50	152,519.85	73	827,987.5	38	850,704.56
30	3,912.97	27	49,401.47	39	197,712.3	72	364,238.45	25	5,804.66	28	130,056.25	87	745,871.7	72	791,416.77
68	1,783.77	03	38,633.85	15	196,973.4	09	334,318.17	72	4,666.57	59	99,744.16	38	635,280.1	76	675,919.25
84	1,657.72	67	36,533.03	67	105,377.7	15	279,370.28	32	3,820.87	87	96,770.53	94	596,502.4	94	635,372.77
41	1,333.40	85	33,294.09	90	102,179.2	32	224,496.80	89	3,587.21	90	91,833.03	98	513,476.8	28	527,345.66
38	1,235.20	23	31,093.32	71	95,760.43	74	189,359.80	76	3,071.48	69	88,163.83	76	443,900.1	70	427,283.84
85	1,096.28	79	26,700.22	03	88,198.12	67	128,384.57	81	2,806.87	94	74,474.81	27	430,092.3	32	401,761.25

Source: Author's calculations.

(b) Under minerals category, the analysis of IIT reveals that only HS code 27 (i.e.38.43 percent GL), has recorded significant increase in IIT with more than 30per cent GLi value in 2019-2020 from that of 1996-1997. The weighted average of minerals (GL_m) was 16.55per cent for 1996-1997 and it increased to 23.09per cent in 2000-2001. Later, declined GL_m fluctuated between 6 to 8 percent for the years 2004-2005 to 2009-2010. The GL for minerals increased from 23.46per cent (i.e. in 2010-2011) to 59.44per cent (i.e. in 2015-2016), but for the year 2016-2017 GL_m falls to 39.78per cent. Further, the weighted average of minerals increased to 49.90 per cent in 2017-2018 but it again declined to 23.38per cent in the year 2019-2020. The IIT for mineral products recorded an increase of 6.83 per cent in 2019-2020 as compared to 1996-1997.

(c) Out of total 72 manufactured products, 44 products (i.e., HS codes: 29, 30, 32, 33, 36, 39, 40, 43, 44, 45, 46, 47, 48, 50, 52, 53, 55, 56, 57, 58, 59, 62, 63, 65, 66, 67, 71, 72, 73, 74, 75, 76, 78, 79, 81, 86, 88, 89, 90, 91, 93, 94, 97 and 98) recorded an increase in GLi's in 2019-2020 as compared to 1996-1997. Among 44 products, the commodities which recorded an increase in IIT with more than 80 per cent GLi values in 2019-2020 as compared to 1996-1997 are HS codes: 78, 88 and 97. The weighted average for manufacturing products (GL_{mp}) was 8.97 per cent in 1996-1997 and it is maximum (i.e., 32.99 per cent) for manufacturing products in 2000-2001. GL_{mp} keep on fluctuating between 11per cent to 18 per cent for the years 2008-2009 to 2017-2018 and further it increased to 22.09 per cent in the year 2019-2020. The GL for manufacturing products increased by only 13.12 per cent points in 2019-2020 as compared to 1996-1997. The results regarding manufactured products IIT are supported by Bagchi and Bhattacharyya (2021) study which found that manufacturing industries were the main drivers to increase IIT between India and China.

Table 6 provides a frequency distribution of values of GLi for industry groups for the years 1996-1997, 2000-2001, 2004-2005 and 2008-2009 to 2019-2020.Over the time, the minimum number of groups (i.e. 4 per cent to 10 per cent) recorded highest level of GLi (i.e. more than 80 percent), while maximum number of industries (i.e. 34per cent to 54 per cent) registered lowest level of GLi (i.e. less than 20 per cent). For all the years, there are 5 to 33 groups of industries having zero value showing no IIT.

5. Analysis based on Top Fifteen Exports/Imports and GLi values

The analysis identified: (i) Commodities appeared in both India's top fifteen exports and imports for the years 1996-1997 and 2019-2020 and recorded significant

Table 5: India-China Grubel- Llyod Intra Industry Trade Index (in percent) Agriculture and Allied Products (GL_a)

HS	1996 -97	2000 -01	2004 -05	2008 -09	2009 -10	2010 -11	2011 -12	2012 -13	2013 -14	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20
01	0.00	0.00	0.00	0.00	0.07	0.05	0.35	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
02	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03	0.00	0.00	0.20	0.18	0.14	0.30	0.15	0.17	0.00	0.15	0.30	0.47	0.65	0.26	0.31
04	0.00	0.37	81.30	82.38	80.49	46.41	0.00	1.01	3.49	0.00	0.20	10.29	43.08	0.00	0.00
05	37.65	30.17	48.79	25.29	53.47	32.74	35.87	42.85	32.31	41.92	48.48	35.71	57.70	36.12	95.83
06	0.00	40.47	64.21	42.84	43.73	30.47	90.57	93.29	92.47	92.22	98.98	93.53	59.61	21.58	15.80
07	3.85	10.15	2.43	2.04	0.30	0.71	1.81	3.11	4.09	2.93	5.96	9.51	17.90	25.18	80.42
08	20.34	57.77	3.72	6.93	22.60	7.11	9.24	14.54	12.15	16.82	15.83	18.17	17.94	86.41	86.70
09	22.46	13.32	30.35	35.84	47.90	79.09	62.53	31.77	44.09	81.56	58.12	58.44	40.83	11.44	3.90
10	0.00	8.90	0.00	0.05	0.00	1.57	0.16	0.00	0.00	0.00	0.06	0.01	67.73	30.71	10.10
11	0.00	0.28	33.73	50.79	48.05	53.10	97.40	80.21	92.17	96.69	65.76	18.12	7.83	21.63	25.81
12	12.69	60.29	55.36	41.29	60.33	34.38	42.31	73.16	56.83	19.15	67.42	60.43	98.29	71.48	26.40
13	59.43	1.95	10.62	23.21	35.72	25.18	11.00	13.77	17.63	32.84	38.07	48.67	59.57	27.54	62.04
14	4.95	14.62	40.59	11.63	0.99	1.11	3.45	4.87	11.62	42.62	55.77	83.81	66.69	55.22	21.86
15	30.86	6.15	4.69	27.74	1.91	4.45	20.47	1.66	1.08	1.16	1.14	1.92	5.38	9.66	7.90
16	0.00	0.00	2.45	3.38	5.79	6.88	66.20	3.29	8.32	0.00	54.31	46.78	52.25	67.27	75.36
17	5.36	56.67	22.60	35.91	6.11	44.12	76.90	90.60	93.60	5.03	29.06	75.92	92.19	67.15	65.00
18	0.00	0.00	2.77	19.81	70.22	70.49	73.39	14.90	6.26	37.95	42.55	1.89	10.21	79.93	91.72
19	0.00	25.65	47.39	11.02	49.56	53.55	18.30	15.71	27.51	6.14	30.26	92.19	87.65	97.64	83.88
20	0.00	24.68	2.31	32.85	46.74	20.98	28.37	37.19	70.69	96.41	58.31	74.99	84.24	70.59	49.60
21	71.90	68.59	73.74	14.04	57.62	35.91	26.25	27.39	22.59	30.06	26.68	30.00	46.09	44.60	29.37
22	0.00	8.83	21.08	35.00	37.40	3.14	27.93	53.37	57.17	63.51	82.64	92.49	65.60	83.96	68.90
23	2.42	44.09	29.18	17.17	32.31	17.99	35.03	31.29	31.28	65.93	43.30	59.49	16.10	4.95	17.83
24	0.00	0.00	42.89	57.74	75.37	48.21	12.36	20.19	98.92	80.51	48.44	96.56	62.03	99.93	17.11
GL_a	5.16	7.38	13.02	19.27	14.86	13.69	21.84	13.58	15.31	22.91	22.06	25.54	22.98	13.81	11.01

Minerals Products (GL_m)

HS	*1996-97*	*2000-01*	*2004-05*	*2008-09*	*2009-10*	*2010-11*	*2011-12*	*2012-13*	*2013-14*	*2014-15*	*2015-16*	*2016-17*	*2017-18*	***2018-19***	***2019-20***
25	92.09	73.56	60.18	66.35	45.39	39.09	44.85	6.49	20.63	23.39	23.59	23.87	28.08	39.08	36.80
26	8.60	19.31	6.22	1.67	0.98	1.85	2.32	3.39	4.58	17.72	8.38	3.24	4.69	5.57	2.60
27	0.00	0.64	3.56	16.24	42.13	88.78	80.85	94.89	89.03	75.20	97.17	89.67	79.90	53.39	38.43
GL_m	16.55	23.09	8.27	8.63	6.58	23.46	26.70	25.97	44.85	54.58	59.44	39.78	49.90	41.36	23.38

Manufactured Products (GL_{mp})

HS	*1996-97*	*2000-01*	*2004-05*	*2008-09*	*2009-10*	*2010-11*	*2011-12*	*2012-13*	*2013-14*	*2014-15*	*2015-16*	*2016-17*	***2017-18***	***2018-19***	***2019-20***
28	44.85	14.02	79.58	54.52	38.88	48.45	24.96	11.45	29.01	50.45	44.87	36.81	30.20	11.38	24.79
29	26.57	60.49	61.16	25.04	28.86	30.72	34.02	34.21	29.24	28.43	24.46	27.13	45.82	54.95	50.62
30	11.07	14.43	47.23	68.22	63.21	51.43	61.51	88.63	58.62	36.70	27.28	33.62	48.88	46.32	43.34
31	2.80	0.00	0.00	0.42	0.00	0.00	0.00	0.02	0.03	0.00	0.03	0.06	0.12	0.11	0.29
32	23.08	41.48	74.41	62.51	55.84	45.73	35.79	40.33	45.84	42.74	39.80	47.18	49.32	62.46	71.69
33	15.93	42.93	80.58	86.10	90.78	85.83	94.33	62.11	77.37	97.64	83.54	66.70	84.36	74.58	63.79
34	96.13	46.64	88.17	70.37	62.56	50.07	48.33	25.71	26.40	26.88	22.74	25.75	29.86	25.91	29.54
35	22.98	0.74	95.01	12.37	11.01	4.43	13.69	8.97	9.91	8.62	7.04	5.37	6.33	3.54	2.82
36	0.00	82.04	0.10	0.50	0.00	0.08	0.00	86.05	96.22	0.00	0.00	61.54	0.00	91.04	0.26
37	0.97	8.21	0.89	0.49	0.44	0.49	0.04	0.50	0.18	0.20	1.44	0.92	0.29	0.84	0.66
38	63.55	97.32	51.54	31.34	48.29	29.34	36.71	37.53	30.98	24.13	24.35	22.34	17.24	20.02	22.13
39	27.79	27.97	39.52	44.39	75.19	63.56	74.00	71.45	59.73	34.47	30.75	27.51	37.80	57.91	47.40
40	24.08	18.28	81.57	26.37	15.37	28.85	19.39	34.30	22.14	19.87	14.86	18.30	27.33	36.91	36.72
41	94.16	27.98	37.17	35.62	30.60	36.56	35.44	35.62	33.48	37.89	48.13	51.00	49.44	46.57	82.63
42	20.43	24.30	35.49	4.51	6.74	12.38	26.47	23.44	18.61	18.09	18.93	22.81	14.95	12.00	13.82
43	0.00	0.00	0.00	0.00	0.09	0.00	0.93	0.00	0.04	5.88	8.84	24.00	11.17	33.16	22.54
44	13.49	34.22	13.12	4.89	3.71	3.65	2.81	3.83	6.03	7.96	68.76	51.02	42.10	64.02	31.40
45	0.00	1.38	0.00	0.01	0.02	0.04	12.83	0.00	18.17	10.20	6.61	15.60	43.73	16.50	13.84
46	0.00	48.68	0.00	0.00	6.44	0.00	0.00	17.00	5.35	5.54	1.36	17.77	20.86	12.06	11.03

47	0.00	23.88	0.03	0.00	0.72	1.08	1.59	1.20	0.58	0.00	0.21	0.00	0.06	1.93	40.50
48	15.67	29.29	7.94	1.18	2.36	2.47	2.71	2.70	2.50	2.12	2.08	1.58	7.52	39.12	41.79
49	6.92	31.39	2.45	6.43	2.43	1.72	2.85	2.94	3.04	5.00	2.08	5.18	5.32	7.61	5.87
50	3.96	4.55	2.18	1.65	3.94	6.17	5.08	5.70	10.84	14.94	13.63	14.47	11.78	19.20	17.80
51	70.14	26.20	18.45	29.17	57.47	50.37	42.05	28.66	19.55	22.38	21.66	17.98	24.78	45.68	17.14
52	18.50	44.08	92.79	51.02	18.07	16.64	7.53	12.17	10.78	12.00	14.30	16.92	23.00	12.76	26.26
53	15.39	19.30	1.84	45.98	67.36	78.69	75.03	63.81	67.29	69.86	63.35	99.82	94.26	98.48	94.96
54	40.52	22.75	4.16	2.48	3.23	5.97	4.04	3.17	3.15	3.59	3.33	4.39	7.56	10.56	4.92
55	23.91	80.40	83.77	60.15	55.29	75.38	61.78	33.15	26.92	32.53	27.66	46.04	28.78	35.12	25.35
56	1.52	7.58	0.97	3.98	13.65	19.98	9.49	9.66	20.20	25.77	13.51	11.95	6.77	10.15	10.48
57	40.82	69.88	21.78	38.82	34.04	32.27	40.47	48.44	54.99	68.55	70.73	69.29	67.19	66.17	56.89
58	1.36	61.20	1.27	3.71	3.23	5.00	2.55	3.40	3.60	6.59	5.12	5.00	4.83	4.09	4.61
59	1.43	0.32	0.75	0.61	1.31	2.13	2.32	4.42	6.51	8.00	7.25	7.95	6.66	7.95	8.66
60	88.52	0.93	1.05	0.13	0.13	0.35	0.21	0.08	0.11	0.08	0.03	0.11	1.35	0.99	0.50
61	30.85	23.41	37.20	32.61	58.50	51.41	45.20	51.56	43.58	40.29	38.94	33.80	30.07	35.21	28.82
62	22.68	29.04	71.68	50.43	67.35	69.98	92.04	79.14	64.17	67.94	68.86	72.95	60.08	70.88	61.65
63	24.73	30.92	19.38	11.00	27.20	25.21	24.49	24.75	29.11	20.59	17.92	23.30	28.88	25.11	26.67
64	62.38	10.25	2.66	7.65	3.74	3.09	4.69	6.34	11.28	15.05	18.83	19.62	17.15	17.86	26.39
65	0.00	44.54	0.00	4.13	3.00	4.12	11.15	5.12	2.27	1.93	2.52	1.69	1.65	3.28	3.69
66	0.00	0.00	0.00	0.01	0.01	0.01	0.32	0.00	0.00	1.00	0.14	0.00	0.57	0.27	2.60
67	2.45	9.75	8.55	11.47	10.49	12.92	9.95	12.80	9.82	11.76	13.76	11.97	18.75	27.79	25.03
68	13.89	19.64	95.12	57.13	48.86	94.55	27.94	24.02	26.00	20.16	11.86	5.13	5.14	4.11	4.34
69	44.73	14.98	5.65	2.56	1.10	0.93	0.82	2.41	1.96	2.55	0.50	3.00	4.91	9.12	13.08
70	14.72	23.97	14.60	47.86	50.90	39.65	46.82	33.95	43.52	34.51	27.11	18.41	5.99	6.19	8.50
71	41.86	1.33	20.78	96.21	77.54	21.73	22.94	61.49	23.44	21.50	36.92	41.91	59.99	84.63	61.91
72	31.10	53.13	31.99	35.63	55.31	54.55	47.23	33.58	50.03	8.32	11.59	40.73	33.33	36.63	63.04
73	4.43	83.18	21.52	4.01	5.18	7.99	10.80	7.71	12.47	10.62	10.05	10.59	7.80	8.21	9.85
74	1.24	46.30	52.08	86.60	30.84	25.32	17.59	18.63	18.40	19.42	24.97	39.73	24.94	97.09	79.86
75	0.00	0.00	12.43	0.98	0.76	0.22	1.12	3.41	40.24	0.38	96.19	44.90	42.08	18.62	65.59
76	3.49	54.39	84.50	12.46	81.69	7.25	22.24	5.96	28.56	6.59	1.54	7.52	6.75	2.17	12.03
77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	0.00	0.29	0.00	3.86	8.86	19.78	0.22	0.74	21.63	0.25	27.38	0.55	91.66	19.44	93.62

79	0.00	32.28	8.91	20.74	5.67	26.72	39.17	95.11	16.66	18.24	59.93	30.16	4.52	45.71	17.98
80	0.00	29.81	47.49	4.13	5.69	13.66	3.53	39.66	40.85	0.83	0.30	0.03	0.00	0.00	0.00
81	0.00	1.59	2.49	8.74	0.60	0.75	0.48	0.73	0.80	0.63	1.08	1.53	1.14	1.01	1.60
82	7.41	10.71	24.29	9.79	2.61	16.70	11.85	7.60	9.96	9.01	6.23	9.33	8.27	8.83	6.88
83	13.51	4.91	7.62	7.85	6.38	11.43	6.11	4.51	3.65	3.75	5.20	2.83	1.97	2.49	2.33
84	17.42	17.03	18.28	8.20	9.49	7.93	7.26	8.34	9.75	9.38	8.35	9.12	10.04	11.65	11.42
85	10.30	16.09	3.83	2.32	4.80	4.49	4.16	3.43	4.19	3.29	2.86	3.54	3.29	5.48	8.66
86	0.00	0.00	12.06	1.70	1.55	1.17	1.81	2.05	3.75	12.67	4.48	2.68	9.78	3.68	2.96
87	65.98	51.24	88.91	11.90	11.62	12.86	19.57	17.22	21.32	16.50	12.61	12.86	11.57	12.20	12.84
88	0.00	32.47	0.00	80.09	87.56	59.20	85.50	24.04	7.83	25.54	50.47	24.29	37.98	66.73	87.29
89	1.18	23.01	0.03	11.45	1.72	0.00	0.00	3.51	0.15	0.01	0.00	0.00	0.00	0.00	8.83
90	5.45	81.42	40.01	18.66	38.57	23.06	22.35	24.61	23.90	16.74	18.87	20.69	17.08	17.28	22.18
91	0.00	0.89	0.14	0.46	0.34	0.29	1.42	0.45	0.67	1.08	0.98	0.97	0.69	1.26	0.62
92	94.32	41.49	11.58	27.84	8.71	4.22	4.76	4.85	3.20	6.56	4.81	6.89	4.61	22.10	14.26
93	0.00	19.56	4.02	86.85	2.78	70.54	58.03	86.12	0.17	2.32	9.44	32.96	1.59	35.98	9.68
94	0.00	0.33	0.94	1.64	2.57	2.91	3.51	3.84	4.61	4.36	4.56	4.66	3.07	3.45	2.77
95	7.77	0.80	1.84	0.53	0.63	0.51	0.95	0.70	0.54	0.39	2.61	2.57	1.27	2.37	3.25
96	6.77	45.40	15.79	2.56	2.13	3.39	7.36	4.36	4.31	4.37	4.56	3.77	4.77	4.91	3.06
97	0.00	4.19	5.94	27.06	40.08	84.60	20.01	40.99	16.10	3.03	1.70	0.79	2.49	69.79	97.83
98	0.35	0.00	13.89	0.17	1.97	0.20	0.04	0.55	0.14	0.61	0.39	0.19	0.49	0.32	0.69
99	37.59	95.19	62.64	11.87	43.71	78.01	69.66	14.60	10.69	52.92	60.19	87.39	10.93	66.62	33.18
GL_{mp}	8.97	32.99	29.78	17.55	17.67	16.45	14.30	14.20	15.14	13.13	11.47	13.00	15.23	21.65	22.09
GL (total)	17.18	28.65	22.39	16.16	15.93	17.2	15.67	14.77	17.05	14.86	13.29	14.59	17.10	22.84	21.80

Source: Author's calculations.

increase in IIT with more than 50 percent GLi value in 2019-2020. (ii) Commodities which appeared in either India's top fifteen imports or India's top fifteen exports (for the years 1996-1997 and 2019-2020) and recorded significant increase in IIT with more than 50 percent GLi value in 2019-2020. (iii) Commodities which registered significant increase in IIT with more than 50 percent GLi value in the year 2019-2020 but are not present in the India's top fifteen exports and imports in any of the years 1996-1997 and 2019-2020.

(i) The careful analysis shows that in the list of India's top fifteen exports and imports from China, nine exportable products (HS codes: 26, 03, 72, 52, 29, 25, 15,84 and 85) and eight importable products (HS codes: 29,85,84,28, 73,72,32 and 76) appeared in both the years 1996-1997 and 2019-2020. Out of which, HS codes: 72-iron and steel, 29-organic chemicals, 84-nuclear reactors, boilers, machinery and mechanical appliances; parts thereof and 85-electrical machinery and equipment's and parts thereof are managed to be there in top fifteen exports as well as in top fifteen imports and also recorded significant change in the levels of GLi in 2019-2020 over the year 1996-1997. The HS codes 72 and 29 recorded an increase in GLi in 2019-2020 over the year 1996-1997 by 31.94 percent and 24.05 percent points respectively and are also recorded more than 50 percent. The HS codes 84 and 85 recorded a decline in GLi in the year2019-2020 over the year 1996-1997 by 6 percent and 1.64 percent points and recorded less than 50 percent GLi. This is also further studied and supported by Veeramani (2004) that IIT expansion and growth is selective to specific commodities rather than across all manufacturing industries in India.

(ii) The HS codes which appeared in either India's top fifteen imports or India's top fifteen exports (for the years 1996-1997 and 2019-2020) and also recorded significant increase in IIT with more than 50 percent GLi value in 2019-2020is HS code 29 (organic chemicals), 32 (Tanning or Dyeing Extracts; Pigments and Other Colouring Matter; Paints; Putty and other Mastics; Inks) and 72 (iron and steel). The HS codes 29, 32 and 72 recorded an increase in GLi values by 24.05 per cent, 48.61 per cent and 31.94 per cent in the year 2019-2020 over the year 1996-1997.

(iii) The HS codes which recorded significant increase in IIT with more than 50 percent GLi value in 2019-2020 (but are not present in India's top fifteen imports and exports during both the years 1996-1997 and 2019-2020) are 97 – works of art collectors' pieces and antiques (97.83 per cent), 5 – products of animal origin, not elsewhere specified or included (95.83per cent), 53 – other vegetables textiles fibers;

Table 6: Frequency Distribution of GLi Values

GLi Values	*No. and percentage of Industries**														
	1996-97	*2000-01*	*2004-05*	*2008-09*	*2009-10*	*2010-11*	*2011-12*	*2012-13*	*2013-14*	*2014-15*	*2015-16*	*2016-17*	*2017-18*	*2018-19*	*2019-20*
>80 &<100	5 (5.0)	6 (6.0)	10 (10.1)	6 (6.0)	4 (4.0)	4 (4.0)	6 (6.0)	8 (8.0)	6 (6.0)	6 (6.0)	5 (5.0)	8 (8.0)	7 (7.0)	8 (8.0)	10 (10.1)
>60 & <80	5 (5.0)	6 (6.0)	8 (8.0)	5 (5.0)	9 (9.0)	8 (8.0)	9 (9.0)	6 (6.0)	4 (4.0)	6 (6.0)	7 (7.0)	7 (7.0)	7 (7.0)	13 (13.1)	11 (11.1)
>40 &<60	6 (6.0)	15 (15.1)	10 (10.1)	11 (11.1)	19 (19.1)	13 (13.1)	9 (9.0)	6 (6.0)	12 (12.1)	6 (6.0)	12 (12.1)	11 (11.1)	15 (15.1)	9 (9.0)	7 (7.0)
>20 &<40	16 (16.1)	20 (20.2)	14 (14.1)	18 (18.1)	11 (11.1)	18 (18.1)	19 (19.1)	20 (20.2)	20 (20.2)	18 (18.1)	18 (18.1)	18 (18.1)	14 (14.1)	19 (19.1)	20 (20.2)
>0 & <20	34 (34.3)	39 (39.3)	45 (45.4)	53 (53.5)	51 (51.5)	50 (50.5)	50 (50.5)	53 (53.5)	51 (51.5)	54 (54.5)	52 (52.5)	50 (50.5)	50 (50.5)	44 (44.4)	46 (46.4)
0	33 (33.3)	13 (13.1)	12 (12.1)	6 (6.0)	5 (5.0)	6 (6.0)	6 (6.0)	6 (6.0)	6 (6.0)	9 (9.0)	5 (5.0)	5 (5.0)	6 (6.0)	6 (6.0)	5 (5.0)

Source: Author's calculations. * figures in parentheses indicate percentage

Table 7: India – China Intra Industry Trade of Top Fifteen HS Codes

HS Code (1996-1997)	*GLi (%)*	*HS Code (1996-1997)*	*GLi (%)*	*HS Code (2019-2020)*	*GLi (%)*	*HS Code (2019-2020)*	*GLi (%)*
34	96.13	38	63.55	97	97.83	41	82.63
92	94.32	64	62.38	05	95.83	07	80.42
41	94.16	13	59.43	53	94.96	74	79.86
25	92.09	28	44.85	78	93.62	16	75.36
60	88.52	69	44.73	18	91.72	32	71.69
21	71.90	71	41.86	88	87.29	22	68.90
51	70.14	57	40.82	08	86.70	75	65.59
87	65.98	-	-	19	83.88	-	-

Source: Author's calculations.

Table 8: Import and Export Oriented HS Codes of India's IIT with China

	Category-wise	*1996-1997 Number of count (HS Codes)*	*2019-2020 Number of count (HS Codes)*
Import Oriented	Agriculture and allied products	5 (05,07 to 09 and 21)	8 (01, 11, 14, 15 and 21 to 24)
	Mineral products	1 (27)	0
	Manufactured products	47 (28, 29, 32, 33, 35, 37 to 40, 43, 47 to 51, 53 to 56, 58 to 60, 66, 69 to71, 73 to 76, 78 to 85, 87, 89 to 91, 94 to 96, 98 and 99)	61 (28 to 40, 42 to 51, 54 to 66, 68 to 73, 75, 76, 80 to 87, 89 to 91, 93 to 96, 98 and 99)
	Total no. of products	53	69
Export Oriented	Agriculture and allied products	8 (03, 12 to 17 and 23)	15 (03 to 10, 12, 13 and 16 to 20)
	Mineral products	2 (25 and 26)	3 (25 to 27)
	Manufactured products	16 (30, 31, 34, 41, 42, 44, 52, 57, 61 to 64, 67, 68, 72 and 92)	10 (41, 52, 53, 67, 74, 78, 79, 88, 92 and 97)
	Total no. of products	26	28

Source: Author's calculations.

Annexure I: Orientation's share of HS codes in India's export to and import from China in 1996-97 and 2019-20.

	Export (HS codes)	*Import (HS codes)*
1996-97	3,12-17,23,25,26,30,31,34,41,42,44,52,57,61-64,67,68,72,92.	5,7-9,21,27-29,32,33,35,37-40,43,47-51,53-56,58-60,69-71,73-76,78-85,87,89-91,94-96,98,99.
2019-20	3-10,12,13,16-20,25-27,41,52,53,67,74,78,79,88,92,97.	1,11,14,15,21-24,28-40,42-51,54-66,68-73,75,76,80-87,89-91,93-96,98,99.

HS Code List of all Commodities
https://www.dgciskol.gov.in/itchs_2012.aspx

paper yarn and woven fabrics of paper yarn (94.96 per cent), 78 – lead and articles thereof (93.62 per cent), 18 – cocoa and cocoa preparations (91.72 per cent), 88 – aircraft, spacecraft, and parts thereof (87.29 per cent), 8 – edible fruit and nuts; peel or citrus fruit or melons (86.70per cent), 19 – preparations of cereals, flour, starch or milk; pastry cooks products (83.88 per cent), 41 – raw hides and skins other than furskins and leather(82.63 per cent), 7 – edible vegetables and certain roots and tubers (80.42 per cent), 74 – copper and articles thereof (79.86 per cent), 16 – preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates(75.36 per cent), 22 – beverages, spirits and vinegar (68.90 per cent), 75 – nickel and articles thereof (65.59 per cent), 17 – sugars and sugar confectionary (65per cent), 33 – essential oils and resinoids; perfumery, cosmetics or toilet preparation (63.79per cent), 13 – lac; gums, resins and other vegetable saps and extracts (62.04per cent), 71 – natural or cultured pearls, precious or semiprecious stones, pre.metals, clad with pre.metal and article there of (61.91per cent), 62– articles of apparel and clothing accessories not knitted or crocheted (61.65per cent) and 57– carpets and other textiles floor coverings (56.89per cent). Out of above-mentioned HS codes, there are nine agriculture and allied products (i.e. HS code: 5, 18, 8, 19, 7, 16, 22, 17 and 13) and elevenare manufactured products (i.e. HS code: 97, 53, 78, 88, 41, 74, 75, 33, 71, 62 and 57) which are recorded significant increase in IIT with more than 50 percent GLi value for the year 2019-2020. Further in addition to this as compared to the year 1996-1997, eight agriculture and allied products (HS codes: 5, 7, 8, 16, 17, 18, 19 and 22) and seven manufactured products (HS codes: 33, 53, 74, 75, 78, 88 and 97) recorded an increase of more than 50per cent in IIT in the year 2019-2020. Dwesar and Kesharwani (2019) observed an increase in IIT, but its proportional share remained inconsistent as supported and highlighted by the sustained IIT growth found under product categories in our study.

Table 7 shows the top fifteen GLi's (India – China IIT) for the years 1996-1997 and 2019-2020. This table reveals that there are seven agriculture and allied products and eight manufactured products among top fifteen GLi's for the year 2019-2020. There is only one group with HS code 41 which had appeared in top fifteen GLi values for the years 1996-1997 and 2019-2020. HS code 41 recorded a decline in value of GLi to 82.63 per cent in the year 2019-2020 from 94.16 per cent in the year 1996-1997. All other top fifteen IIT products are replaced in year 2019-2020 as compared to the year 1996-1997. Under top fifteen GLi values, the number of agriculture and allied products increased to seven in the year 2019-2020 from only two in the year

1996-1997 whereas the number from manufactured products declined to eight from thirteen in the year 1996-1997. The GLi value recorded by 15th product also showed an increase (from 40.82per cent for HS code 57 to 65.59per cent). While considering the top five HS codes with more than 90 percent GLi's values include two agriculture and allied items (i.e. HS codes: 5 and 18) and three manufactured item (HS code 53, 78 and 97) for the year 2019-2020 as compared to year 1996-1997 which include one mineral product (HS code 25) and three manufactured products (i.e. HS codes: 34, 92 and 41).

Table 8 identifies the two-digit HS codes of India having export oriented and import oriented IIT with China except the HS codes with value zero during the years 1996-1997 and 2019-20. The HS codes which recorded higher share in India's import from as compared to share in India's exports to China are identified as commodities having import oriented IIT whereas HS codes with higher share in India's export to as compared to shares in India's import from China are identified as commodities having export oriented IIT. The number of import-oriented HS codes increased to 69 during the year 2019-2020 from 53 during the year 1996-1997, whereas the number of export-oriented HS codes increased to only 28 during 2019-2020 from 26 during 1996-1997. India's export oriented IIT with China showed a noticeable increase along with small increase in import oriented IIT in case of agriculture and allied products. In case of manufactured products increase in import oriented IIT and decrease in export oriented IIT was observed. Mineral products recorded increase in export oriented IIT only.

IV. CONCLUSIONS

The overall India-China IIT shows an increase but remained less than 30 percent (along with consistent trade deficit) throughout the study period. The increase in IIT was found in sixty-two products including seventeen agriculture and allied, one mineral and forty-four manufactured products for the year 2019-2020 as compared to 1996-1997. HS codes 72, 29, 84 and 85 appeared in India's top fifteen exports and imports in both the years 1996-1997 and 2019-2020, with higher import shares in 2019-2020 indicating the import oriented IIT. The export-oriented IIT was observed in agriculture-allied and manufactured products particularly under HS codes 05, 18, 53, 78 and 97 with more than 90 percent GLi values in 2019-2020. As policy implications, India should focus on Foreign Trade Agreement with China especially in agricultural and manufactured products, showing increase in IIT. India can also

explore export opportunity in mineral products to China due to export-oriented IIT. Furthermore, China's ageing population and labor shift towards manufacturing provides India an opportunity to expand agricultural exports and earn long-term export potential. However, the study is limited to the use of the Grubel-Lloyd Index and does not examine the determinants affecting IIT intensity, which can be explored in future research.

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