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NATIONAL AND REGIONAL EFFECTS OF RCEP ON TRADE: THE APPLICATION OF THE WITS-SMART TOOL WITH THE FOCUS ON CHINA

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This paper investigates the effects of RCEP trade creation and trade diversion on China and its sectors, as well as the impact of imports and exports on provinces. The World Bank's World Integrated Trade Solution Software for Market Analysis and Restrictions on Trade (WITS-SMART) tool with the 2020 data, alongside the OECD Inter-Country Input-Output (ICIO) tables and the Chinese Multi-Regional Input-Output (MRIO) tables based on the 2017 data under two scenarios. The results of the study indicate that trade growth with Japan and South Korea is significant, on the one hand, whereas the trade effects with the ASEAN nations and regions such as Australia and New Zealand are relatively low, on the other. The research emphasizes the disparities between various regions in China, demonstrating that the Eastern coastal provinces obtain more trade benefits than the Central and Western areas. The study highlights the importance of implementing the policies encouraging collaboration in high-growth sectors and developing tailored strategies for regional advancement.

Keywords: China, Input-output tables, RCEP, SMART-WITS tool, trade creation and trade diversion

JEL Classification: F14, F15, F17

INTRODUCTION

Signed in 2020, the Regional Comprehensive Economic Partnership (RCEP) is a landmark free trade agreement (FTA) aimed at eliminating tariffs and fostering regional integration. As listed, Chapter 2 of the RCEP Agreement outlines the 20-year phased

reduction of tariffs on 90% of traded goods, forming the foundation of this study (Department of Foreign Affairs and Trade, 2020). Unlike the customs unions, RCEP operates as an FTA without a unified external tariff policy. Building on J. Viner's (1950) theory of trade creation and trade diversion, and P. Krugman's (1991) theory of New Economic Geography, the study examines how RCEP's tariff reductions influence trade creation and trade diversion on the example of China and its sectors, and regional import-export disparities.

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Regional trade agreements (RTAs) are transformative tools in reshaping global trade. With RCEP contributing over one-third of the global GDP, understanding its multidimensional impacts on China's trade capacity and regional dynamics is becoming imperative (Goswami, Khan, Labiba, Achol, Saha & Zulfikar, 2022; Rahman, Rahman, Manini & Sharma, 2024). Despite extensive research in RTAs, studies rarely offer insights into RCEP's multidimensional impacts, particularly for China. The existing literature predominantly addresses single sectors or aggregate national effects, regional disparities being often overlooked.

Building on these insights, this study further explores the dual national and regional implications of the RCEP for China. At the national level, RCEP is expected to broaden market access for Chinese products, particularly in the manufacturing sectors (Tran & Tran, 2023). Reduced tariffs and streamlined trade facilitation measures are likely to enhance the global competitiveness of Chinese goods (Mo & Nie, 2022). Regionally, the impact of the Agreement is anticipated to be uneven, favoring the coastal provinces with robust manufacturing bases, simultaneously posing distinct challenges for the inland regions with differing industrial profiles (Zuev, Ostrovskaya & Kuznetsov, 2023). A deeper assessment is essential to understand these disparities and develop targeted strategies.

To address the foregoing gaps, this study is guided by the three key hypotheses:

- H1: Tariff reductions by the RCEP member economies significantly enhance China's trade creation effects, whereas trade diversion effects remain lower than trade creation.
- H2: The impacts of RCEP on China's industries exhibit significant heterogeneity, with the high-tech and manufacturing sectors benefiting the most from trade creation, whereas the low-value-added industries face greater adverse effects from trade diversion.
- H3: RCEP impacts on China's imports and exports vary significantly across the provinces, with the coastal regions benefiting substantially more than the inland provinces.

The paper is organized as follows: Section 2 provides a review of the literature on RTAs, with the focus on the studies examining RCEP economic effects; Section 3 outlines the research methodology, and in Section 4, the results of the study are presented and interpreted. Finally, Section 5 concludes with the key findings and offers policy recommendations.

LITERATURE REVIEW

RTAs have long been recognized as pivotal tools in reshaping international trade patterns by reducing tariff and nontariff barriers. For instance, the development of the cross-border economic zones (CBEZ) has demonstrated a significant potential in fostering connectivity and economic cooperation in border regions, as observed in Vietnam's northern regions (Nguyen, Vu, Nguyen, Nguyen & Nguyen, 2019). The foundational work of J. Viner (1950) distinguishes the dual impacts of RTAs: trade creation, on the one hand, which fosters efficiency by encouraging trade among member states, and trade diversion, on the other, which shifts trade from more efficient nonmembers to less efficient members, potentially reducing overall welfare. Recent empirical studies have extended these theoretical insights, highlighting the effects of RTAs in different economic contexts (Franco-Bedoya & Frohm, 2022). In Asia, agreements like the ASEAN Free Trade Area (AFTA) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) have provided critical case studies demonstrating the transformative role of RTAs (Gaurav & Bharti, 2019).

Empirical research in RTAs often underscores the predominance of trade creation over trade diversion, particularly when member economies exhibit complementary industrial structures. M. Ando, S. Urata and K. Yamanouchi (2022) showed that Japan's FTAs had significantly enhanced bilateral trade volumes, particularly in the high-value sectors such as the electronics and automotive industries. However, H. Lee (2016) cautioned that the impact of trade diversion could broadly vary depending on the agreement's specific rules, such as the preferential

rules of origin. K. P. Timsina and R. J. Culas (2021) provided a detailed analysis of Australia's FTAs, illustrating how trade creation in agricultural exports initially had outpaced trade diversion effects, which had become more pronounced over time. This supports the hypothesis that RCEP's tariff reductions will significantly enhance China's trade creation effects (H1).

The effects of RTAs are often unevenly distributed across sectors and regions. S. L. Baier and J. H. Bergstrand (2007) demonstrated that the export-oriented sectors with higher global competitiveness tended to benefit disproportionately from trade agreements. In the context of Japan and South Korea, recent studies have shown that FTAs bolster sectors such as electronics, chemicals, and machinery due to their strong integration in global value chains (Xiu & Yu, 2022). Regionally, RTAs often favor coastal regions with advanced industrial bases and infrastructure. B. Mo and H. Nie (2022) observed similar patterns in China, where coastal provinces had gained significantly more from previous trade agreements compared to the inland regions. This heterogeneity underscores the importance of tailoring policies in order to address regional disparities.

Building on these insights, RCEP emerges as a significant case study for understanding the transformative role of RTAs in fostering trade integration in the Asia-Pacific region. Studies on RCEP highlight its ability to integrate a diverse array of economies, ranging from highly developed countries like Japan to emerging markets such as Vietnam. N. Rahman *et al* (2024) applied gravity models to predict significant increases in China's trade volumes with Japan and South Korea, driven by sectoral complementarities. Q. F. Zhang, X. Chen, J. L. Zhang and L. Cai (2023) emphasized the reduction in both tariff and nontariff barriers under RCEP, which is expected to enhance China's export competitiveness in the key industries such as electronics, textiles, and machinery. D. Ling and K. Qian (2023) further explored the RCEP's potential to boost China's digital trade and e-commerce sectors, highlighting its transformative implications for modern trade structures. These findings collectively

support the hypotheses H2 and H3, highlighting the sectoral heterogeneity and regional disparities in RCEP impacts.

In summary, the existing literature highlights the critical role of RTAs in reshaping trade patterns but often overlooks the multidimensional impacts of agreements like RCEP. By addressing these gaps, this study contributes to the understanding of RCEP trade effects at both the national and regional levels.

RESEARCH METHODOLOGY

Research design

This study employs a mixed methodological framework so as to analyze RCEP impacts on China's trade. Specifically, the World Bank's World Integrated Trade Solution Software for Market Analysis and Restrictions on Trade (WITS-SMART) is utilized in order to quantify trade creation and trade diversion effects, and supplement this with input-output analyses using the OECD Inter-Country Input-Output (ICIO) tables and the Chinese Multi-Regional Input-Output (MRIO) tables.

The WITS-SMART model

The WITS-SMART model quantifies the trade creation and trade diversion effects resulting from RCEP tariff reductions. Specifically:

trade creation is calculated as follows:

$$TC_{ijk} = M_{ijk} * \eta * \frac{\Delta_{ijk}}{(1+t_{ijk}) * (1+\eta/\beta)} \quad (1)$$

where

TC_{ijk} : trade creation,

M_{ijk} : imports,

t_{ijk} : the tariff,

η : the import elasticity of demand (system-defined),

β : the export elasticity of supply (99 by default),

i: commodity,
 j: the exporting country,
 k: the importing country;

trade diversion is calculated as follows:

$$TD_{ijk} = \frac{M_{RCEP} * M_{RoW} \left[\left(\frac{1+t_t}{1+t_0} \right) - 1 \right] * \lambda}{M_{RCEP} + M_{RoW} + M_{RoW} \left[\left(\frac{1+t_t}{1+t_0} \right) - 1 \right] * \lambda} \quad (2)$$

where

TD_{ijk} : trade diversion,

M_{RCEP} : the imported commodities from RCEP countries,

M_{RoW} : the imported commodities from the rest of the world,

t_t : the tariff (where t_0 and t_t represent the pre- and post-integration levels of the tariffs),

λ : the elasticity of substitution (1.5 by default).

This analysis directly supports the validation of the hypotheses H1 and H2, thus providing insights into the impacts on trade creation and trade diversion for China from both national and sectoral points of view.

IO tables

The IO framework including the ICIO tables and the Chinese MRIO tables complements the WITS-SMART analysis by capturing interregional trade linkages within China. The ICIO and MRIO tables offer a detailed view of an economy’s structural dynamics by revealing the intricate web of interconnections between various sectors of the economy. This aspect makes them particularly valuable for research focused on understanding the impacts of economic policies and their broader implications (Xing, Dong & Guan, 2017; Jia, Cao & Jia, 2023).

Equation (4) is an IO equation, where the vector x is the column vector representing the total output of each industrial sector. The matrix Z has the elements z_{ij} that denote the intermediate inputs from the sector i to the sector j . The vector y is the column vector signifying the final demand of each industrial sector, and the vector μ is the column vector indicating the external imports of each industrial sector.

$$\begin{bmatrix} x^1 \\ x^2 \\ \vdots \\ x^G \end{bmatrix} = \begin{bmatrix} z^{11} & z^{12} & \dots & z^{1G} \\ z^{21} & z^{22} & \dots & z^{2G} \\ \vdots & \vdots & \ddots & \vdots \\ z^{G1} & z^{G2} & \dots & z^{GG} \end{bmatrix} \mu + \begin{bmatrix} y^1 \\ y^2 \\ \vdots \\ y^G \end{bmatrix} \quad (3)$$

The direct consumption coefficient is defined as $a^{rs} = z^{rs} \times \text{diag}(x^r)^{-1}$, where the element a_{ij}^{rs} represents the value of the product from the sector i of the country r directly consumed in the production of one unit of the product by the sector j of the country s , with $\text{diag}(x^r)$ denoting the diagonal matrix whose diagonal elements are the elements of the vector x^r . At this point, Equation (4) can be abbreviated so as to read $X = A \times \text{diag}(A)\mu + Y$, i.e. $X = AX + Y$. Equation (4) can be rewritten as follows:

$$\begin{bmatrix} x^1 \\ x^2 \\ \vdots \\ x^G \end{bmatrix} = \left(I - \begin{bmatrix} a^{11} & a^{12} & \dots & a^{1G} \\ a^{12} & a^{22} & \dots & a^{2G} \\ \vdots & \vdots & \ddots & \vdots \\ a^{G1} & a^{G2} & \dots & a^{GG} \end{bmatrix} \right)^{-1} \begin{bmatrix} y^1 \\ y^2 \\ \vdots \\ y^G \end{bmatrix} \quad (4)$$

where x^r represents the total output of the sector r . z^{rs} represents the intermediate consumption of the sector r by the sector s , and y^r represents the final output of the sector r . This equation takes into account the interdependencies between the production sectors and includes imports through the vector μ , while the matrix A is the technical coefficient matrix reflecting the proportion of each sector’s output used to meet the demands of the other sectors.

The global trade effect can be calculated as follows:

$$\Delta X = (I - A)^{-1} \Delta Y \quad (5)$$

where ΔY equals the trade effect from Equation (3).

Equation (7) indicates the indirect trade effects:

$$\Delta O = \Delta X - \Delta Y \quad (6)$$

The total household consumption is as follows:

$$\Delta c_r = \{ (\sum_i \Delta O_i * W_{r,i}) * (1 - tx_r) \} (1 - s_r) \quad (7)$$

where

Δc_r : total household consumption,

$w_{r,i}$: the average wage per worker by the sector i and the region r ,

tx_r : the total household income tax rate by the region r ,
 s_r : the average household savings rate by the region r .
 In the above, $r \in \{1,2,\dots,n\}$ and $i \in \{1,2,\dots,n\}$

$$\Delta f^i = Q * \Delta c_r \quad (8)$$

The vector of the consumption shocks inducing effects $\Delta f^i_{(g^{n \times 1})}$ can be calculated as the product of the private consumption structure matrix $Q_{(g^{n \times g})}$ and the consumption vector for each region $\Delta c_{(g \times 1)}$.

Matrix Q equals as follows:

$$Q_{r,i} = \frac{c_{r,i}}{\sum_i c_{r,i}} \quad (9)$$

Exports from each region can be calculated as follows:

$$\Delta \text{Exports} = \widehat{ex}(I - A)^{-1} \Delta f \quad (10)$$

where

\widehat{ex} is export intensity, equaling exports over the total output. The data are estimated based on China's MRIO table.

Imports from each region can be calculated as follows:

$$\Delta \text{Imports} = \widehat{im}(I - A)^{-1} \Delta f \quad (11)$$

where

\widehat{im} is import intensity, equaling imports over the total output. The data are estimated based on China's MRIO table.

Data sources and scenario design

Data sources

The dataset for this research included 2020 transactional data from the WITS-SMART system chosen as the pre-pandemic baseline for assessing the impact of RCEP on China's trade creation and trade diversion. Standardized 2-digit Harmonized System (HS) codes were used to ensure precise sectoral analysis. China was set as the beneficiary, the other RCEP member economies being categorized according to their roles, utilizing the World Bank's classification system to organize over 90 sectors into 16 categories for the streamlined analysis.

For the ICIO analysis, the study used the 2017 OECD ICIO tables valued for their standardized, up-to-date data from the OECD and non-OECD countries. These tables facilitated reliable trade dynamics analysis and global value chain comparisons (Melnyk, Kubatko, Piven, Klymenko & Rybina, 2021). Additionally, the 2017 MRIO tables from the China Emissions Accounts and Datasets (CEADs) were employed, focusing on its 31 mainland provinces and 42 industries. This dataset highlights the interconnections between sectors and regions, offering a broader view of China's economic dynamics.

Scenario setting

The scenario design employed is based on the commitments outlined in Chapter 2, Article 2.4 of the RCEP Agreement, which states that each party shall progressively eliminate or reduce customs duties on originating the goods of the other Parties in accordance with its Schedule in Annex I (Schedules of Tariff Commitments). According to Annex I, the member countries commit to eliminating tariffs on at least 90% of traded goods progressively over a maximum period of 20 years. Therefore, Scenario 1 reflects the initial phase of trade liberalization, while Scenario 2 represents the full implementation phase, targeting comprehensive trade integration.

Scenario 1: During the initial phase, tariffs are reduced to zero for 25% of imports from Japan, 38.6% from Korea, 67.9% from ASEAN, 65.8% from Australia, and 66.1% from New Zealand. This reflects early-stage trade liberalization.

Scenario 2: In the full implementation phase, tariffs reach zero for 86% of imports from Japan and Korea, 90.5% from ASEAN, and 90% from Australia and New Zealand, demonstrating RCEP's goal of enhanced regional trade integration.

Model computation

The research hypotheses are addressed through the following steps:

Step 1: Using the WITS-SMART model, trade creation

and trade diversion are quantified under the two scenarios. The results are integrated with the OECD ICIO tables, forming a matrix of 7 regions, 37 sectors, and 2 stages.

Step 2: The Step 1 export shocks are applied to the ICIO tables so as to evaluate how trade changes indirectly affect various sectors through the supply chain linkages.

Step 3: The China MRIO table assesses RCEP's impact on regional imports and exports, highlighting provincial-level trade discrepancies.

This combined WITS-SMART and IO approach offers a detailed examination of trade creation, trade diversion, and regional disparities.

RESULTS AND DISCUSSION

Trade creation and trade diversion in China

The impact of trade creation and trade diversion brought to China by the RCEP member countries is presented in this section, as shown in Table 1 below.

Trade creation

Under S1, China's trade creation totaled USD 975 million. This figure is expected to significantly increase to USD 8.7 billion in S2, indicating the growing impact of the RCEP tariff reductions as the agreement progresses. Among the member countries,

Japan and South Korea contributed the most to trade creation in both scenarios. For instance, China generated USD 802 million and USD 159 million in S1 from Japan and South Korea, and the figures are projected to grow to USD 6.5 billion and USD 1.9 billion in S2.

Trade creation with the ASEAN countries also soared, increasing from USD 14 million in S1 to USD 60 million in S2. However, the overall contribution from ASEAN remained smaller compared to that from Japan and South Korea. Australia and New Zealand exhibited relatively limited trade creation effects, with the figures growing modestly from S1 to S2.

Trade diversion

Trade diversion effects are also significant, though smaller in magnitude compared to trade creation. In S1, China gained USD 835 million in trade diversion, which is estimated to escalate to USD 6.4 billion in S2. The key contributors to the trade diversion are Japan and South Korea. For example, China is forecasted to generate USD 4.8 billion and USD 1.5 billion in S2 from Japan and South Korea, compared to USD 654 million and USD 171 million in S1, respectively.

For the ASEAN countries, trade diversion is projected to grow from USD 10 million in S1 to USD 33 million in S2. Similarly, Australia and New Zealand showed minimum trade diversion effects, with incremental increases observed between the two scenarios.

Table 1 China's trade creation and trade diversion from the other RCEP member economies under the two scenarios

USD million	New Zealand		South Korea		Japan		Australia		ASEAN		Total	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
Trade Creation	0.01	0.04	159	1,963	802.00	6,506	0.40	235	14	60	975.41	8,764.04
Trade Diversion	0.02	0.07	171	1,543	654.00	4,797	0.38	53	10	33	835.40	6,426.07

Source: Authors, based on the WITS-SMART simulation

The sectoral analysis of trade creation and trade diversion

The following section presents that all Chinese industries have faced increased trade creation and trade diversion from S1 to S2. However, an in-depth study reveals that the distribution of trade creation and trade diversion across the industries is markedly uneven, as is shown in Table 2.

Japan

Japan is the biggest contributor to China's trade creation and trade diversion under RCEP, particularly in the high-tech and manufacturing industries, its contributions spanning all the three sectors, but being heavily concentrated in the secondary industries.

The primary sector

In the primary sector, Japan's contributions are modest but noteworthy, especially in the fuels industry. Trade creation and trade diversion in S2 amount to USD 75.4 million and USD 44 million, respectively, these effects reflecting Japan's capacity to supply refined petroleum products, which complement China's industrial demand. The other primary industries, such as animal and vegetable products, show negligible trade effects due to Japan's limited agricultural exports.

The secondary sector

Japan dominates the secondary sector, where the total trade creation reaches over USD 6.5 billion in S2. The machinery and electronics industry leads with the trade creation of USD 1.68 billion, driven by China's reliance on Japan for advanced machinery and electronic components. In the chemicals industry, trade creation and trade diversion are expected to surge from USD 296.5 million and USD 195.9 million in S1 to USD 1.4 billion and USD 745.2 million in S2, respectively, thus reflecting the growing demand for industrial chemicals in China. Additionally, the plastics and rubber industry generates the trade effects exceeding USD 600 million in S2, emphasizing Japan's position as the critical supplier of intermediate goods.

The tertiary sector

In the tertiary sector, Japan's contributions are primarily in Miscellaneous Goods and Textiles and Clothing, with the total trade creation and trade diversion effects of over USD 666 million and USD 186 million in S2, respectively. These industries highlight Japan's ability to integrate in China's value chains for consumer-oriented products. The trade effects in transportation and the other service-related industries remain at a minimum, indicating Japan's focus on manufacturing and goods.

South Korea

South Korea ranks second in terms of trade effects, with significant contributions in both the primary and secondary sectors, reflecting its advanced industrial base and regional integration under RCEP.

The primary sector

South Korea's contributions to the primary sector are primarily concentrated in the fuels industry. Trade creation and trade diversion in S2 are projected to reach USD 85.3 million and USD 89.7 million, respectively, these effects aligning with South Korea's role as the regional supplier of energy resources. The contributions to the other primary industries, such as animal and vegetable products, remain at a minimum, reflecting the country's industrialized economy.

The secondary sector

The secondary sector dominates South Korea's trade effects, with substantial growth in the key industries. In the chemicals industry, trade creation and trade diversion are expected to rise from USD 13.4 million and USD 16.7 million in S1 to USD 306.8 million and USD 137.7 million in S2, respectively, highlighting the increasing demand for South Korea's industrial chemicals. The machinery and electronics industry contributes significantly, with the total trade creation and trade diversion of USD 340.1 million and USD 360.4 million in S2, respectively, which reflects South Korea's position as the leading supplier of high-tech equipment and electronic components to China. The other secondary industries such as Metals and Plastics

and Rubber contribute moderately, emphasizing the diversified nature of South Korea's industrial exports.

The tertiary sector

In the tertiary sector, South Korea demonstrates competitive advantages in Textiles and Clothing and Transportation. The total trade creation and trade diversion in these industries are projected to increase to USD 156.5 million and USD 109 million in S2, respectively, these results indicating South Korea's ability to cater to China's demand for durable goods and intermediate materials, underscoring the integration of regional value chains.

Australia

Australia's trade contributions are concentrated in the primary sector with relatively limited impacts in the secondary and tertiary industries. Its trade effects under RCEP highlight its role as the key supplier of raw materials and agricultural products.

The primary sector

The animal products industry dominates Australia's primary sector contributions. Trade creation and trade diversion are estimated to rise to USD 228.8 million and USD 47.2 million in S2, respectively, driven by Australia's competitive livestock exports and China's growing demand for high-quality meat products. In the fuels industry, trade effects remain moderate, reflecting Australia's position as a supplier of coal and natural gas to China. Contributions to the other primary industries, such as vegetable and wood products, are at a minimum, reflecting Australia's focus on energy and livestock exports.

The secondary sector

Australia's impact in the secondary sector is negligible. Most industries, including chemicals, machinery, and textiles, show trade effects under USD 1 million. This limited impact reflects a lack of manufacturing complementarities between Australia and China under RCEP.

The tertiary sector

In the tertiary sector, Australia's contributions are at a minimum, with trade effects concentrated in the niche industries such as education and professional services, which are not captured in the current dataset, which highlights the resource-dependent nature of Australia's trade relationship with China.

New Zealand

New Zealand's contributions are the smallest among the RCEP members, focusing almost exclusively on the primary sector.

The primary sector

The animal products industry accounts for nearly all of New Zealand's trade effects under RCEP. Trade creation and trade diversion in S2 are expected to be less than USD 1 million, reflecting the country's small export volume and the niche focus on dairy and meat products. Contributions to the other primary industries are negligible, emphasizing New Zealand's narrow trade specialization.

The secondary and tertiary sectors

New Zealand has minimal impacts in the secondary and tertiary industries, with trade effects close to zero, which reflects the country's limited industrial base and focus on agricultural exports.

ASEAN

ASEAN countries significantly contribute to China's trade across all the three sectors, reflecting strong regional supply chain integration and trade facilitation under RCEP.

The primary sector

The vegetable products and wood products industries dominate ASEAN's primary sector contributions. Trade creation in the vegetable products industry is estimated to grow from USD 8.7 million in S1 to USD 36.8 million in S2, highlighting ASEAN's role as a supplier of raw materials for China's food and agricultural industries. Similarly, trade creation in the

wood products industry is estimated to increase to USD 2.4 million in S2, driven by ASEAN's supply of timber and related products.

The secondary sector

In the secondary sector, ASEAN's contributions are modest but diversified. The textiles and clothing industry is projected to generate trade creation of USD 9.2 million in S2, reflecting ASEAN's competitive advantage in low-cost manufacturing. The plastics and rubber industry is expected to contribute USD 0.4 million in trade creation in S2, emphasizing ASEAN's role in intermediate goods production. The other industries, such as chemicals and machinery, show limited contributions, underscoring the region's focus on light manufacturing.

The tertiary sector

ASEAN's role in the tertiary sector is limited, with trade creation in the transportation and miscellaneous goods industries totaling less than USD 10 million, which reflects the region's focus on goods trade rather than services.

The provincial-level impacts of imports and exports

This section illustrates the changes in imports and exports across China's different regions, as is shown in Table 3.

The eastern region

The eastern region, with its well-established industrial base and robust infrastructure, has experienced the most significant trade growth under RCEP. The region's performance is driven by its high concentration of export-oriented industries and advanced connectivity to global markets.

Guangdong: As China's leading exporting province, Guangdong exhibits the largest absolute trade growth. Imports are projected to rise from USD 461.7 million in S1 to USD 5.1 billion in S2, while exports are estimated to surge from USD 774.7 million to USD 8.6 billion. This remarkable growth is largely attributable to Guangdong's strong presence in

the high-value-added sectors such as electronics, machinery, and textiles. The province benefits from reduced tariffs under RCEP, which enhances its competitive edge in global supply chains. Notably, the gap between imports and exports broadened under S2, highlighting Guangdong's pivotal role as the manufacturing hub that attracts intermediate goods for processing and re-export.

Jiangsu: Jiangsu follows closely, with imports increasing from USD 261.5 million in S1 to USD 2.9 billion in S2, and exports rising from USD 414.5 million to USD 4.6 billion. Compared to Guangdong, Jiangsu demonstrates a more balanced trade profile, driven by its diversified industrial structure encompassing machinery, chemicals, and renewable energy components, which diversification allows Jiangsu to leverage RCEP tariff reductions across multiple industries, ensuring steady growth in both imports and exports.

Shanghai: As an international financial and trade hub, Shanghai is projected to achieve combined imports and exports of USD 8.35 billion in S2, which is up from USD 749 million in S1. While its total trade volume is slightly lower than Guangdong's, Shanghai's trade growth reflects its role as the key logistics and distribution center. The city's infrastructure facilitates efficient import-export processes, amplifying the positive impacts of RCEP trade facilitation measures.

When speaking about the regional comparison, Guangdong's dominance among the eastern provinces in export-oriented manufacturing gives it a competitive edge, while Jiangsu's diversified industries enable balanced growth. Shanghai's role as a logistics hub complements these production-driven provinces, highlighting the region's interconnected trade ecosystem.

The central region

Traditionally less export-focused, the central region exhibited substantial growth under RCEP, underscoring its emerging potential in trade. The region's gains are particularly notable in the provinces investing in industrial development and the infrastructure.

Table 2 Trade creation and trade diversion in various Chinese sectors from the RCEP members under the two scenarios, in USD million

	New Zealand				Australia				South Korea				Japan				ASEAN			
	TC		TD		TC		TD		TC		TD		TC		TD		TC		TD	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
Animal	0.0	0.0	0.0	0.0	0.0	228.8	0.0	47.2	0.0	90.1	0.0	4.4	0.0	27.0	0.0	7.3	0.0	0.0	0.0	0.0
Vegetable	0.0	0.0	0.0	0.0	0.4	4.4	0.4	4.3	3.5	7.3	3.0	7.4	0.8	27.6	0.4	6.0	8.7	36.8	0.0	0.0
Food Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	267.6	12.9	37.8	5.6	632.3	31.1	89.9	0.6	1.2	0.0	0.0
Minerals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6	153.7	4.5	12.7	0.0	0.0	0.0	0.0
Fuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.7	85.3	47.4	89.7	51.5	75.4	12.8	44.0	0.0	0.0	0.0	0.0
Chemicals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	306.8	16.7	137.7	296.5	1,414.6	195.9	745.2	0.0	1.4	0.0	0.0
Plas or Rubb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	250.2	9.3	281.7	33.5	611.4	44.7	644.7	0.0	0.4	0.0	0.0
Hides and Skins	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.5	0.0	50.8	0.0	8.5	0.0	27.0	0.0	3.1	0.0	0.0	0.0	0.0
Wood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.3	0.4	0.0	8.0	0.0	3.7	0.5	2.4	0.0	0.0
Text and Clot	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.5	7.0	94.3	8.0	51.9	15.0	186.8	8.5	127.0	3.1	9.2	0.0	0.0
Footwear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	3.7	0.0	6.9	0.0	4.2	0.0	0.0	0.0	0.0
Stone and Glas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	21.2	9.1	25.0	16.8	145.3	8.1	119.8	0.0	0.0	0.0	0.0
Metals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5	143.3	14.3	123.4	209.2	685.2	157.9	559.1	0.0	0.0	0.0	0.0
Mach and Elec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	43.9	340.1	49.3	363.4	131.3	1,683.8	146.1	1,631.2	0.0	4.9	0.0	0.0
Transportation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.2	0.0	57.1	2.2	155.2	2.0	169.9	1.2	4.1	0.0	0.0
Miscellaneous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	232.9	0.4	351.2	28.1	666.1	41.5	628.8	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.4	234.6	1.8	55.5	159.1	1,961.6	170.7	1,543.3	802.1	6,506.3	653.5	4,796.6	14.1	60.4	0.0	0.0

Source: Authors, based on the WITS-SMART simulation

Hubei: Hubei stands out in the central region, with the imports increasing from USD 12.4 million in S1 to USD 138.1 million in S2 and the exports rising from USD 68.5 million to USD 762.4 million. This growth is driven by the province's burgeoning automotive and electronics sectors, which benefit from reduced input costs due to RCEP tariff reductions. Hubei's strategic location as a transportation hub further facilitates trade, enhancing its integration in the regional supply chains.

Henan: Henan's imports are projected to grow from USD 27.5 million in S1 to USD 309.3 million in S2, while the exports are estimated to increase from USD 61.1 million to USD 680 million. The province's focus on light manufacturing and agriculture contributes to this growth, with RCEP enabling greater access to raw materials and intermediate goods. However, compared to Hubei, Henan's trade growth is more modest, reflecting its less developed industrial base.

Anhui: Imports in Anhui are expected to rise from USD 50.2 million in S1 to USD 558.2 billion in S2, while its exports are estimated to increase from USD 103.5 million to USD 1.2 billion. Anhui's growth is largely driven by its electronics and machinery industries, which have increasingly aligned with the RCEP member markets. The province also benefits from the policies encouraging industrial upgrading, making it a rising player in regional trade.

In terms of the regional comparison, Hubei's superior performance highlights the benefits of the well-established industrial base and the strategic location, while Henan and Anhui illustrate the potential for growth in the provinces investing in trade-oriented development. The central region's progress underscores its transition from a domestically oriented economy to an emerging player in international trade.

Table 3 The impact of RCEP on China's provincial imports and exports, in millions USD

Regions	S1			S2			Total
	Imports	Exports	Subtotal	Imports	Exports	Subtotal	
Beijing	247.18	195.22	442.40	2,753.06	2,173.71	4,926.77	5,369.17
Tianjin	313.02	199.20	512.22	3,486.80	2,217.62	5,704.42	6,216.63
Hebei	42.97	96.70	139.67	478.39	1,074.63	1,553.02	1,692.69
Shanxi	11.60	18.97	30.57	129.30	210.83	340.13	370.71
Neimenggu	34.97	32.96	67.93	390.14	366.80	756.94	824.87
Liaoning	196.91	126.98	323.90	2,189.01	1,415.75	3,604.76	3,928.65
Jilin	127.94	24.42	152.36	1,426.74	271.91	1,698.64	1,851.00
Heilongjiang	63.05	23.74	86.80	702.11	263.84	965.94	1,052.74
Shanghai	480.08	268.90	748.98	5,351.59	2,994.87	8,346.46	9,095.44
Jiangsu	261.52	414.46	675.98	2,908.46	4,604.73	7,513.19	8,189.17
Zhejiang	115.92	410.25	526.17	1,291.60	4,562.78	5,854.39	6,380.55
Anhui	50.16	103.54	153.70	558.52	1,152.06	1,710.58	1,864.27
Fujian	263.42	408.68	672.10	2,933.75	4,539.66	7,473.41	8,145.52
Jiangxi	24.93	139.99	164.92	277.43	1,554.98	1,832.41	1,997.33
Shandong	226.58	232.57	459.15	2,521.42	2,588.75	5,110.16	5,569.31
Henan	27.78	61.08	88.86	309.29	679.99	989.29	1,078.15
Hubei	12.40	68.53	80.93	138.09	762.44	900.53	981.46
Hunan	19.43	41.29	60.72	216.56	460.10	676.66	737.37
Guangdong	461.65	774.70	1,236.35	5,137.80	8,608.15	13,745.95	14,982.31
Guangxi	64.73	56.25	120.98	721.06	626.50	1,347.56	1,468.54
Hainan	37.74	43.05	80.80	419.86	479.41	899.28	980.07
Chongqing	63.65	150.29	213.95	709.30	1,673.80	2,383.10	2,597.05
Sichuan	22.91	41.35	64.26	255.28	460.36	715.64	779.91
Guizhou	62.16	51.42	113.58	692.06	571.97	1,264.03	1,377.61
Yunnan	17.99	43.93	61.92	200.47	489.31	689.79	751.71
Tibet	1.74	8.27	10.01	19.43	92.68	112.11	122.12
Shaanxi	22.86	52.59	75.45	254.61	585.41	840.01	915.46
Gansu	8.89	11.92	20.81	99.05	132.47	231.52	252.33
Qinghai	2.25	10.41	12.66	25.04	115.66	140.71	153.37
Ningxia	29.68	85.22	114.90	331.04	948.70	1,279.74	1,394.64
Xinjiang	152.72	52.61	205.33	1,693.54	584.35	2,277.89	2,483.22

Source: Authors, based on the ICIO and Chinese MRIO tables

The western region

While lagging behind the eastern and central regions, the western region showed notable growth under RCEP in absolute trade volumes. This progress highlights the potential for trade-led development in less industrialized areas.

Sichuan: Sichuan's exports are projected to grow from USD 41.4 million in S1 to USD 460.4 million in

S2, while the imports are expected to increase from USD 22.9 million to USD 255.3 million. The province's growth is fueled by its agricultural exports and the emerging electronics manufacturing sector. RCEP tariff reductions provide Sichuan with greater market access for its agricultural products, while its electronics sector benefits from lower input costs.

Yunnan: Yunnan is expected to achieve imports of USD 200.5 million and exports of USD 489.3 million in S2, which is up from USD 18 million and USD 43.9 million in S1, respectively. The province's proximity to the ASEAN markets positions it as the key trade partner within the RCEP framework. Agricultural products, including rubber and coffee, dominate Yunnan's exports, reflecting its comparative advantage in the resource-based sectors.

Guizhou: Guizhou is projected to generate imports of USD 692.1 million and exports of USD 572 million in S2, which is a substantial increase from USD 62.2 million and USD 51 million in S1, respectively. The province's trade is primarily driven by its mineral resources and the emerging light manufacturing industries. However, the limited infrastructure yet remains a constraint on further growth.

In terms of the regional comparison, among the western provinces, Sichuan's diversified trade profile gives it a slight advantage over the resource-dependent provinces such as Yunnan and Guizhou. The western region's growth underscores the importance of continued investments in the infrastructure and industrial diversification to fully capitalize on the RCEP benefits.

The RCEP agreement has led to diverse trade impacts across China's regions. With its strong industrial base and connectivity, the eastern region remains the primary beneficiary, driving national trade growth. The central region demonstrates a substantial potential, supported by industrial upgrading and strategic investments. Although starting from a lower base, the western region shows promising progress, particularly in agriculture and resource-based exports. These findings emphasize the need for region-specific policies to address disparities and maximize the benefits of regional economic integration under RCEP.

CONCLUSION

This study examines the national and regional impacts of RCEP on China's trade, focusing on trade

creation and diversion, sectoral disparities, and provincial-level changes. The results obtained in this study are indicative of the following main findings, namely:

Trade creation significantly exceeds trade diversion, with Japan and South Korea contributing the most to trade creation effects.

The high-tech and manufacturing sectors benefit the most, while the low-value-added industries experience smaller gains or even adverse effects.

Regional disparities are evident, with the coastal provinces such as Guangdong and Jiangsu achieving the biggest trade gains compared to the more modest growth in the inland regions.

Based on these findings, several policy recommendations are proposed.

Strengthening partnerships with the key RCEP members such as Japan and South Korea is critical, particularly in the high-tech sectors such as machinery and electronics. These collaborations can enhance China's industrial capabilities and its global competitiveness.

In a similar fashion, the ASEAN countries present the untapped potential in both the emerging and established sectors. Strengthening supply chain integration with ASEAN, particularly in renewable energy and advanced manufacturing, could yield substantial mutual benefits. As A. T. Nguyen and T. M. T. Tran (2021) emphasized, trade facilitation measures, including the reduction of nontariff barriers and improvements in institutional coordination, are critical for fostering regional supply chain integration and enhancing trade flows. These efforts should be coupled with exploring partnerships in rapidly evolving sectors so as to diversify trade opportunities and promote technological innovation.

In terms of regional development strategies, the uneven distribution of RCEP benefits across China's regions necessitates region-specific policy interventions to bridge the development gaps and maximize the economic potential of the agreement.

In the eastern region, which already benefits from the robust industrial bases and the strong export capabilities, policies should prioritize fostering the innovation-driven industries. Upgrading the high-value-added sectors such as advanced manufacturing and digital services will consolidate the region's role as a global manufacturing and trade hub.

For the central region, investments in the infrastructure and industrial modernization are critical to attract trade and investment. Policy support should focus on nurturing emerging industries like automotive and electronics to position the region as the key player in domestic and international value chains.

While lagging behind in trade volumes, the western region holds a significant potential for growth through strategic infrastructure development. Enhancing connectivity, both domestically and internationally, will facilitate the integration of the resource-based industries and light manufacturing into regional and global supply chains. Encouraging trade-oriented diversification can further elevate the region's economic profile.

Addressing industry-specific challenges. Sectoral heterogeneity in RCEP trade impacts necessitates tailored support for the industries faced up with unique challenges. Vulnerable sectors, particularly in the primary and tertiary industries, require targeted subsidies or tariff adjustments so as to mitigate potential adverse effects and enhance resilience. For instance, the resource-based industries in the primary sector may benefit from the policies aimed at improving efficiency and value addition.

While showing strong trade effects, the secondary sector should prioritize diversification to reduce dependency on high-tech imports. Encouraging the development of domestic capabilities in the key sectors such as machinery and chemicals will enhance self-sufficiency and support long-term industrial growth.

Limitations do exist in this research. This study relies on the pre-pandemic data potentially limiting its applicability to the post-COVID-19 trade dynamics. Future research should explore updated datasets to capture RCEP evolving impacts.

This study primarily focuses on tariff reductions, leaving nontariff barriers and broader legislative changes under RCEP unexplored. Considering the factors such as trade facilitation measures, regulatory harmonization, and digital trade agreements could provide a broader understanding of the RCEP effects.

The static models employed in this research study effectively capture the immediate impacts of RCEP. However, expanding the analysis in order for it to include dynamic models could reveal the long-term evolution of trade flows and economic interdependencies. Additionally, the parameter settings of the model need to be more realistic in the future. For example, export elasticity in the WITS-SMART tool is set to 99 by default and cannot be changed, which is an idealized setting.

By addressing these limitations, future research can deepen our understanding of RCEP multifaceted impacts, offering more precise guidance for policymakers navigating the complexities of regional economic integration.

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