

**An Empirical Analysis of Trade Performance
between China and the BRICS**

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An Empirical Analysis of Trade Performance between China and the BRICS

Abstract

When we look back at the last decade, it is clear that the BRICS countries have already begun to play a significant role on the world stage. Between the years 2001 and 2019 intra-BRICS trade increased more than 15 times. Virtually unscathed from any of the global crisis, these countries are poised for a strong long-term, growth. However, the costs inflicted by the COVID-19 pandemic on the society and economic activity of the five countries have halted this trend. Further the growth of the BRICS economies requires creation of their closer partnership in trade and investments. China is playing the leading role in this process, as a main investor and importer of FDI and also as a major trade partner in the BRICS regional group. In this background, the paper attempts to explore the trade performance of China with the rest of the BRICS countries and further analyse the opportunities and potential of China's trade with the rest of the BRICS economies.

Keywords

BRICS, China, Revealed Comparative Advantage, Revealed Trade Advantage, Commodity trade, Trade Performance.

JEL Classification: C1, C4, F1, F4

Design/Methodology/Approach

The paper has adopted suitable research techniques mainly based on different measures of Revealed Comparative Advantage (RCA), in addition to simple Balassa Index. Accordingly, alternative RCA indices are calculated. The stability of different measures of RCA is also tested along with application of basic gravity model & Intensity of Trade Indices to observe the performance of various indicators of trade among the nations with reference to China. The time series data related to imports and exports are considered for the period from 1991-92 to 2018-19 are in US dollars.

Findings

In line with this, the final summary statistics (mean and coefficient of variation) for the four RCA indices presents China's revealed comparative advantage in 14 distinct product groups under the 7 categories out of which the 37 products taken for study and the stability index of these products also present a fairly stable index for the whole period taken for study with less coefficient of variation.

Practical Implications

The paper finds a growing intensity of trade between China and BRICS, along with the positive values of gravity co-efficient and this is further analyzed with the untapped trade potential that could be tapped by the China and the BRICS economies.

Originality/Value

The author concludes a growing trade potential between China and the rest of the BRICS, that could be enhanced for mutual trade cooperation and economic growth with China's Revealed Comparative Advantage in 14 distinct commodity groups. Further the analysis on implications of bilateral treaties and tariffs would add value to the current study.

1.Introduction

Since the beginning of the 21st century developing countries were at the helm of global growth and the cynosure of economic activity. This has especially been reflected when we observe the growth rates of Brazil, India and China. These three countries feature in the list of fastest-growing economies and also the largest emerging economies in terms of GDP. Imagining a bloc formed which includes these countries was impossible given their geographical distance from each other. The acronym 'BRIC' was coined in the year 2001 and South Africa was added to the group during December 2010 to make it a group of five nations called BRICS. Today the BRICS countries are widely seen as the pistons powering the 21st century global economy as the five BRICS countries together constitute for 43 percent of the global population, 20 percent of the earth's landmass, and nearly 25 percent of the world's share of global gross domestic product over 17% share in the world trade. BRICS countries have also been credited with nearly 50 percent of the world's economic growth and have been the main engines of global economic growth over the years.

The BRICS economies have emerged as a major driving force in the global economic arena, with the balance of economic power shifting dramatically towards Asia over the next decades. With 43 percent of the world's population, BRICS group account for more than one fifth of global output and nearly a fifth of all trade and of foreign direct investment flows. They have also become growing source of aid for the continent. Their global strength is set to continue growing, as the economies of China and India overtake the western developed world. The BRICS account for 25.7percent of the world land area; and have contributed to more than 50 percent to the world's economic growth during the last 10 years. Intra- BRICS trade has grown from \$567bn in 2010 to \$744bn in the year 2017. The total BRICS GDP amounted to 25% of global GDP (US\$21 trillion) and BRICS share in international trade stood at almost 20% (US\$6.7 trillion) in 2020. Over the past five years, intra- BRICS exports grew by 45% and the share of intra-BRICS exports in total BRICS international trade increased from 7.7% to 10%. The GDP of the five countries also grew faster than global and G7 countries GDP at an average annual rate of 5.31% according to the IMF. The costs inflicted by the COVID-19 pandemic on the society and the economic activity of the five countries, however, have halted this trend. Among the ten countries most affected by the pandemic, four are BRICS members. The health

crisis is also reflected in the economic indicators registered in their negative values. In 2020, the BRICS have registered at overall growth rate of about -30.1% with Brazil, India and South Africa's economies bearing growth rates below the world average. Changes in domestic and foreign policy orientation in Brazil and South Africa and the deterioration of a crucial axis of BRICS cooperation—the India-China relationship — have further spearheaded scepticism on the breath of the BRICS as a political grouping in addition to an economic powerhouse. Further the growth of the BRICS economies requires creation of their closer partnership in trade and investments. China is playing the leading role in this process, as a main investor and importer of FDI and trade partner in BRICS regional group. China continue to deepen its economic ties with other BRICS countries and open up its financial market to serve as a cushion against rising global uncertainty. In this context, the present paper makes an attempt to assess the trade performance of China with the rest of the BRICS countries and further analyse the opportunities and potential of China's trade with the rest of the BRICS regional grouping. The paper adopted suitable research techniques mainly based on different measures of Revealed Comparative Advantage (RCA), in addition to simple Balassa Index. Accordingly, alternative RCA indices are calculated. The stability of different measures of RCA is also tested along with application of basic gravity model to observe the performance of various indicators of trade among the nations with reference to China.

2. Objectives of the Study

- To analyze the trends and pattern of growth among BRICS countries.
- To estimate the trade potential of China with rest of the BRICS countries.
- To identify the opportunities and commodity trade potential, which could further enhance trade between China and the rest of the BRICS countries.

3. Review of the Earlier Studies

Many studies indicate a strong economic co-operation among the BRICS regional group and the important role that the BRICS started to play in the world geo-political spectrum. Jason (2011) observes that the BRIC economies of China, India, Brazil and Russia as the promising engines of global economic growth and development, further the recent data on BRIC countries' consumer spending habits reveal interesting insights about consumer behavior and priorities in each emerging market. The study observes that, China and Brazil present two very

different patterns of consumer behavior in BRIC countries, Chinese demonstrate a strong inclination to delay current consumption in favor of saving for the future. Brazilians, on the other hand, put a higher priority on living for the present by devoting a considerably larger share of income to discretionary spending. On average, Chinese report saving 31 percent of income. Brazilians report saving a relatively modest 10 percent, the lowest level of the four BRIC. Brütsch & Papa (2012) examines the associational dynamics and practices that inform their collective journey. Drawing on the rationalist literature on bargaining coalitions and on the constructionist literature on 'imagined' communities, they have developed an analytical framework to investigate whether states exploit their BRICS affiliation tactically, to rise in tandem, or strategically, to rise together. Out of two case studies, which examine BRICS efforts to curb Washington's 'exorbitant privilege', and to develop a collective response to the climate crisis, respectively, suggest that even when the BRICS share soft revisionist goals, coalitional cohesion and community formation are tentative at best. In the absence of clear common objectives, the BRICS abandon all but the rhetoric of coalitional behaviour and concludes that unless the five emerging powers agree on a coherent strategy to harness their relative strengths, the BRICS' geopolitical play will be defeated by their own tactical ploys. Soares (2013) finds that the five key emerging market economies, commonly termed the BRICS (Brazil, Russia, India, China and South Africa), have been lauded for their stellar economic growth and resilience through the 2008-09 financial crisis. They have become the models of development for development practitioners, researchers and other emerging economies. However, the paper observes that not all people in these countries have benefited equally from growth and some countries have seen enormous increases in income inequality – specifically China, India and South Africa; Brazil has enjoyed a reduction. Petrone (2019), viewed that despite these countries experiencing a set back with respect to internal and structural problems, they had represented an innovative answer to the functioning of the current global framework. In fact, unlike like many western countries they have shown commitment in many crucial areas of global concern such as climate change and sustainable development which could provide an important solution towards strengthening their weak 'soft power'. Further the author also presented that by working together to instigate the global change, and taking the advantage of the declining Western power, BRICS can play a decisive role in shaping the global governance. Singh (2019), presented that given the global economic outlook facing a grave challenge amongst the growing protectionism and rising trade tensions manifested in the unilateral

measures, the BRICS nations continue to offer economic opportunities. The author presented that, BRICS has successfully lobbied the International Monetary Fund for greater voting rights for emerging economies. Ms Singh also opined that one of the significant progress for the bloc was the establishment of the New Development Bank which is a response to the slow reforms of the IMF and the World Bank, and acts as a check to the dominance of the G7 countries.

4. Need for the Study

The year 2020 has seen several aspects of the fundamentals of trade and business being restructured throughout the global economy, owing to the unending impact of the Covid-19 pandemic. With more than a year travelling with the pandemic, the popular narrative surrounding the Covid-19 has slowly changed from 'when it ends...' to becoming 'the new normal'. During the period the world has experienced a massive transformation in terms of geo-politics, economy and in organization and distribution of production and supply chain networks. Off late, BRICS as emerging economies, exhibited greater economic strength in the face of the US credit turmoil, global growth slowdown, during the Euro crisis. Similarly, the New Development Bank (NDB) has also demonstrated high efficiency in the financial cooperation, during the current health crisis by undertaking "timely measures" through its Emergency Assistance Program by offering a \$10 billion pool of emergency loans to its member states for healthcare and economic recovery. The relative and absolute importance of BRICS is expected to continue to rise for the foreseeable future. The biggest factor that propels BRICS economies is the huge market space that it offers to the entire world. In terms of economic growth, China has been outperforming the other four countries by a wide margin over the past thirty years. During the past decade, the real GDP growth averaged 10% in China, 7% both in India and Russia, 4.6% in South Africa and 3.3% in Brazil. The domestic investment ratios are around 40 and 30% of GDP in China and India respectively and Brazil, Russia and South Africa account to 20 to 23% of their GDP. Over the past decade, the combined BRICS' GDP has grown 179% and total trade of the member nations has risen by 94%. From 2008 to 2017, the world's average growth rate was around 1%, but that of BRICS nations was about 8%. The BRICS also have been predominant recipients of FDI too during the last decades. Nobel Prize laureate Michael Spence also predicted that BRICS would replace the US and Europe as the key engines of the world economy. Also, the BRICS countries have made a road map of target USD 500 billion intra-BRICS trade by the end of 2020. Among the

BRICS countries, China has been the key player in BRICS with world largest forex reserves the second-largest by nominal GDP since 2010, and the world's largest manufacturing economy since 2010, and the second-wealthiest nation in the world. In this background it would be extremely useful to explore the trade performance of China with the rest of the BRICS countries and further analyse the opportunities and potential of China's trade with the rest of the BRICS economies.

5. Database & Methodology

The research paper, employs a combination of descriptive along with the explorative research design for the study. The study is based on the information collected through the variety of secondary sources from variety of sources including research papers, books, periodicals, research journals and online webpages of Reserve bank of India, UNCTAD database, IMF, Ministry of Commerce and Industry, and Ministry of Finance, Govt. of India. The time series data related to imports and exports are considered for the period from 1991-92 to 2018-19 are in US dollars. To achieve more accuracy in research findings and to make them logical, the collected data is further analyzed by using the appropriate statistical tools (available in SPSS 16.0) relevant for the study.

Further the research analysis is based on revealed comparative advantage (RCA) indices. This is a common approach to analyze the trade data. However, since first proposed by Balassa (1965), the definition of RCA has been revised and modified such that a plethora of measures now exist, with the required specifications aimed to measure the RCA at the global level, whilst some restrict the analysis to the bilateral trade between just two countries or trading partners. As the objective of the study is to analyze the competitiveness of China within the rest of the BRICS, she has chosen to calculate the RCAs with the BRICS as the comparator, but using total rather than bilateral trade flows.

5.a. Measuring the Revealed Comparative Advantage

The theory of Revealed Comparative Advantage (RCA) is grounded in the studies of conventional trade theories. The original Revealed Comparative Advantage (**RCA index**), is formulated by Balassa (1965), which can be expressed as given:

$$B = (x_{ij}/x_{it}) / (x_{wj}/x_{wt})$$

Here 'x' represents the exports, 'i' presents a country, 'j' is a commodity and 't' is a set of commodities that are considered for the study and 'n' is a set of countries taken for the study. 'B' is based on the observed trade patterns; which measures a country's exports of a commodity relative to its total exports and to the corresponding export performance of a set of countries, e.g., the BRICS. If $B > 1$, then a comparative advantage is revealed. Vollrath (1991) offered three alternative specifications of the revealed comparative advantage, following the analyses of international competitiveness in agriculture (Vollrath, 1987 and 1989; and Vollrath, 1990). The first of these measures is called **Relative Trade Advantage** (RTA), which accounts for imports as well as exports. It is calculated by taking the difference between **Relative Export Advantage** (RXA) and the **Relative Import Advantage** (RMA):

$$RTA = RXA - RMA \quad \text{Where, } RXA = B \quad \text{and}$$

$$RMA = (m_{ij}/m_{it}) / (m_{nj}/m_{nt})$$

Where 'm' represents imports. Thus,

$$RTA = \left[\frac{(x_{ij}/x_{it})}{(x_{nj}/x_{nt})} \right] - \left[\frac{(m_{ij}/m_{it})}{(m_{nj}/m_{nt})} \right]$$

RXA, RMA and RTA are the measures used by Eiteljorge and Hartmann (op.cit.)

The Vollrath's second measure can be explained as the logarithm of the relative export advantage (In RXA): and the third measure is Revealed Competitiveness (RC) can be expressed as:

$$RC = \ln RXA - \ln RMA.$$

The advantage of expressing these latter two indices in logarithmic form is that they become symmetric through the origin. Positive values of Vollrath's three measures are the RTA, In RXA and RC, reveals the presence of a comparative/competitive advantage.

5.b. The Trade Intensity Index

The Trade Intensity Index (TII) is used to determine whether the value of trade between the two countries is greater or smaller than would be expected on the basis of their importance in the world trade. This can be expressed as the share of one country's exports going to a partner divided by the share of the total world exports going to the same partner. It is calculated as: $TII = (X_{ij}/X_{it}) / (X_{wj}/X_{wt})$

Where X_{ij} is the value of country 'i' exports to country j, X_{wj} is the value of world exports to country j, X_{it} is country i's total exports and X_{wt} is total world exports. Since the average of intensity index is one, the computed index being greater than one would indicate a higher degree of trade intensity between the two given countries.

5c. The Gravity Coefficient: The value of Gravity Coefficient, presents the proximity of a country with a given set of countries or a country. The value ranges between 0 and 1. The computed index being greater than one would indicate a higher degree of trade intensity between the two given countries. In the below table 'X' is Exports and 'M' imports.

$$GC = (X+M)_{ij} / (X+M)_{iw} / (X+M)_{jw} / (X+M)_w$$

6. Results and Analysis

6.a. BRICS Trade as Percentage of the Total World Trade

The five BRICS countries are distinguished from a host of other promising emerging markets by their demographic and economic potential to rank among the world's largest and most influential economies in the 21st century. Among the BRICS countries, China holds the largest trade share with respect to total world exports and imports, which is gradually on rise. During the initial period of study 1990 the share of China is 1.7% of the total world exports and 1.4% of the total world imports this has been drastically on rise to 13.202% of exports and 10.789% of total world imports by the year 2019. Today it has been considered as the new Asian Tiger which has the power to surpass the world largest economy the United States of America- too and has been playing an important role in the geo- political spectrum. The trade share of Russia has been constantly around 1% of the total world exports and imports till the year 2004, since

the year 2005 the exports of Russia has been on rise, they occupied 2.3% of total world exports and 1.16% of total world imports. In spite of the last two decades Russia since the year 1991 by the end of 2019 it accounted for 2.223% of world exports and 1.325% of total world imports. India initiated economic reforms in the year 1991 which has set the pace of the Indian economy during the period -the share of India is 0.51% of exports and 0.65% of the total world imports respectively. By the end of the year 2019 this rose to 1.713% of the total world exports and 2.252% of the total world imports. The trade share with respect to Brazil is 0.89% of world exports and 0.62% of the total world imports during the period 1991, this has been gradually on rise, by the year 2000 the trade share with respect to exports declined to 0.85% of total world exports and imports rose to 0.88% of the total world imports. This rose to 1.190% of total world exports and 0.957% of total world imports by the end of the year 2019. For the year 2012 China's exports is 64% and imports stand at 61.16% of total BRICS trade followed by Russia and India which stands at 16.5% of exports and 15.39% of imports respectively.

Table. 1
BRICS Countries Exports and Imports as Percentage of World Exports & Imports

Year	Brazil		Russia		India		China		South Africa		BRICS	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
1990	0.899	0.624	-	-	0.514	0.654	1.776	1.479	0.674	0.510	4.111	3.267
1991	0.899	0.631	-	-	0.504	0.563	2.045	1.755	0.662	0.518	5.686	3.467
1992	0.943	0.592	1.413	1.101	0.517	0.604	2.239	2.065	0.618	0.506	6.137	4.867
1993	1.015	0.716	1.571	1.150	0.568	0.591	2.416	2.698	0.638	0.519	6.545	5.674
1994	1.008	0.826	1.563	1.153	0.579	0.613	2.801	2.639	0.586	0.533	6.537	5.763
1995	0.899	1.034	1.567	1.164	0.592	0.663	2.876	2.523	0.538	0.584	6.543	5.739
1996	0.883	1.037	1.638	1.252	0.612	0.690	2.793	2.528	0.540	0.549	6.504	6.127
1997	0.947	1.130	1.578	1.295	0.625	0.729	3.265	2.501	0.554	0.580	6.991	6.253
1998	0.928	1.076	1.351	1.132	0.607	0.762	3.335	2.489	0.479	0.519	6.747	5.990
1999	0.839	0.884	1.321	0.742	0.624	0.802	3.408	2.830	0.467	0.456	6.705	5.610
2000	0.855	0.881	1.629	0.741	0.657	0.774	3.866	3.381	0.465	0.446	7.490	6.159
2001	0.940	0.915	1.646	0.839	0.700	0.786	4.298	3.799	0.473	0.441	8.085	6.761
2002	0.929	0.746	1.652	0.915	0.758	0.848	5.012	4.430	0.458	0.439	8.946	7.390
2003	0.963	0.654	1.792	0.978	0.777	0.933	5.777	5.306	0.481	0.511	9.943	8.376
2004	1.049	0.701	1.987	1.028	0.831	1.053	6.436	5.923	0.501	0.564	10.965	9.262
2005	1.129	0.720	2.323	1.164	0.949	1.326	7.260	6.125	0.492	0.578	12.292	9.853
2006	1.137	0.776	2.504	1.330	1.005	1.444	7.995	6.408	0.480	0.637	13.261	10.466
2007	1.146	0.890	2.529	1.571	1.072	1.612	8.710	6.721	0.498	0.622	14.084	11.224
2008	1.226	1.108	2.922	1.773	1.207	1.950	8.864	6.880	0.500	0.617	14.878	12.128
2009	1.219	1.054	2.418	1.512	1.314	2.027	9.578	7.928	0.492	0.584	15.186	12.967
2010	1.321	1.243	2.620	1.613	1.480	2.272	10.319	9.058	0.529	0.611	16.432	14.583
2011	1.400	1.288	2.854	1.760	1.656	2.524	10.378	9.475	0.536	0.661	16.979	15.336
2012	1.324	1.263	2.888	1.816	1.600	2.650	11.181	9.843	0.476	0.665	17.574	15.893
2013	1.277	1.321	2.755	1.666	1.661	2.454	11.657	10.282	0.507	0.666	17.856	16.522
2014	1.184	1.255	2.611	1.640	1.698	2.429	12.323	10.282	0.490	0.640	18.308	16.222
2015	1.154	1.071	2.062	1.152	1.618	2.357	13.732	10.044	0.489	0.626	19.057	15.252
2016	1.155	0.885	1.761	1.118	1.649	2.232	13.074	9.801	0.475	0.566	18.108	14.666
2017	1.227	0.876	1.921	1.565	1.687	2.502	12.758	10.255	0.501	0.565	18.164	15.524
2018	1.229	0.951	2.483	1.265	1.668	2.595	12.770	10.772	0.483	0.575	18.429	16.148
2019	1.190	0.957	2.223	1.325	1.713	2.523	13.202	10.789	0.475	0.558	18.798	16.150

Source: Author's calculations based on data from www.unctad.org.

Among the BRICS Brazil is one economy which has taken up inclusiveness as a priority and social transfers have helped to reduce inequality in Brazil, the share of Brazil is 7.5% of exports and 7.8% of total BRICS imports in the year 2012. One significant factor is the share of Brazil has been reduced in total BRICS trade from 13.8 % (of exports), 17.26% (of imports) in 1995 to 7.5 % (of exports) and 7.8 % (of imports). Even with respect to Russia too, the share has been on decline from 24.24% of exports and 21.76% of imports in 1995 to 16.53 % of exports and 11.98% of imports in the year 2012. South Africa joined the group in the year 2010, initially South Africa was occupying a share of 8.31% of exports and 9.52% of imports in the

year 1995 and this was gradually declining, by the year 2012, the trade share of South Africa in total BRICS trade is 2.72% of exports and 3.62% of imports. Finally, South Africa share has been 0.475% of the total world exports and 0.558% of the total world imports and South Africa's intra-trade has been larger than the other partners in the BRICS regional group. The BRICS countries has been playing an important role in the economic-geopolitical scenario of the world trade occupying nearly 19 percent of the total world exports and 16 percent of the total world imports by the year 2019.

6.b. Intra-BRICS Trade

When compared to other regional groups Intra-BRICS trade has been low but the BRICS countries have made a road map of target USD 500 billion by the end of the year 2020. With respect to total BRICS trade share, China accounts for more than 60% of total BRICS trade with 7.06 percent of its exports and 9.45 percent of its imports diverted towards the others BRICS partners. Brazil accounts for 30.56 % of the BRICS exports and 23.84% of imports. India's share in total BRICS has always been significantly high. The share of Russia is 6.40% for the initial period of study and this rose to 16.05% of exports during the year 2019. With respect to imports during the year 2006 it is 12.40% and 23.41% of total intra-BRICS imports. 4.69% in the year 2000 and 12.25% by the year 2012.

Table.2
Intra-BRICS Exports as Percent of its Global Exports

Country/Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Brazil	10.30%	10.70%	12.10%	18.10%	20.10%	20.90%	21.30%	22.30%	22.40%	22.50%	22.67%	25.90%	29.73%	30.56%
Russia	6.40%	5.50%	6.10%	7.90%	6.80%	8.00%	8.80%	8.50%	8.90%	10.20%	13.60%	14.64%	15.01%	16.05%
India	10.10%	9.90%	9.30%	8.50%	11.90%	9.40%	9.70%	9.10%	9.00%	6.80%	6.15%	7.21%	8.10%	8.71%
China	4.50%	5.90%	6.40%	5.70%	6.70%	7.10%	6.90%	6.80%	6.80%	6.00%	6.22%	6.83%	7.04%	7.06%
South Africa	6.50%	9.70%	10.10%	15.40%	14.70%	15.70%	15.50%	16.90%	14.80%	13.90%	14.25%	15.23%	14.81%	16.04%

Table.2
Intra-BRICS Exports as Percent of its Global Exports

Country/Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Brazil	10.30%	10.70%	12.10%	18.10%	20.10%	20.90%	21.30%	22.30%	22.40%	22.50%	22.67%	25.90%	29.73%	30.56%
Russia	6.40%	5.50%	6.10%	7.90%	6.80%	8.00%	8.80%	8.50%	8.90%	10.20%	13.60%	14.64%	15.01%	16.05%
India	10.10%	9.90%	9.30%	8.50%	11.90%	9.40%	9.70%	9.10%	9.00%	6.80%	6.15%	7.21%	8.10%	8.71%
China	4.50%	5.90%	6.40%	5.70%	6.70%	7.10%	6.90%	6.80%	6.80%	6.00%	6.22%	6.83%	7.04%	7.06%
South Africa	6.50%	9.70%	10.10%	15.40%	14.70%	15.70%	15.50%	16.90%	14.80%	13.90%	14.25%	15.23%	14.81%	16.04%

Source: Author's calculations based on data from www.unctad.org.

Even though China has been the largest shareholder among the BRICS, China has been largely trading outside BRICS group. So, the Intra-trade share of China is 4.50% of total intra-BRICS exports in the year 2006 and this rose to 7.06% of total intra-BRICS exports by the year 2019. It also occupies 9.45% total intra- exports by the year 2019. With respect to South Africa the Intra-trade with BRICS has been significantly on rise as aid from the other BRICS promotes their trade and investment, and BRICS continue to support Africa's development through project aid-aimed at improving infrastructure concessional and soft loans as well as credit grants. The Intra-trade of South Africa increased from 6.30% of total intra-BRICS exports to 16.04% of total intra-BRICS exports and 14.80% of intra-BRICS imports to 0.49% of intra-BRICS imports from the year 2006 to the year 2019.

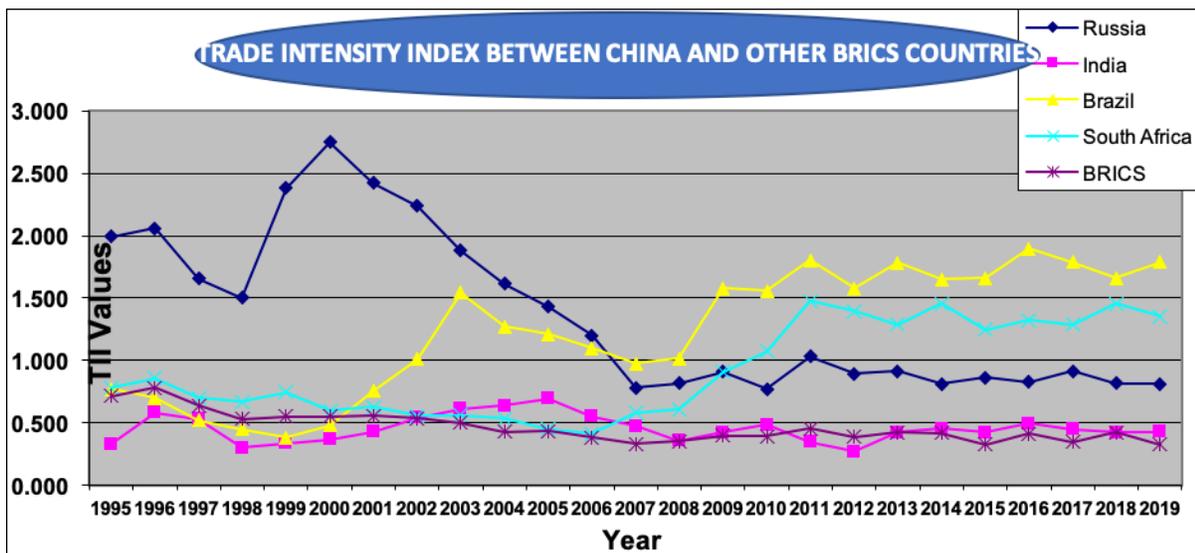
6.c. The Analysis of Trade Intensity Index & Gravity Co-efficient

Keeping in view the growing importance of China in the world economy both economically and politically and the increasing efforts by the BRICS countries to enhance the mutual trade relations among themselves, the Trade Intensity Index & the Gravity Coefficient of China with the rest BRICS trade would provide useful analysis. The TII's values present that the Trade Intensity Index (TII) between China and the rest of the BRICS reveals a mixed trend. As the TII values of Brazil with China indicates an increasing trend with 0.773(1995) and this has gradually reached 1.012 during the year 2002 and finally to 1.789(2019). Brazil has been an important destination for Chinese exports over the years, by the end of the year 2019, the bilateral trade between the two nearly reached over \$100 billion. Also, over half of China's investments in South America were directed towards Brazil since the year 2017. Similarly, the values of gravity Coefficient too present a growing proximity of China with Brazil since the year 2000, owing to the rising demand for raw materials and agricultural

produce from China. Off late, China is investing in Brazilian electric transmission lines from Amazon as well as Brazilian planes and other consumable products. Also the recent US-China tariff war has opened new doors for the Brazilian Soya market.

The values of China's TII with Russia indicates a greater trade share between both the countries, as both the countries share a long common border and the trade relations have shown a greater proximity since the dissolution of USSR. For the initial period of the study 1995, the TII value is 1.994. These values of TII between China and Russia presents a constant trend since the year 2007, owing to the lost decade of Russia however, the two-way investment has been on increase in recent years. By the year 2010 China surpassed Germany to become Russia's largest trading partner responsible for \$ 260 bn. This is also evident from the values of the gravity co-efficient from the year 2000 (1.476) to the year 2019 (1.415). Russia's largest export energy is strategically important to China, but China stands to command more influence as a buyer than Russia standing as a supplier.

Chart.1

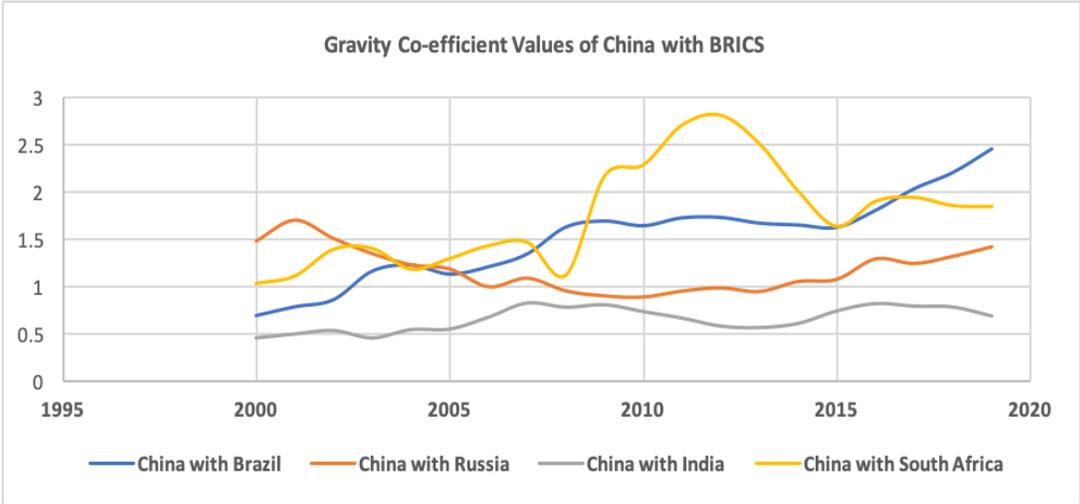


Source: Author's calculations based on data from www.unctad.org.

Though the tone of relationship between both the countries has varied over period of time, the two nations have sought economic co-operation with each other. The TII values of China with India presents the least TII values compared with the other BRICS countries presenting the lower trade value. However, the bilateral trade between both the countries touched US\$ 89.6 bn during the year 2017-18 with trade deficit widening of US\$ 62.9 bn. The values of China's TII

with India has always been lower than one presenting a lower intensity of trade between them owing to the continued tensions between both the nations. Similarly, the gravity coefficient values (Chart. 2) too present a lower degree of trade proximity between the two, compared with the rest of BRICS. Since the year 2007, Sino-South African relations have become increasingly close with increasing trade policy and political ties. By the year 2014 the two way trade reached US\$ 60.3 bn. The value of gravity co-efficient too present the increasing trend between both the countries from the year 2000(1.029) to the year 2019 (1.843).

Chart.2



Over a period, South Africa has evolved as an important trade partner and the bilateral trade volume reached US\$1.67 billion accounting for about 20% of the total volume of China-Africa trade by the year 2019. Similarly, the intensity of trade of South Africa is more with BRICS as a region, while that of the other BRICS. This can be seen from increasing the Trade Intensity Index values (TII) during the period of study and also revealed from the values of gravity co-efficient, but off late the place is occupied by Brazil. However, the overall TII values of China’s trade with BRICS can be seen experiencing a declining trend from the year 1995(0.716) to the year 2019 (0.325). In the absence of formal regional trade agreement among the BRICS and high tariffs levels along with supply chain bottlenecks are some of the major causes for the lower values of intra-trade.

6d. Revealed Comparative Advantage of China with BRICS:

The four RCA indices defined above are computed for China's trade with other countries of the BRICS group for a period of 2008 to 2018, for the 7 distinct product categories with 37 product groups following the Standard Industrial Trade Classification (SITC) Rev. 3-digit level data from the United National Conference statistics database. The full sample taken for the study therefore covers 37 distinct product groups and covers the trade flows in each of the 10 years. Annual RCA indices are calculated at the three-digit level from the data extracted from the Unctad statistical database. The final values of the commuted summary statistics (the mean and the coefficient of variation) for the four RCA indices (the Balassa Index 'B', the Relative Trade Advantage 'RTA', the Relative Export Advantage 'RXA', and the Relative Import Advantage 'RMA'), are portrayed in **Table. 3**. The indices values present a similar pattern of trade, with all the four showing a revealed comparative advantage: B; for analysed **17 distinct product groups** (listed in Appendix.1) under the seven categories.

Table. 3
Revealed Comparative Advantages of India with BRICS, by product group

2008-2018								
	Mean				Co-efficient of Variation			
	B	RTA	In RXA	RC	B	RTA	In RXA	RC
Revealed Comparative Advantage if:	>1	>0	>0	>0				
Food and Live Animals:								
Live animals other than animals of division 03	0.08	-0.12	-1.16	-0.32	40.52	-54.88	-19.67	-43.62
Meat and meat preparations	0.91	0.86	-0.05	1.32	24.14	29.44	-189.51	28.58
Dairy products and birds' eggs	1.25	1.09	0.03	1.36	45.55	53.37	865.80	46.10
Fish, crustaceans, molluscs and preparations thereof	0.29	0.26	-0.54	1.24	23.20	24.28	-17.82	17.56
Cereals and cereal preparations	0.85	0.82	-0.14	1.41	52.65	57.68	-181.01	31.46
Vegetables and fruits	0.49	-0.86	-0.43	-0.55	15.55	-14.50	-20.45	-17.58
Sugar, sugar preparations and honey	0.46	0.00	-0.60	0.06	67.16	-18932.29	-81.99	1229.48
Coffee, tea, cocoa, spices, and manufactures thereof	1.11	0.53	0.05	0.17	10.39	27.65	103.31	26.54
Feedstuff for animals (excluding unmilled cereals)	1.97	1.88	0.29	1.54	29.25	29.76	37.50	14.65
Miscellaneous edible products and preparations	0.13	0.05	-0.93	0.27	5.98	35.31	-2.45	38.55
Beverages and Tobacco:								
Beverages	0.21	-0.23	-0.61	-0.24	33.151	-56.66	-14.76	-54.81
Tobacco and tobacco manufactures	3.22	3.01	0.49	1.52	613.28	24.91	21.59	5.99
Mineral Fuels, Lubricants and Related Materials :								
Coal, coke and briquettes	6.14	-0.34	0.48	-0.24	133.34	-2429.02	72.15	-176.62
Petroleum, petroleum products and related materials	3.32	0.21	0.62	0.23	10.19	24.78	8.49	21.59
Gas, natural and manufactured	0.03	-1.32	-6.55	-2.29	142.42	-24.07	-51.50	-166.83
Electric current	0.00	-0.22	-5.43	0.35	174.20	-161.43	-61.69	643.10
Chemicals and Related Products, n.e.s.:								
Organic chemicals	1.65	0.08	0.33	0.02	28.69	1014.85	51.98	1647.52
Inorganic chemicals	1.51	-0.13	0.24	-0.14	18.91	-237.41	68.19	-222.81
Dyeing, tanning and colouring materials	0.02	-0.49	-2.18	-1.87	15.12	-7.63	-3.23	-4.16
Medicinal and pharmaceutical products	17.32	16.55	1.25	1.34	3.44	3.75	1.19	2.34
Essential oils for perfume materials and cleaning preparations	0.58	0.24	-0.24	0.29	14.59	32.36	-23.59	26.56
Fertilizers other than group 272	0.34	-1.29	-0.54	-0.72	64.66	-32.53	-42.79	-31.14
Manufactured Goods:								
Leather, leather manufactures and dressed furskins	1.22	0.38	0.05	0.29	8.9	46.54	82.74	48.12

Rubber manufactures, n.e.s.	0.26	-0.28	-0.58	-0.41	14.90	-22.17	-9.83	-22.42
Cork and wood manufactures (excluding furniture)	0.18	-0.82	-0.78	-0.87	15.45	-23.68	-8.16	-15.24
Paper and paper manufactures	0.45	-0.22	-0.36	-0.28	22.10	-58.42	-32.82	-72.59
Textile yarn and related products	2.18	1.90	0.34	0.81	4.22	5.52	5.44	6.24
Iron and steel	3.42	2.91	0.54	0.83	16.92	17.32	14.41	8.69
Machinery and Transport Equipment:								
Specialised machinery	1.42	0.53	0.16	0.21	16.47	33.22	44.83	33.13
Telecommunication and sound recording apparatus	1.22	-0.03	-0.03	-0.10	62.14	-2387.60	-1943.89	-353.46
Electrical machinery, apparatus and appliances, n.e.s.	0.24	-0.16	-0.65	-0.22	9.12	-33.50	-6.28	-31.16
Road vehicles	0.51	0.05	-0.40	0.17	12.58	155.10	-14.19	151.35
Other transport equipment	4.15	2.74	0.70	0.63	32.15	27.44	22.81	35.91
Miscellaneous manufactured articles	Chart Area							
Furniture and parts thereof	0.47	-0.80	-0.23	-0.42	16.26	-26.10	-22.82	-24.47
Travel goods, handbags, etc.	2.76	2.18	0.54	0.69	13.69	21.43	14.13	16.88
Footwear	1.38	0.68	0.24	0.31	5.42	19.22	17.94	29.37
Professional and scientific instruments, n.e.s.	0.55	-0.44	-0.37	-0.27	10.98	-23.46	-17.43	-21.17
Source: Author's calculation based on SITC-3digit level data from www.unctad.org								

The Relative Trade Advantage could be seen with respect to 20 distinct product groups (listed in Appendix. 2) where the value of $RTA > 1$, these are the commodity groups that could form a major export potential basket for China to trade with the rest of the BRICS countries. A total of 15 commodities have shown In RXA (Relative Export Advantage) values greater than 1 presenting India's greater integration with the group. (listed as Appendix. 3) and Revealed Competitiveness (RC) could be observed with respect to 22 commodity categories where the $RC > 1$ (Appendix. 4), finally the summary statistics (mean and coefficient of variation) for the four indices are exhibited in the table above (Table.3). The relatively low coefficient of variation for these product groups indicates that the indices were fairly stable over the 10-year period of time taken for the analysis.

6 e. Stability of Revealed Comparative Advantage:

The coefficients of variation presented in **Table. 4** suggest that the RCA indices were fairly stable over the ten years of time, from 2008-2018. To examine this further, a number of measures of stability are applied to the indices. A simple indicator which measures stability is the relative importance of those products which reveal a comparative advantage in time period 't' but a disadvantage in t+1 or vice-versa i.e. therefore a Revealed Comparative Disadvantage

(RCD) in t and an RCA in t+1 (Hoekman and Djankov, 1997). Those product groups in which China had an RCA in 2009 but an RCD in 2018 accounted for between 43% and 40% of the total value of the 37 commodities in 2018 and less than 40% in the year 2018. (Table.3). Those product groups for which there was a ‘switch’ in the opposite direction –an RCD in 2008 but RCA in the year 2018 were slightly more prevalent but still only accounted for at most 56% of the total value of the commodities in either year (Table. 4). This would seem to support the contention that the structure of China’s revealed comparative advantage did not change radically during the period of the study.

Table. 4

Index	Percentage Share of Product Groups where:				
	RCA2008	and	RCD 2018	RCD2008and	RCA2018
	2008		2018	2008	2018
B	42.34		40.54	56.76	59.55
RTA	55.65		45.84	43.35	53.05
In RXA	44.24		62.26	56.76	38.83
RC	55.65		45.84	43.34	56.05
Source: Authors' Calculations based on SITC Rev.3 data					

Table. 5

Mean	1.613	1.645	2.187	1.74	1.958	1.986
Maximum	17.541	17.922	22.838	17.417	18.191	17.296
Percent of B Index:						
<1	40.54	43.23	35.12	48.68	40.54	40.54
<2	24.32	27.02	21.621	18.91	18.91	18.81
<3	18.91	13.51	16.21	10.81	8.1	8.2
<4	5.4	8.108	10.81	8.1	2.6	2.7

However, examining changes in the distribution of the B (Balassa) index (**Table. 5**) over the period as suggested by Hinloopen and Van Marrewijk (2001), shows that China’s revealed comparative advantage has gradually rose i.e. the mean for the period 2008 is 1.613 there was a

gradual rise to 2.187(2012) and thereafter weekend to reach 1.986 in the period 2018. This is presented by the summary statistics in the table.5. The maximum value also gradually declined from 17.54% by the year 2013. Furthermore, in the year 2008, 18.91 of the 'B' values were greater than 3 and halved to 8.1 by the year 2016 & 2018, and 5.4% of the B value is less than 4 this reduced to 2.6% & 2.7% in the 2012 & 2013 respectively.

7. Conclusion

During the recent 12th virtual BRICS Summit, hosted by Russia the BRICS countries reiterated that in the storming ocean of world politics, BRICS countries can contribute significantly in maintaining international stability and ensuring the global economic growth by becoming a united center of the multipolar world. The countries pledged to work together against the serious global concerns as terrorism and covid-19 crisis. In view of this BRICS leader in the summit targeted to reach US\$ 500 Billion Intra-BRICS trade by the end of 2020. In line with this values of Intensity Indices and the values of Gravity Co-efficients present a growing intensity of trade between China and the rest of the BRICS, and the final summary statistic (mean and coefficient of variation) for the four RCA indices presented China's revealed comparative advantage in 14 distinct product groups under the 7 categories out of which the 37 products taken for study and the stability index of these products also present a fairly stable index for the whole period taken for study with less coefficient of variation. Hence China can intensify its efforts to accelerate the trade and investment relations with the BRICS grouping which could strategically compete in the international market and could evolve as a successful regional grouping in the future not only in economic terms but also in the geo-political strata. To intensify trade with the partner BRICS nations China's focus should be on the potential product groups which can has export potential in the BRICS regional market, identify the major trading partners which can absorb the country's potential product groups, select the right manufacturing export units which can undertake the responsibility of entering the overseas markets, provide adequate & improved infrastructure to exporters, bring tariff rates in line with the international level in order to remove any bias against production for exports, allow exporters to borrow from the international markets if rates of interest are higher in the domestic markets, adopt strategic state intervention to promote exports aggressively and create necessary institutions and organizations which aid and promote exports, create special domestic financial facilities in term lending institutions for export related investment, check the domestic

consumption of commodities which have great export potential so as to make surpluses available for exports and to make exporters cost and quality conscious. Together, the BRICS together need to rework on lowering the tariffs levels, reducing the non-tariff barriers and this is the time they should look forward towards financial integration to increase their intra-trade and become the competitive successful regional group. Above all the differences that exist beyond trade should be cleared through dialogue summits and joint meets.

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Appendix:

Appendix.1

<u>Commodities with RCA, B>1</u>
<u>Food and Live Animals:</u>
Dairy products and birds' eggs,
Coffee tea, cocoa, spices and manufactures there off,
Feedstuff for animals.
<u>Beverages & Tobacco:</u>
Tobacco and tobacco manufactures.
Coal.Coke & Briquettes
<u>Mineral Fuels, Lubricants & Related Materials:</u>
Petroleum, Petroleum products & related materials.
<u>Chemicals & Related Products:</u>
Organic Chemicals,
Inorganic Chemicals
Medicinal & Pharma Products.
Essential oils for perfume materials and cleaning preparations
<u>Manufactured Goods:</u>
Leather, leather manufactures & dressed furskins,
Textile Yarn & Related Products,
Iron & Steel.
<u>Machinery and Transport Equipment:</u>
Specialized Machinery,
Telecommunications
<u>Miscellaneous Manufactures Articles:</u>

Travel Goods, Hand bags,
Footwear

Appendix.2 Commodities with RTA>0

Food and Live Animals: Meat & Meat Preparations Feedstuff for animals. Fish, Crustaceans, Molluses Cereals
Dairy products and bird eggs,
Meat & Meat Preparations

Appendix. 2 Commodities with RTA>0

<u>Food and Live Animals:</u>
Dairy products and bird eggs,
Meat & Meat Preparations
Feedstuff for animals.
Fish, Crustaceans, Molluses
Cereals
<u>Beverages & Tobacco:</u>
Tobacco and tobacco manufactures.
Coal.Coke & Briquettes Coffee tea, cocoa, spices and manufactures there off,
Miscellaneous edible products and preparations
Sugar, Sugar Preparations
<u>Mineral Fuels, Lubricants & Related Materials:</u>
Petroleum, Petroleum products & related materials.

<u>Chemicals & Related Products:</u>
Organic Chemicals,
Medicinal & Pharma Products.
<u>Manufactured Goods:</u>
Leather, leather manufactures & dressed furskins,
Textile Yarn & Related Products,
Iron & Steel.
<u>Machinery and Transport Equipment:</u>
Specialized Machinery,
Other Transport Equipment.
<u>Miscellaneous Manufactures Articles:</u>
Travel Goods, Hand bags,
Footwear

Appendix. 3 Commodities with in RXA>0

<u>Food and Live Animals:</u>
Dairy products and bird eggs,
Coffee tea, cocoa, spices and manufactures there off,
Feedstuff for animals.
<u>Beverages & Tobacco:</u>
Tobacco and tobacco manufactures.
Coal.Coke & Briquettes
<u>Mineral Fuels, Lubricants & Related Materials:</u>
Petroleum, Petroleum products & related materials.
<u>Chemicals & Related Products:</u>
Organic Chemicals,
Inorganic Chemicals
Medicinal & Pharma Products.
<u>Manufactured Goods:</u>
Leather, leather manufactures & dressed furskins,

Textile Yarn & Related Products,
Iron & Steel.
<u>Machinery and Transport Equipment:</u>
Specialized Machinery,
<u>Miscellaneous Manufactures Articles:</u>
Travel Goods, Hand bags,
Footwear

Appendix. 4 Commodities with RC>0

<u>Food and Live Animals:</u>
Dairy products and bird eggs,
Meat & Meat Preparations
Coffee tea, cocoa, spices and manufactures there off,
Feedstuff for animals.
Fish, Crustaceans, Molluses
Cereals
<u>Beverages & Tobacco:</u>
Tobacco and tobacco manufactures.
Coal.Coke & Briquettes
Miscellaneous edible products and preparations
Sugar, Sugar Preparations
<u>Mineral Fuels, Lubricants & Related Materials:</u>
Petroleum, Petroleum products & related materials.
<u>Chemicals & Related Products:</u>
Organic Chemicals,
Inorganic Chemicals
Medicinal & Pharma Products.
<u>Manufactured Goods:</u>
Leather, leather manufactures & dressed furskins,
Textile Yarn & Related Products,
Iron & Steel.

<u>Machinery and Transport Equipment:</u>
Specialized Machinery,
Telecommunications
Other Transport Equipment.
<u>Miscellaneous Manufactures Articles:</u>
Travel Goods, Hand bags,
Footwear

Appendix Chart. 1

Trade Intensity Index between China and BRICS Countries

Year	Russia	India	Brazil	South Africa	BRICS
1995	1.994	0.332	0.773	0.781	0.716
1996	2.062	0.580	0.700	0.860	0.779
1997	1.656	0.531	0.519	0.700	0.640
1998	1.504	0.298	0.447	0.669	0.529
1999	2.380	0.336	0.383	0.745	0.553
2000	2.751	0.369	0.479	0.596	0.553
2001	2.422	0.426	0.755	0.627	0.556
2002	2.238	0.541	1.012	0.554	0.537
2003	1.879	0.612	1.543	0.559	0.497
2004	1.612	0.638	1.273	0.538	0.429
2005	1.433	0.693	1.213	0.451	0.433
2006	1.200	0.549	1.097	0.414	0.383
2007	0.779	0.475	0.974	0.581	0.328
2008	0.817	0.355	1.015	0.608	0.351
2009	0.907	0.421	1.577	0.910	0.399
2010	0.771	0.483	1.556	1.072	0.394
2011	1.032	0.347	1.802	1.478	0.454
2012	0.895	0.269	1.581	1.397	0.387
2013	0.912	0.425	1.782	1.289	0.425
2014	0.814	0.455	1.652	1.456	0.416
2015	0.861	0.423	1.659	1.245	0.326
2016	0.825	0.493	1.895	1.326	0.412
2017	0.912	0.447	1.789	1.289	0.345
2018	0.815	0.421	1.659	1.456	0.425
2019	0.814	0.426	1.789	1.356	0.325

Appendix Chart. 2

Gravity Co-efficient Values of China with rest of the BRICS				
Year	China with Brazil	China with Russia	China with India	China with South Africa
2000	0.691	1.476	0.460	1.029
2001	0.784	1.696	0.501	1.110
2002	0.860	1.503	0.536	1.391
2003	1.162	1.343	0.460	1.401
2004	1.226	1.225	0.546	1.182
2005	1.131	1.180	0.552	1.294
2006	1.208	0.993	0.676	1.429
2007	1.344	1.083	0.823	1.465
2008	1.628	0.949	0.780	1.120
2009	1.692	0.896	0.805	2.166
2010	1.643	0.884	0.734	2.284
2011	1.726	0.947	0.666	2.704
2012	1.730	0.980	0.583	2.807
2013	1.670	0.943	0.567	2.505
2014	1.650	1.048	0.611	2.006
2015	1.626	1.072	0.741	1.633
2016	1.806	1.287	0.817	1.899
2017	2.035	1.239	0.791	1.939
2018	2.208	1.315	0.781	1.853
2019	2.457	1.415	0.688	1.843

Source: Author's calculations based on data from www.unctad.org

List of Abbreviations

RC – Revealed Competitiveness

RCA- Revealed Comparative Advantage

RTA-Revealed Trade Advantage

REA-Revealed Export Advantage

RIA-Revealed Import Advantage

RCD-Revealed Comparative Disadvantage

BIMSTEC- Bay of Bengal Initiative for Multisectoral Technical Economic Co-operation

SAARC- South Asian Association for Regional Co-operation

ASEAN: Association of South East Asian Nations

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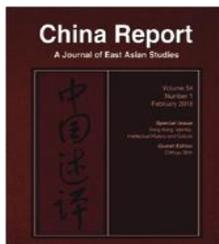


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