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Intra-industry trade in ICT services in BRIC Countries (2005-2017)

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Abstract

Information and communication technology (ICT) services, a key contributor to the growth and development of the countries, has also been an important item of international trade (both import and export) of emerging economies, particularly the BRIC countries. This paper examines the trends and patterns of exports, imports and intra-industry trade (IIT) in the ICT services in BRIC countries for the period 2005-2017, which has been an area unexplored in the international trade literature. Our analysis, based on the UNCTAD data, revealed that India has been the major contributor of the ICT services exports from the BRIC countries throughout the study period, which was distantly followed by China, while the share of Brazil and Russia has been relatively negligible. However, the growth in the ICT service exports during the study period was highest in China and it was lowest in India. At the same time, China was not only the leading importer of the ICT services among the BRIC countries throughout 2005 – 2017, but the growth rate in the ICT service exports of this country was highest among the BRIC countries. The computed IIT index values indicated the prevalence of intra-industry trade in ICT services, *albeit* with different intensity, in all the four BRIC countries. Among the BRIC countries, the degree of IIT in the ICT services was highest in Russia followed by China and lowest in India during our study period. The diversity in the nature and quality of the emerging ICT services originated from different countries will lead to further growth of intra-industry trade in the ICT services in BRIC countries and other countries in the future.

Keywords: BRIC countries, ICT Services, Intra-Industry Trade

1. Introduction

Traditional international trade focused on the exports and imports of products of different industries and therefore the traditional international trade theories gave more attention to explain the nature, causes and outcomes of inter-industry international trade in goods. One of the most important developments in the pattern of international trade in post-World War II was the simultaneous import and export of commodities within standard industrial classifications or product group; and this phenomenon is termed as intra-industry trade (IIT).

The phenomenon of intra-industry trade was first observed and empirically studied in the 1960s (Verdoorn, 1960 ^[15]; Balassa, 1963, 1966; ^[3, 4] and Grubel, 1967) ^[8]. After the development of the most popular index for the measurement of IIT by Grubel and Lloyd (1975) ^[9], there has been an ever increasing flow of empirical studies in intra-industry trade in goods using data from different countries. Scholars have started studying new aspects of IIT and many new models are developed to measure and explain the changing pattern of IIT. However, most of the empirical studies and analyses of intra-industry trade and even the inter-industry trade have been confined to trade in goods, but trade in services, particularly, intra-industry trade in services received little attention from international trade economists until recently. Moreover, we could not come across any study on intra-industry trade in information and communication technology (ICT) services.

The ICT has been widely recognised as a key contributor to economic the growth and development of a country. The United Nations Conference on Trade and Development (UNCTAD) conceptualises the ICT sector as “comprising economic activities whose products are intended to enable and/or fulfill the function of information processing and communication, including the production of both goods and services” (UNCTAD, 2015, p. 3) ^[14]. Trade in ICT services usually comprises trade in telecommunications services and in computer and information services.

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In this background, this paper seeks to fill the gap in the literature by studying the trends in trade, particularly intra-industry trade, in ICT services in the BRIC countries during 2005 – 2017. The term “BRIC” is an acronym for the economic bloc of emerging countries consisting of Brazil, Russia, India, and China. These countries, covering over 25% of the world's land area and around 40% of the world's population, are the emerging market powers in the global economy. South Africa joined the BRIC group in 2010, but due to the unavailability of comparable data for the study, we restrict our analysis to the original BRIC group. This paper makes a comparative analysis of the trends in exports, imports and intra-industry trade in the ICT services in the BRIC countries during 2005-2017.

The remainder of the paper is organized as follows: Section II describes the data set and methods used in the study. The major findings are presented and discussed in Section III. The final section provides concluding remarks.

2. Materials and methods

The empirical analysis in this study is exclusively based on a secondary data set extracted from the United Nations Conference on Trade and Development (UNCTAD) for a period from 2005 to 2018. The selection of the period of study is mainly based on the availability of data. The growth in exports and imports of the BRIC countries are assessed by estimating the compound annual growth rates using semi-log trend equation.

A number of indices are available for measuring intra-industry trade, but we have used the most widely used and popular one developed by Grubel and Lloyd (1975) [9] for measuring the extent of intra-industry trade in ICT service in BRIC countries. Thus, for the ICT services the IIT index

is computed as follows:

$$IIT_i = \frac{[(X_i + M_i) - |X_i - M_i|]}{(X_i + M_i)} \times 100 \quad \text{---- (1)}$$

Where, X_i and M_i denote exports and imports of ICT services respectively.

This is simplified to:

$$IIT_i = \left[1 - \frac{|X_i - M_i|}{(X_i + M_i)} \right] \times 100 \quad \text{---- (2)}$$

$$0 \leq IIT_i \leq 100$$

The computed value of this index takes its lower bound of zero when $X_i = M_i$, indicating that all trade is inter-industry and the upper bound value of 100 when $X_i = 0$ or $M_i = 0$, indicating that all trade is intra-industry. The closer the value of the index to its lower bound the lesser is the degree of intra-industry trade and vice versa.

3. Results and discussion

The discussion of the intra-industry trade will be incomplete without a detailed examination of the exports and imports. Therefore, this section, we first examine the trends and patterns of the ICT services trade (i.e., both exports and imports separately) in the BRIC countries and then we analyze the trends in the intra-industry trade in ICT services in the BRIC countries during 2005 – 2017.

Table1: Trends and patterns of ICT services exports from BRIC Countries during 2005 – 2017

(Amount in US dollars at current prices in millions)

Year	Brazil		Russia		India		China		BRIC Countries Together
	Amount	Share [@] (%)	Amount	Share [@] (%)	Amount	Share [@] (%)	Amount	Share [@] (%)	
2005	312	1.5	994	4.9	16698	82.1	2325	11.4	20330
2006	287	1.0	1314	4.8	22152	80.7	3696	13.5	27449
2007	409	1.1	2196	6.0	28190	77.6	5519	15.2	36315
2008	632	1.3	2950	6.2	36276	76.1	7822	16.4	47681
2009	521	1.2	2472	5.6	33578	75.8	7710	17.4	44281
2010	577	1.1	2538	4.7	39916	74.6	10476	19.6	53507
2011	504	0.8	3016	4.7	46938	72.9	13908	21.6	64366
2012	687	1.0	3401	4.9	48618	70.5	16247	23.6	68952
2013	658	0.9	4061	5.4	53628	71.1	17098	22.7	75445
2014	1375	1.7	4382	5.5	54293	67.7	20173	25.1	80223
2015	1499	1.7	3835	4.5	54850	63.8	25784	30.0	85967
2016	1727	2.0	3810	4.5	53469	62.5	26531	31.0	85538
2017	2133	2.4	4528	5.1	53961	61.0	27767	31.4	88389
CAGR* & Average [#]	17.1*	1.4 [#]	11.1*	5.1 [#]	9.5*	72.0 [#]	21.7*	21.5 [#]	12.1*

Notes: [@]Share in the total exports from the BRIC countries; ^{*}Compound annual growth rate (%) of exports during 2005-2017; [#]Average share (%) during 2005 – 2017.

Source: UNCTAD

Table 1 provides a clear picture of the exports of the ICT services from the BRIC countries during 2005-2017. Among the BRIC countries, India is the largest exporter of the ICT services throughout the study period, which was distantly followed by China. The magnitude of the ICT services exports by Brazil and Russia has been relatively negligible. Share of India alone in the ICT service exports of

the BRIC countries, on average, was around two and half times than the combined share of the other three countries in the group. However, the growth in the ICT service exports during the study period was highest in China, followed by Brazil and Russia and the growth rate of the ICT exports was the least in India. Therefore, the share of India in the total ICT services exports of the BRIC countries have

steadily declined from 82 percent in 2005 to 61 percent in 2017, while the share of China steadily grown up from 11 percent to 31 percent during the same period.

The trends and patterns of imports of ICT services are displayed in Table 2. It is interesting to note that China was the leading importer of the ICT services among the BRIC countries throughout 2005 – 2017. Moreover, there was

tremendous growth in the ICT imports of China during the study period, particularly since 2014. The average shares of the other three countries in the ICT service imports of BRIC were almost closer. Share of Brazil in the ICT services import has steadily fallen throughout the study period, particularly after 2013.

Table 2: Trends and Patterns of ICT Services Imports from BRIC Countries during 2005 – 2017

(Amount in US dollars at current prices in millions)

Year	Brazil		Russia		India		China		BRIC Countries Together
	Amount	Share [®] (%)	Amount	Share [®] (%)	Amount	Share [®] (%)	Amount	Share [®] (%)	
2005	1765	27.8	1098	17.3	1258	19.8	2223	35.0	6345
2006	2045	25.5	1376	17.1	2102	26.2	2503	31.2	8025
2007	2297	20.6	2026	18.2	3527	31.7	3290	29.5	11140
2008	2997	20.5	3050	20.8	3907	26.7	4675	32.0	14629
2009	2874	22.1	3086	23.8	2590	19.9	4442	34.2	12992
2010	3568	24.4	3709	25.3	3261	22.3	4103	28.0	14641
2011	4005	24.6	4658	28.6	2592	15.9	5035	30.9	16289
2012	4517	25.2	4831	27.0	3070	17.1	5490	30.7	17909
2013	4970	22.9	5700	26.3	3376	15.6	7624	35.2	21670
2014	3448	14.0	6428	26.2	3935	16.0	10748	43.8	24560
2015	3140	13.7	5197	22.6	3417	14.9	11230	48.9	22985
2016	3053	12.2	5010	20.0	4400	17.6	12579	50.2	25041
2017	3660	10.9	4937	14.8	5663	16.9	19176	57.4	33437
CAGR* & Average [#]	5.3*	20.3 [#]	13.5*	22.2 [#]	7.5*	20.0 [#]	17.8*	37.5 [#]	12.4*

Notes: [®]Share in the total imports from the BRIC countries; *Compound annual growth rate (%) of imports during 2005-2017; [#]Average share (%) during 2005 – 2017.

Source: UNCTAD

Table 3: Trends in the Intra-Industry Trade in the ICT Services in the BRIC Countries during 2005 – 2017

(Intra-industry trade in percentage)

Year	Brazil	Russia	India	China	BRIC Countries Together
2005	30.0	95.0	14.0	97.8	47.6
2006	24.7	97.7	17.3	80.8	45.2
2007	30.2	96.0	22.2	74.7	46.9
2008	34.8	98.3	19.4	74.8	47.0
2009	30.7	89.0	14.3	73.1	45.4
2010	27.8	81.3	15.1	56.3	43.0
2011	22.4	78.6	10.5	53.2	40.4
2012	26.4	82.6	11.9	50.5	41.2
2013	23.4	83.2	11.8	61.7	44.6
2014	57.0	81.1	13.5	69.5	46.9
2015	64.6	84.9	11.7	60.7	42.2
2016	72.3	86.4	15.2	64.3	45.3
2017	73.6	95.7	19.0	81.7	54.9
Average	39.8	88.4	15.1	69.2	45.4
C. V.	48.8	8.1	23.3	19.2	8.1

Source: Author's Calculations Based on UNCTAD Data

Table 3 reveals that intra-industry trade (IIT) in ICT services persist, *albeit* with different intensity, in all the four BRIC countries. The intensity of the IIT of the BRIC countries taken together in the ICT services with the world ranged between 40 percent and 55 percent during 2005 – 2017 and the average intensity was around 45 percent during this period. Among the BRIC countries, the degree of IIT in the ICT services had been highest in Russia followed

by China and lowest in India during our study period (see Figure 1). The fluctuations in the level of IIT in ICT services were relatively high in Brazil, where there was a sudden surge in the intensity of the IIT after 2014. At the same time, the fluctuations in the IIT were lowest in Russia, where the intensity was remaining the highest throughout our study period.

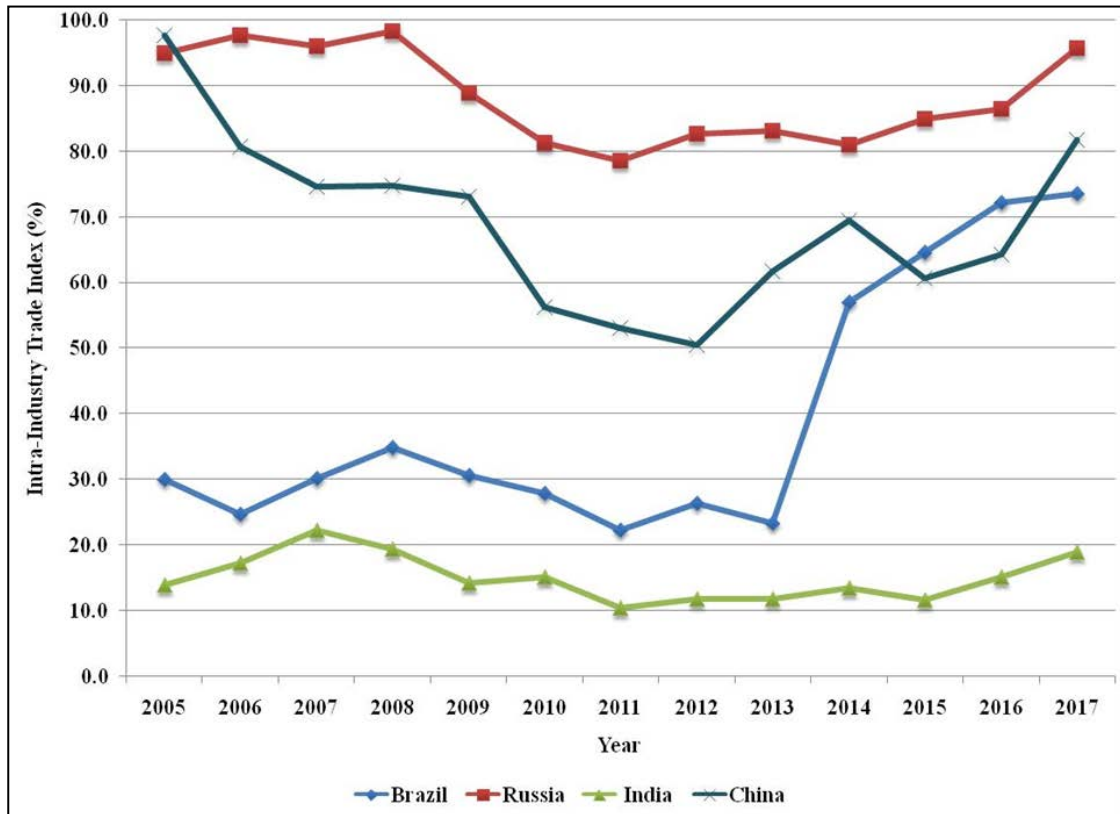


Fig 1: Trends in the Intra-Industry trade in the ICT services imports from BRIC Countries during 2005 – 2017

4. Concluding remarks

This study examined the intra-industry trade in ICT services of the BRIC countries during 2005- 2017, which has been an area left unexplored in the literature. The trends and patterns of the exports and imports of the ICT services in the BRIC countries have been examined first before analysing the trends in the IIT in the ICT services.

A lion share of the ICT services exports from the BRIC countries have been contributed by India throughout the study period 2005-2017, which was distantly followed by China and the magnitude of the ICT services exports from Brazil and Russia has been relatively negligible. However, the growth in the ICT service exports during the study period was highest in China but it was lowest in India, which has clearly reflected in a drastic decline in the share of India in the total ICT services exports of the BRIC countries and a sharp increase in the share of China during the study period.

China was not only the leading importer of the ICT services among the BRIC countries throughout 2005 – 2017, but the growth rate in the ICT service imports of the country was highest among the BRIC countries.

The simultaneous persistence of exports and imports of the ICT services in all the BRIC countries reflected the prevalence of intra-industry trade in the ICT services in these countries during 2005 – 2017. The computed IIT index values confirmed the existence of intra-industry trade in ICT services, albeit with different intensity, in all the four BRIC countries. Among the BRIC countries, the degree of IIT in the ICT services had been highest in Russia followed by China and lowest in India during our study period. The fluctuations in the level of the IIT in ICT services were relatively high in Brazil during the study period, while it was comparatively low in Russia.

The diversity in the quality and nature of the emerging ICT services originated from different countries will lead to further growth of intra-industry trade in the ICT services in BRIC countries and other countries in the years to come.

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