

India–China Intra-Industry Trade : Analysis of India’s Route Toward Global Production Sharing

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Abstract

Purpose : The goal of this study was to evaluate the degree of intra-industry trade (IIT) that exists between China and India while taking vertical specialization into account. We looked into the amount of IIT between these two Asian trading giants because of Asia's increasing involvement in global production sharing and the contribution of vertical specialization to intra-industry trade within Asia.

Methodology : The study was based on 20 years' worth of secondary bilateral commodity trade data at the HS two-digit level (2002–2021). The adjusted Grubel–Lloyd index was used to compute the IIT between China and India. The unit value dispersion technique was then used to further divide the overall IIT into vertical and horizontal sub-industry trade.

Findings : It has been observed that there has been a noteworthy increase in India's IIT with China over the years, with a distinct trend of commodities displaying vertical differentiation. This result indicated that the structure of bilateral commerce between China and India was significantly influenced by cross-border manufacturing fragmentation.

Practical Implications : The study's findings underscored the urgent requirement for targeted policy interventions across industries to tackle India's trade dynamics with China. Sector-specific methods were considered necessary in order to recognize the predominance of commodities with the vertical difference in bilateral commerce.

Originality : The current study specifically focused on analyzing the bilateral IIT between two significant emerging countries in Asia, in contrast to previous research on the vertical specialization aspect of IIT in Asia, which primarily examined IIT on a multilateral basis.

Keywords : bilateral trade, trade deficit, vertical intra-industry trade, vertical specialization

JEL Classification Codes : F10, F14, F19

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Intra-industry trade (IIT) is a phenomenon that occurs when a nation simultaneously exports and imports commodities from the same industry, i.e., similar goods from the same industry move from one country to another. The literature on IIT divides overall IIT into vertical IIT and horizontal IIT. Horizontal intra-industry trade (HIIT) occurs within an industry where products are distinguished by attributes such as features, style, and color rather than by quality or price. Conversely, the conventional vertical IIT (VIIT) paradigm contends that VIIT happens when comparable items with varying attributes or costs are exchanged. However, there is an emerging perception that vertical specialization significantly influences IIT. As a result of countries specializing in specific production steps rather than manufacturing complete items from start to finish, vertical specialization may lead to IIT. Particularly, countries that practice vertical specialization import or export intermediate products

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while exporting finished goods later in the manufacturing process. This leads to the simultaneous import and export of commodities at different stages of the manufacturing process within the same industry. China, India, and Indonesia are among the emerging Asian economies that have become increasingly popular with multinational companies. These companies range from P&G, Unilever, and Nokia to emerging indigenous brands like Mahindra and Mahindra, Bharat Forge, Marico, and Ashok Leyland. Significant growth in foreign direct investment has coincided with this spike in interest (Sarangi & Pattnaik, 2018). The rise of IIT in the region has been fueled by the growing recognition of vertical specialization as a critical element influencing production, trade dynamics, and overall development within Asian countries (Sawyer et al., 2010). Due to the broad fragmentation of products across international markets and their increasing involvement in vertical specialization, the bulk of Asia's developing economies have taken on substantial roles in global production networks.

India, a prominent growing nation in Asia, has a long history of active international trade and has recently established important bilateral and multilateral commercial ties with a variety of economies. The pattern and direction of India's commerce have undergone substantial changes since the implementation of economic reforms in 1991. The percentage of India's IIT in its total foreign trade increased significantly between 2001 and 2015, rising from 33.25% to 40.76% (Aggarwal & Chakraborty, 2017). The most significant change in the direction of India's trade has been seen in its increased interconnectedness with Asian economies. High-income OECD nations made up 56.5% of India's imports and 53.12% of its exports in 1995, but by 2019, these percentages had dropped to 32% and 40%, respectively. India's share of imports from rising Asian economies increased from 25% to 47.1% during the same period, while its share of exports increased from 21% to 33% (data derived from the UNCTAD Stats website).

In comparison to other Asian economies, India's merchandise trade volume with China has grown significantly faster during the past 20 years. India and China's trade volume has grown significantly since 1991 (Ahmad et al., 2018). China has been one of India's largest economic partners in Asia, and this trend has accelerated since China joined the World Trade Organization (WTO) in 2001. Figure A1 in the appendix illustrates how, in the past 20 years, India's two-way goods trade with China has increased almost 30 times, from US\$ 2.9 billion in 2001–2002 to US\$ 86.4 billion in 2020–2021. However, it is crucial to highlight that alongside the expansion in bilateral trade with China, India has grappled with a significant and continually widening trade deficit.

Nonetheless, it is undeniable that China plays a substantial role in India's international trade. The appendix's Figure A2 illustrates how China's share of India's total trade increased during the last 20 years, from 3.14% in 2001–2002 to 11.19% in 2021–2022. This highlights the significance of India's bilateral trade relations with China. Additionally, it was discovered that these two economies experienced rapid GDP growth beyond that period. For instance, Kowalski (2008) asserted that following India and China's integration into the global economy, their economic growth and trade surged.

This paper explores the existence and consequences of IIT between India and China, taking into account the rapidly expanding bilateral trade relationship between the two countries. It focuses on the vertical specialization component of IIT. It is believed that comprehending the dynamics of trade within Asia requires an understanding of vertical specialization. Existing literature predominantly concentrated on examining the vertical specialization aspect of IIT and its role in the Asian region, with relatively limited attention to individual country-level analyses, especially concerning India. China and India are two of the most important trading partners in Asia, and they can have a big impact on how closely the area is linked when it comes to sharing global production. In light of this, the main objectives of this study are to investigate the existence of IIT between these two significant trading giants and evaluate the possible benefits it offers from the Indian point of view.

Theoretical Background of Intra-Industry Trade

The phenomenon of IIT was first noted empirically with the trading behavior of the European Common Market (Balassa, 1966; Grubel, 1967). Later, Grubel and Lloyd (1971) developed an index called GL-index to compute IIT and demonstrated that IIT is a pure phenomenon. A number of theories have explained the phenomena of IIT since the late 1970s (Dixit & Stiglitz, 1977; Krugman, 1980, 1981; Lancaster, 1980). These models have emphasized the importance of economies of scale, demand for diversity in monopolistic markets, and horizontal product differentiation as the cornerstones of IIT. Here, trade is feasible between nations with comparable resources, needs, and technological capabilities.

Falvey (1981) developed a vertically differentiated trade model discussing how different intensities of factors can be used to make goods in the same industry but of different quality. He gave an example of how higher-grade goods were more costly because their production processes required more sophisticated capital equipment. Thus, high-quality variations were more likely to be imported by labor-intensive developing countries and exported by capital-intensive industrialized ones. Here, trade between nations with different factors and technology can occur, and this two-way trade of vertically differentiated items is mainly responsible for increased IIT worldwide (Fontagné et al., 2006).

International trade has seen a trend over the last two or three decades that is typified by the growth of vertical specialization, the international dispersion of manufacturing processes, and novel sourcing tactics used by multinational corporations. A developing phenomenon is the fragmentation of the industrial process and the global assignment of duties and activities across many nations based on comparative advantage (Örgün, 2015). This phenomenon is commonly known as “Global Production Sharing.” Trade incorporating production fragmentation across borders has led to a rising share of IIT, primarily VIIT. Thus, VIIT results from global manufacturing process fragmentation as well as vertical production links brought on by quality variations (Ando, 2006). Vertical specialization within the same industry at different stages of production is, therefore, developing into a new type of IIT. As evidenced by the rapidly growing share of IIT, for example, the rapid growth of intraregional commerce among emerging Asian nations (Ando, 2006; Sawyer et al., 2010; Wakasugi, 2007). The increasing dispersion of manufacturing processes throughout the area and developing vertical specialization have led to an increase in trade in intermediate commodities and the rising share of IIT in Asia (Zebregs, 2004). Wakasugi (2007), in his study, used the VIIT index to measure production fragmentation in East Asia. The study suggested that East Asia had a significant and expanding role in global production sharing. Sawyer et al. (2010) examined the importance of IIT in East, Southeast, South, and Central Asia in 2003. They discovered that high-income East Asian countries and ASEAN had the greatest levels of IIT for most product categories. China and India also scored highly, highlighting the significance of their contributions to the fragmentation of the global industry and vertical specialization.

However, throughout their investigation, it was discovered that the developing economies of South and Central Asia had low IIT levels. Tewari et al. (2015) undertook systematic research on IIT utilizing data at the harmonized system (HS) six-digit level. The study indicates that although volume is still relatively low, vertically specialized commerce has been expanding between India and ASEAN. The study also notes that the automotive industry is likely vulnerable to cross-border production fragmentation because it is often one of the few in India that is linked to international production networks.

The examination of India's bilateral IIT with China is important, especially in light of the country's rapidly expanding trade with China, given the growing connections between cross-border product fragmentation and trade in vertically specialized products in Asia. It is important to evaluate IIT's vertical specialization component. The goal of this research is to understand the potential opportunities from the Indian perspective and explore the occurrence of IIT between these two global trading giants, and the present paper especially focuses on the following:

- ⇒ Examining the extent of IIT between India and China from 2002 to 2021.
- ⇒ Determining the proportion of vertically differentiated goods in bilateral trade between China and India.
- ⇒ Analyzing the possible relationship between the shares of IIT and VIIT in India–China bilateral trade.

Methodology

Data

The HS is used to classify things into different product categories, and this classification is the basis for the trade data used in the study. Secondary statistics from the Indian Ministry of Commerce's database about India's imports and exports with China between 2002 and 2021.

Intra-Industry Trade Index

In the empirical literature, numerous methods for estimating IIT have been developed (Balassa, 1966; Grubel & Lloyd, 1971, 1975). Grubel and Lloyd's (1971, 1975) G-L index is the most often utilized way among all the proposed approaches for determining IIT.

The formula for the GL-index, which calculates the country's bilateral IIT share in its overall trade with a particular trading partner “*j*” in a particular industry “*q*,” is as follows:

$$GLI_{jq} = \frac{\{(X_{jq} + M_{jq}) - |X_{jq} - M_{jq}|\}}{(X_{jq} + M_{jq})} \times 100 \quad (1)$$

Here, GLI_{jq} denotes the GL-index of the industry *q*, X_{jq} and M_{jq} stand for the export value of industry “*q*” from the home country to partner country “*j*” and the import value of industry “*q*” from partner “*j*” to the home country, respectively. The numerator of the ratio, which is calculated as the difference between the home country's total bilateral trade with partner “*j*” (i.e., $X_{jq} + M_{jq}$) and the absolute value of their net trade (i.e., $|X_{jq} - M_{jq}|$), actually represent the home country's bilateral IIT with trade partner “*j*” in industry “*q*.” So, the GLI_{jq} indicates a country's proportion of IIT of industry “*q*” in overall trade with partner “*j*.” The GLI_{jq} equals 100 when all trade is IIT, i.e., when an industry's exports are exactly equal to its imports. GLI_{jq} becomes 0 when there is no IIT. As a result, as the extent of IIT rises, the index of IIT takes on values ranging from 0 to 100, i.e., $0 < GLI_{jq} < 100$. The weighted¹ average is used to obtain the average share of IIT of all industries in the country's total trade with partner “*j*,” and the following formula defines it:

$$GLI = \frac{\sum_{q=1}^n (X_{jq} + M_{jq}) - \sum_{q=1}^n |X_{jq} - M_{jq}|}{\sum_{q=1}^n (X_{jq} + M_{jq})} \times 100 \quad (2)$$

Thus, Equation (2) gives the average share of IIT in *n* industries as a percentage of the overall merchandise trade in a nation with the country “*j*.” However, Equation (2) is not an appropriate measure if the nation's total merchandise trade is imbalanced (surplus or deficit) with its trading partner and, therefore, is downward biased for measuring the degree of IIT. To overcome this issue, Grubel and Lloyd (1975) suggested another method that adjusts the index by subtracting the total trade imbalance from the total amount of trade in the denominator, defined as follows:

¹ The weight is determined by the proportion of trade in a particular industry in the total trade of all industries.

$$G-L = \frac{\sum_{q=1}^n (X_{jq} + M_{jq}) - \sum_{q=1}^n |X_{jq} - M_{jq}|}{\sum_{q=1}^n (X_{jq} + M_{jq}) - |\sum_{q=1}^n X_{jq} - \sum_{q=1}^n M_{jq}|} \times 100 \quad (3)$$

Here, IIT is measured in terms of total balanced trade between home and partner countries rather than total trade between the countries, and in this way, G-L claims to have addressed the downward bias of its earlier version (Vona, 1991).

This study determines the degree of India's IIT with China using the adjusted G-L index, which is given by Equation (3), in light of the limitations of the unadjusted G-L index.

Unit Value Dispersion Method

In order to determine whether IIT is vertical or horizontal, the unit value (UV)² dispersion technique developed by Abd-el-Rahman (1991) is used in this study. In this method, the relative unit values of exports and imports are used to separate the IIT into HIIT and VIIT components. Suppose, UV_q^x and UV_q^m are the unit values of exports and imports, respectively, for industry “q.” According to this method, IIT will be regarded as HIIT for industry “q” if the following condition is met.

$$1 - \alpha \leq \frac{UV_q^x}{UV_q^m} \leq 1 + \alpha \quad (4)$$

And if Equation (5) is met, IIT will be classified as VIIT.

$$\text{either } \frac{UV_q^x}{UV_q^m} < 1 - \alpha \text{ or } \frac{UV_q^x}{UV_q^m} > 1 + \alpha \quad (5)$$

Here, α is the dispersion factor, presumed to be 0.15. Thus, if an industry's ratio of the unit value of export to import falls between 0.85 and 1.15, IIT is considered as HIIT. IIT is regarded as VIIT if the ratio falls outside this range.

Analysis and Results

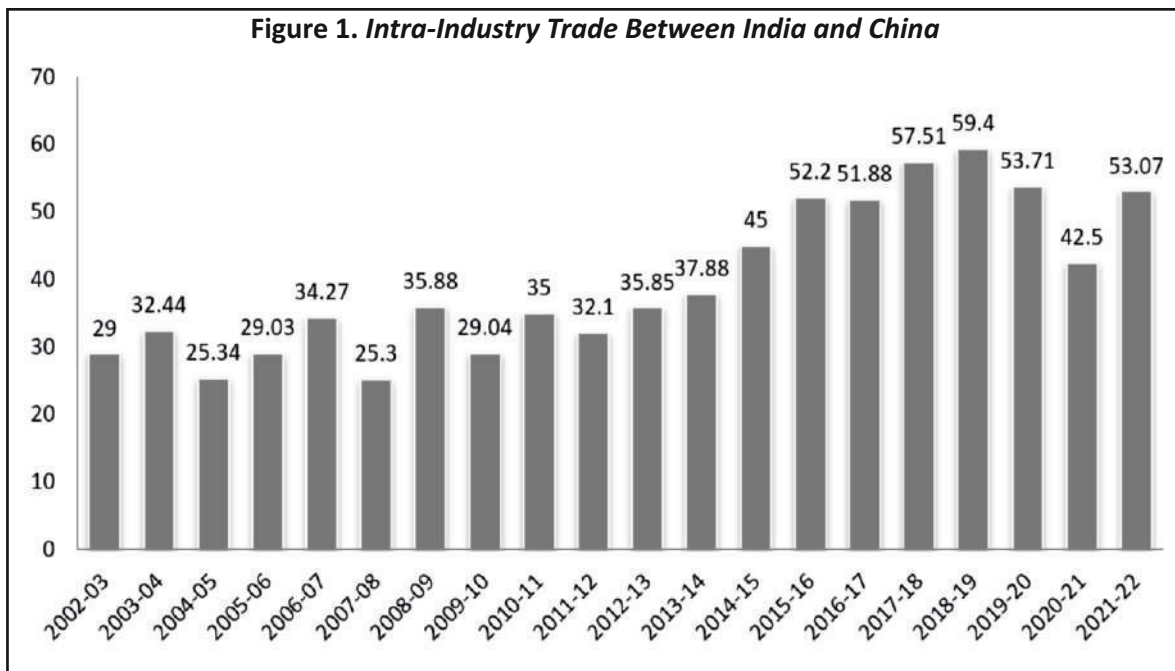
The bilateral IIT of India and China has been calculated using the data of India's exports and imports to and from China at the HS two-digit level.

Figure 1 presents the calculated *adjusted* G-L index values of India–China bilateral trade over 2002–2021, indicating the share of IIT in total trade³ between these two countries. These index values are based on Equation (3), which has been designed to prevent trade balance-related bias, as already discussed.

Despite some variations, Figure 1 shows the increasing trend in the amount of IIT in bilateral commerce between China and India throughout time. In 2002–2003, the share of IIT was around 29%, implying that 29% of India's bilateral trade with China was intra-industry in nature. This percentage rose significantly to about 59% in 2018–2019, but after that, the IIT share decreased for two years. This could be because the COVID issue spread,

² The justification for utilizing UVs is that a variety that is more expensively priced must be of greater quality than a variety that is more cheaply priced. It calculates the average price of a group of goods from a certain product category (Greenaway et al., 1994).

³ It is important to highlight here that adjusted G-L index measures IIT in terms of total balanced trade between India and China rather than total trade between them.



making it harder for the nation to participate in significant foreign commerce. However, trade has again revived in 2021–2022. Studies have shown that trade openness between countries is one of the important determinants of IIT (Sawyer et al., 2010; Zhang et al., 2005).

Another important point to observe from this trend is that the IIT has increased steadily between 2011–2012 and 2018–2019, and after 2015–2016, the calculated IIT index values are above 50% except for 2020–2021, implying that differentiated (specialized) products have accounted for a significant portion of India's trade with China in recent years. Using Equation (3), the industry category-wise IIT index is computed from 2015–2016 to 2019–2020 in order to determine which industry has been substantially contributing to this IIT trend. The industry-specific share of the total IIT is shown in Table 1.

Table 1 illustrates the share of IIT⁴ in each commodity group. It reveals that IIT in the commodities that are classified in the first two groups, where most of the primary commodities are included, registered a smaller share compared to the last three groups together that predominantly comprised processed commodities. Commodities

Table 1. Commodity Group-Wise IIT

Year	2015–16	2016–17	2017–18	2018–19	2019–20
Food and living creatures; oils, fats, and waxes from animals and plants; beverages and tobacco	27.4	23.8	26.55	28.64	37.74
Mineral products; textile; crude materials, inedible	26.22	27.85	32.95	31.025	23.79
Chemicals, chemical products, or Associated industries; metals, base metals, and base metal articles	58.59	64.38	62.03	82.94	80.98
Manufactured goods; miscellaneous manufactured articles	61.47	57.71	62.56	67.41	65.84
Electronic equipment; machinery and transport equipment; parts thereof	87.06	86.42	88.10	89.47	89.8
Others	2.03	3.33	5.6	4.8	7.2

⁴ In this case, aggregate IIT is the weighted average of IIT for each commodity group.

like machinery and transport equipment, which mainly compromise the electronics and automobile industries, registered the highest IIT share throughout the years, implying their significant role in the substantial rise in India–China IIT in the last few years. During that period, India's electronic sector has expanded significantly, with domestic electronics manufacturing increasing from US\$ 30 billion in 2014–2015 to US\$ 75 billion in 2019–2020 (Mohindroo, 2021). The domestic demand for parts and components has also shown an upward tendency in tandem with this growing production. For instance, imports of phone parts have increased to assist multinational corporations (MNCs) like Samsung, Xiaomi, Lenovo, and others that assemble their phones mostly through imports. Imports of telecom equipment have expanded in parallel with the expansion of the local telecom market since the 2000s. As a result, even with the domestic expansion of this sector, import demands have also remained significant. Imports from China accounted for nearly half of India's electronics imports in 2014, accounting for approximately 48% of total imports (Francis, 2018).

Similarly, the automobile sector is also one of the important drivers of economic growth in India with a high participation rate in the global value chain. As pointed out by Tewari et al. (2015), the automobile sector tends to be one of the few industries in India that is connected to global production networks, and, as a result, it is probably subject to cross-border production fragmentation. Table 1 further highlights the noteworthy development in the IIT share of chemical and metal goods during the last two years. This is most likely because of India's industries, which are growing quickly and need large imports of basic metals, chemicals, plastics, iron and steel, and associated goods. For instance, India has the world's third-largest pharmaceutical industry, and two-thirds of its important ingredients come from China (Pandey, 2020), allowing Indian generic manufacturers to provide low-cost medicines not just in India but also in many other countries, including China. Concurrently, organic chemicals, iron ore, and steel and iron make up the majority of India's exports to China. IIT may have grown significantly in this industry as a result of this. However, it is important to remember that India and China have a sizable trade deficit in these two commodity groupings, which highlights the need for further focus on these sectors. The degree of specialization in certain commodities, where growing economies of scale and product diversity have a significant impact, is nevertheless highlighted by rising IIT in these commodities. In the end, this could help to lessen this trade deficit.

From the above discussion, it may be interpreted that most of the rise in India's IIT share with China may be the result of increased Chinese value addition in the Indian manufacturing sector. According to the literature, this value-added trade primarily leads to vertical IIT; thus, it is crucial to investigate the level of VIIT between India and China. To accomplish this, total IIT is split into HIIT and VIIT by using Equations (4) and (5), and the results are summarized in Table 2. This may give insight into the extent of vertical specialization in Indo–China bilateral trade.

Table 2 reveals that the average proportion of IIT between India and China has increased steadily in the first three periods but has grown significantly in the last two, with the highest growth rate attained in 2014–2017. During 2002–2005, the IIT accounted for a share of around 28.95%, which subsequently increased to 52.17% during 2018–2021, showing a nearly two-fold rise. Table 2 also shows that the VIIT has dominated the total magnitude of IIT (HIIT+VIIT) over the five periods of bilateral trade between India and China. It is important to

Table 2. Four-Year Average Share of IIT, HIIT, and VIIT in Bilateral Trade Between India and China

Period	2002–05	2006–09	2010–13	2014–17	2018–21
IIT	28.95	31.12	35.20	51.64	52.17
HIIT	3.05	3.79	5.1	5.01	5.6
VIIT	25.3	27.32	30.08	46.50	46.56

note that VIIT growth has experienced an almost similar pattern to that of IIT. Similar to IIT, VIIT has increased steadily in the first three periods but has grown significantly in the last two, with the highest growth rate attained in 2014–2017. The relative share of HIIT has also increased slightly over the years 2002–2021, from 3.05% to 5.6%, but despite the growing significance of HIIT, vertical relationships continue to dominate bilateral trade between India and China. Again, the largest spike in IIT has been seen between 2010–2013 and 2014–2017, and this may be primarily due to VIIT growth, as HIIT remained less during that period. This indicates that the majority of India–China trade goods are differentiated by quality or by different processing stages (specialization in distinct phases of production within the same industry). As shown in Table 2, the average magnitude of vertically differentiated goods in bilateral trade between India and China grew from 25.3% to 46.56% between 2002–2005 and 2018–2021. Thus, the table suggests that two-way trade in vertically differentiated goods between India and China is becoming increasingly important, implying the significance of value-added trade (specialization in distinct phases of production) in their bilateral trade. This may also point to China's significant contribution to India's manufacturing industry in terms of value creation. For instance, studies by Chakraborty (2017) and Nag (2016) have suggested that China and other East Asian partners make a significant contribution to the foreign value-added components of Indian exports. In that context, it may be inferred that China is assisting India's manufacturing sector in becoming an active participant in global production networks.

Summary and Conclusion

The findings of this paper indicate that India's IIT with China has expanded over time, and goods with vertical differentiation predominate in this trade, emphasizing the importance of production fragmentation in their bilateral trade. The study's findings also suggest that India's trade relationship with China (the country's largest trading partner among Asian nations) is critical to the country's recent expansion of its participation in global value chains and Asian production networks. Thus, potential negotiations between these two global trade giants may be evident in the future as strengthening trade links with China, particularly vertical IIT, may inspire India to become more actively involved in global production sharing. However, it cannot be ignored that India's trade deficit with China is substantial and ever-expanding (as shown in Figure A1), accounting for over 40% of India's entire trade deficit. One of the primary causes of this expanding trade deficit is the overall composition of traded products between these two countries: India largely buys higher-end manufactured goods from China while exporting commodities with lower value-added to China.

Consequently, India's concern over its enormous trade imbalance may prompt it to terminate its trading links with China. Additionally, India's none-too-friendly relationship with China, which stems from border disputes, may deteriorate their trading relationship further. Meanwhile, the opportunity cost for India not advancing its commercial ties with China may be significant given the expanding scope of IIT between India and China and the advantages the nation receives from participation (including backward participation) in global value chains. A significant proportion of India's imports of intermediate goods, parts, and components come from China, which aids in supplying India's rapidly developing sectors like telecom and power industries. Without trade in these commodities, it may be difficult for India to increase its participation in global production sharing. Furthermore, while India continues to mostly export primary products to China, it has gained strength in value-added exports over time. Based on these considerations, it may be concluded that decoupling from China may be challenging for India, particularly in the short term, given that more than one-fourth of the value added to Indian exports is assisted by China (Kwatra, 2020). However, in the long run, India might be able to compete with China. To capitalize on the potential, India must improve the ease of doing business, physical and social infrastructure, and implement land, labor, and tax reforms.

Policy Implications

The results of the analysis demonstrate the urgent need for focused industry-wide policy measures to address the dynamics of trade between China and India. Sector-specific tactics are critical in light of the prevalence of commodities with vertical differentiation in bilateral commerce. It is crucial to take action to diversify sourcing channels and boost local manufacturing capabilities for industries like telecom and electricity that depend significantly on imports from China in order to lower dependency risks and improve trade resilience. In addition, encouraging innovation and value addition in these areas can assist in reducing the trade imbalance and increase India's competitiveness in international value chains. In the meanwhile, efforts to fortify bilateral negotiations ought to concentrate on making it easier for Indian goods to enter the Chinese market, especially in industries where India has a competitive advantage. To fully realize the potential advantages of economic relations with China, governmental interventions must be coordinated with industry-specific needs.

Limitations of the Study and Scope for Further Research

The present paper used highly aggregated trade data at the HS two-digit level, which does not distinguish between parts, components, and assembled end products. Thus, the degree of VIIT recorded in the results may not accurately reflect the degree of vertical specialization in India's trade with China, as traded products might also be differentiated by quality and price. For this reason, there is a lot of need for future studies using more disaggregated data to estimate the VIIT link between China and India.

Authors' Contribution

Riya Das conceived the presented idea, developed the methods, and performed the computations. Dr. Amiya Sarma verified the analytical methods and investigated and supervised the findings of this work. Both authors discussed the results and contributed to the final manuscript.

Conflict of Interest

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

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References

- Abd-el-Rahman, K. (1991). Firms' competitive and national comparative advantages as joint determinants of trade composition. *Review of World Economics*, 127(1), 83–97. <https://doi.org/10.1007/BF02707312>
- Aggarwal, S., & Chakraborty, D. (2017). Determinants of India's bilateral intra-industry trade over 2001–15: Empirical results. *South Asia Economic Journal*, 18(2), 296–313. <https://doi.org/10.1177/1391561417713127>

- Ahmad, I., Kunroo, M. H., & Sofi, I. A. (2018). An RCA analysis of India-China trade integration: Present, potential and prospects. *Foreign Trade Review*, 53(1), 49–58. <https://doi.org/10.1177/0015732516681885>
- Ando, M. (2006). Fragmentation and vertical intra-industry trade in East Asia. *The North American Journal of Economics and Finance*, 17(3), 257–281. <https://doi.org/10.1016/j.najef.2006.06.005>
- Balassa, B. (1966). Tariff reductions and trade in manufacturers among the industrial countries. *The American Economic Review*, 56(3), 466–473. <https://www.jstor.org/stable/1823779>
- Chakraborty, D. (2017). Picking the right alternative: Should India participate in TPP instead RCEP? In J. Chaisse, H. Gao, & C. Lo (eds.), *Paradigm shift in international economic law rule-making: TPP as a new model for trade agreements?* (pp. 501–519). Springer. https://doi.org/10.1007/978-981-10-6731-0_28
- Dixit, A. K., & Stiglitz, J. E. (1977). Monopolistic competition and optimum product diversity. *The American Economic Review*, 67(3), 297–308. <https://www.jstor.org/stable/1831401>
- Falvey, R. E. (1981). Commercial policy and intra-industry trade. *Journal of International Economics*, 11(4), 495–511. [https://doi.org/10.1016/0022-1996\(81\)90031-3](https://doi.org/10.1016/0022-1996(81)90031-3)
- Fontagné, L., Freudenberg, M., & Gaulier, G. (2006). A systematic decomposition of world trade into horizontal and vertical IIT. *Review of World Economics*, 142, 459–475. <https://doi.org/10.1007/s10290-006-0076-6>
- Francis, S. (2018). India's electronics manufacturing sector. *Economic & Political Weekly*, 53(34), 112–117. https://www.macrosan.org/pol/sep18/pdf/Electronics_Mfg_India.pdf
- Greenaway, D., Hine, R., & Milner, C. (1994). Country-specific factors and the pattern of horizontal and vertical intra-industry trade in the UK. *Review of World Economics*, 130(1), 77–100. <https://doi.org/10.1007/BF02706010>
- Grubel, H. G. (1967). Intra-industry specialization and the pattern of trade. *Canadian Journal of Economics and Political Science*, 33(3), 374–388. <https://doi.org/10.2307/139914>
- Grubel, H. G., & Lloyd, P. J. (1971). The empirical measurement of intra-industry trade. *Economic Record*, 47(4), 494–517. <https://doi.org/10.1111/j.1475-4932.1971.tb00772.x>
- Grubel, H. G., & Lloyd, P. J. (1975). Intra-industry trade : The theory and measurement of international trade in differentiated products. *The Economic Journal*, 85(339), 646–648. <http://dx.doi.org/10.2307/2230917>
- Kowalski, P. (2008). *China and India: A tale of two trade integration approaches* (ICRIER Working Paper No. 221). Indian Council for Research on International Economic Relations. <https://www.econstor.eu/handle/10419/176239>
- Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. *The American Economic Review*, 70(5), 950–959. <https://www.jstor.org/stable/1805774>
- Krugman, P. R. (1981). Intraindustry specialization and the gains from trade. *Journal of Political Economy*, 89(5), 959–973. <https://doi.org/10.1086/261015>
- Kwatra, N. (2020, October 5). Can India replace China as the world's factory? *Mint*. <https://www.livemint.com/news/india/can-india-replace-china-as-the-world-s-factory-11601691617840.html>

- Lancaster, K. (1980). Intra-industry trade under perfect monopolistic competition. *Journal of International Economics*, 10(2), 151–175. [https://doi.org/10.1016/0022-1996\(80\)90052-5](https://doi.org/10.1016/0022-1996(80)90052-5)
- Mohindroo, P. (2021, October 24). How domestic electronic component manufacturing can help reduce imports, boost private sector investment. *Business Today*. <https://www.businesstoday.in/opinion/columns/story/how-domestic-electronic-component-manufacturing-can-help-reduce-imports-boost-private-sector-investments-310291-2021-10-24>
- Nag, B. (2016). Emerging production network between India and ASEAN: An analysis of value-added trade in select industries. In D. Chakraborty, & J. Mukherjee (eds.), *Trade, investment and economic development in Asia: Empirical and policy issues* (pp. 41–67). Routledge.
- Örgün, B. O. (2015). New trend in global production system. *Procedia - Social and Behavioral Sciences*, 181, 140–147. <https://doi.org/10.1016/j.sbspro.2015.04.875>
- Pandey, K. (2020, April 7). COVID-19 exposes India's dependence on China for active pharma ingredients. *DownToEarth*. <https://www.downtoearth.org.in/news/economy/covid-19-exposes-india-s-dependence-on-china-for-active-pharma-ingredients-70272>
- Sarangi, S., & Pattnaik, S. (2018). Targeting emerging and untapped markets: Rethinking market intelligence decision framework. *Prabandhan: Indian Journal of Management*, 11(1), 39–51. <https://doi.org/10.17010/pijom/2018/v11i1/120822>
- Sawyer, W. C., Sprinkle, R. L., & Tochkov, K. (2010). Patterns and determinants of intra-industry trade in Asia. *Journal of Asian Economics*, 21(5), 485–493. <https://doi.org/10.1016/j.asieco.2010.04.001>
- Tewari, M., Veeramani, C., & Singh, M. (2015). *The potential for involving India in regional production networks: Analyzing vertically specialized trade patterns between India and ASEAN* (ICRIER Working Paper No. 292). Indian Council for Research on International Economic Relations. <http://hdl.handle.net/10419/176310>
- Vona, S. (1991). On the measurement of intra-industry trade: Some further thoughts. *Review of World Economics*, 127(4), 678–700. <https://doi.org/10.1007/BF02707415>
- Wakasugi, R. (2007). Vertical intra-industry trade and economic integration in East Asia. *Asian Economic Papers*, 6(1), 26–39. <https://doi.org/10.1162/asep.2007.6.1.26>
- Zhang, J., van Witteloostuijn, A., & Zhou, C. (2005). Chinese bilateral intra-industry trade: A panel data study for 50 countries in the 1992–2001 period. *Review of World Economics*, 141, 510–540. <https://doi.org/10.1007/s10290-005-0041-9>
- Zebregs, H. (2004). *Intraregional trade in emerging Asia*. International Monetary Fund. https://www.google.co.in/books/edition/Intraregional_Trade_in_Emerging_Asia/DEgZEAAAQBAJ?hl=en&gbpv=0

Appendix

Figure A1. Trends in India's Merchandise Export and Import with China (in USD Billion)

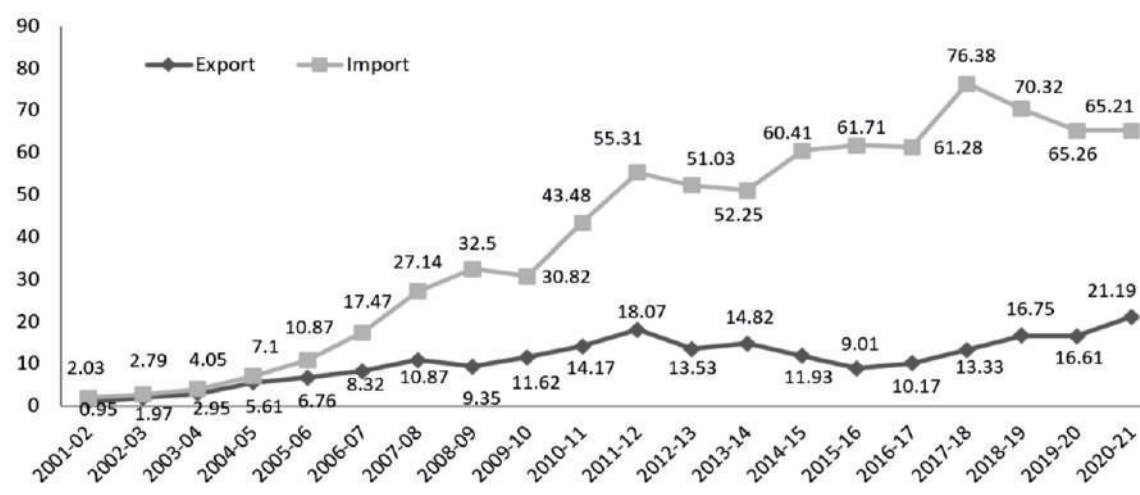
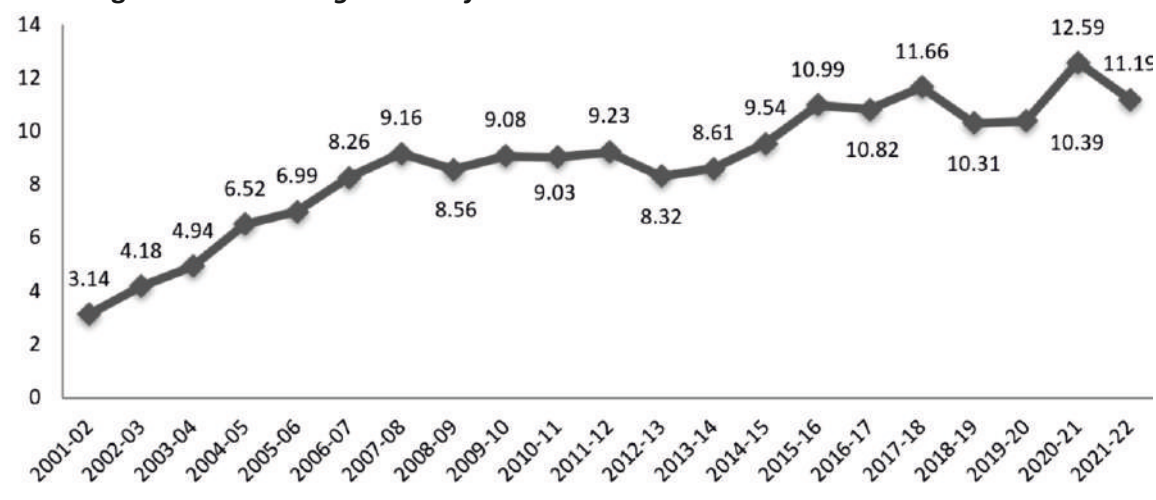


Figure A2. Percentage Share of India-China Bilateral Trade in India's Total Trade



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