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Research on the Impact of RCEP on China's Manufacturing Output and Trade: Based on GTAP Simulation

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Abstract

The signing of RCEP is a milestone for regional economic integration in East Asia. This paper aims to seize the opportunities brought by RCEP to China's manufacturing industry and promote the high-quality development of China's manufacturing industry. Therefore, the paper sets up three simulation scenarios, uses GTAP10 to simulate the impact of RCEP on China's subdivided manufacturing industry, and further explores the impact of RCEP on China's manufacturing industry with different technical levels. The results show that: 1) The reduction of intra-regional trade costs under tariff concessions will promote the increase of output, import and export trade in most of the manufacturing sectors in China; 2) When the tariff is zero, it will obviously promote the import and export of low-tech and medium-high-tech industries in the region. In order to better grasp the benefits of RCEP, we need national policy support and the improvement of the core competitiveness of enterprises.

Keywords

RCEP, China's Manufacturing, GTAP, Tariff Concession

1. Introduction

The world is currently experiencing the greatest change ever seen in a century. Counter-globalization, China-US economic and trade conflict, and the new crown epidemic bring more uncertainty. With the intensification of globalization, more and more countries are beginning to accelerate the process of regional economic integration. According to WTO, more than 350 FTAs have been reached internationally, and China has signed 19 FTAs with 26 countries or re-

gions so far. As a core power in East Asia, China has been trying to strengthen ties with its neighbors to promote regional economic integration.

After eight years of hard negotiations, RCEP was jointly signed by China, ten ASEAN countries, Japan, South Korea, Australia and New Zealand on November 15, 2020. It means that the world's largest free trade area has successfully set sail. RCEP will have great significance to the deepening of regional economic integration, the recovery and stability of the global economy in the post epidemic era. In addition, it will provide a key institutional cooperation platform to achieve a higher level of opening to the outside world and build a new development pattern of "double circulation" for China.

The economic structure of RCEP is highly complementary. Therefore, each member can give full play to its own resource endowment advantages and promote the further deepening of the industrial division of labor and cooperation system. RCEP makes a high-level commitment to the liberalization of the manufacturing industry. Japan, Australia and New Zealand are basically fully open in the manufacturing industry except for a few sensitive areas. Therefore, RCEP provides important development opportunities for the development of China's manufacturing industry. It is conducive to the optimization and upgrading of China's manufacturing industrial structure and the formation of new development advantages at a higher level. How to seize the opportunities and better meet the challenges brought by RCEP has become particularly important for the high-quality development of China's manufacturing industry. Based on this, the paper analyzes the possible impact of tariff concessions, cumulative rules of origin and investment rules on China's manufacturing industry in RCEP. Then the paper uses GTAP model to simulate the impact of tariff reduction on China's manufacturing industry output and import and export trade after the real implementation of RCEP. Furthermore, this paper analyzes the impact of RCEP on low-tech, medium and high-tech manufacturing. It has certain practical significance to provide corresponding countermeasures and suggestions for China's manufacturing industry to seize the historical opportunities brought by RCEP.

2. Literature Review

RCEP officially entered into force on January 1, 2022. So far, 12 countries have entered into force, including Brunei, Cambodia, Laos, Singapore, Thailand, Vietnam, China, Japan, New Zealand, Australia, South Korea and Malaysia. RCEP's formal implementation of the East Asian production network will not only provide new impetus and support to the world economy impacted by COVID-19 and trade protectionism, but also reduce the tariff and non-tariff barriers between member countries, so that the unified market can be established and the production network can be optimized (Ping, 2020; Xu, 2020).

The research of domestic and foreign scholars on RCEP has laid a solid foundation for the research of this paper. Hertel (1997) used GTAP to study the spe-

cific impact of regional integration at first. Ianchovichina et al. (2000) showed that the economic crisis had a negative impact on regional investment in East Asia through dynamic GTAP research. Corong et al. (2017) comprehensively elaborated its application scope on the basis of comprehensively improving GTAP. Itakura & Lee (2019) introduced the global value chain into the general equilibrium model to compare the economic effects of RCEP and CPTPP on Asian countries. Qian & Wang (2019) thought that RCEP can realize the trade interests of members through the complementary advantages among industries, while China, Japan and South Korea can realize the transformation of industrial structure through the multi axle effect of RCEP.

In terms of research methods, since the RCEP has only come into force recently, most of the existing literature predicted and evaluated its economic effects by establishing a computable general equilibrium model (CGE model). In the past, scholars often used the global trade analysis model (GTAP model), and this paper also used the GTAP model. Rahman & Ara (2015) and Li et al. (2018) used the general equilibrium model to study the potential impact of RCEP on the economies of South Asian countries and China. The study shows that RCEP has significant trade and welfare effects on China. Chen & Ni (2014) and Qian (2021) used GTAP to analyze the macroeconomic, trade and industrial effects of the establishment of RCEP on major countries inside region, finding that it will promote the increase of import and export trade and economic output of RCEP. Du & Liu (2020) focused their research on the world manufacturing industry, and found that RCEP will significantly affect the division of labor and layout of the world manufacturing industry and increase China's manufacturing exports. Qiu et al. (2022) took China's service trade as the research object and estimated the impact of RCEP signing on China's service trade based on the structural model. The research results show that RCEP will strengthen the service trade links among RCEP members.

Meng et al. (2018), Lu et al. (2021) and Li & Hu (2021) further focused their research on China's manufacturing industry. Meng et al. (2018) discussed the trade competitiveness and complementarity of electromechanical products between China and other RCEP members, and found that RCEP plays a positive role in promoting the export of electromechanical products in China based on GTAP. Li & Hu (2021) found that RCEP will drive the adjustment of China's traditional manufacturing advantageous industries, and then promote the transformation and upgrading of China's overall industrial structure. Lu et al. (2021) simulated and found that the reduction of tariff barriers will intensify regional competition and cause some negative impacts on some manufacturing enterprises in China.

Combing the existing literature, it is found that scholars have studied the impact of RCEP on the global manufacturing division of labor, sectoral output, import and export scale, and the evaluation of the impact on the economic effect of China's manufacturing industry. However, few scholars further subdivide China's manufacturing industry and explore the specific impact of RCEP on China's man-

ufacturing industry at different technological levels. Based on this, we expand the previous research to further explore the impact of RCEP tariff reduction on low-tech manufacturing, medium and high-tech manufacturing and high-tech manufacturing. China is a large manufacturing country and plays an important role in the regional economic integration of East Asia. The signing of RCEP is both an opportunity and a challenge for the development of China's manufacturing industry. Therefore, studying the impact of the signing of RCEP on China's subdivided manufacturing industry has important guiding significance for China to make full use of the dividends brought by RCEP.

3. Possible Impact of RCEP on China's Manufacturing Industry

RCEP has 20 chapters, including trade in goods, rules of origin, customs procedures and trade facilitation rules, which greatly covers all aspects of trade, investment and facilitation. This paper mainly discusses the possible impact of RCEP on China's manufacturing industry from three aspects: tariff concession of goods trade, principle of accumulation of origin and investment rules.

3.1. Tariff Concession for Trade in Goods

China is the world's largest exporter of goods. Tariff concession for trade in Goods will have an impact on Chinese enterprises to a certain extent. After RCEP officially came into force, China promised that more than 90% of the trade in goods in the region would eventually achieve zero tariff, including zero tariff immediately and zero tax reduction within ten years, which is the most core and direct benefit of RCEP. Tariffs have the most direct impact on the relevant industries of importing and exporting countries. On the whole, RCEP's tariff concession will first effectively reduce the price of products and the cost of trade in the region. The lower price of products will increase the demand for relevant products in the region, thus import and export of relevant products will be promoted. The increase of trade of relevant products in the region will also reduce the relevant trade outside the region. In addition, the reduction of import tariffs on many raw materials and parts will further improve the liquidity of production factors and commodities in the region, reduce the production costs of enterprises, and further drive the output of relevant product departments to increase with the increase of export demand of relevant products.

3.2. Accumulation of Origin

The rules of origin of RCEP determine whether the goods have the origin qualification of RCEP and whether they can enjoy the preferential tariff treatment of RCEP. "Accumulation of origin" means that when determining the origin qualification of products, it is allowed to treat the original materials of other RCEP members used in product production as the original materials of the product producing country, and calculate the regional value components of the original materials. This will make it easier for the final product to meet the set conditions

and obtain the origin qualification, so as to enjoy preferential tariffs.

According to the rules of origin of value-added, the labor-intensive assembly and processing industry may benefit first, and intermediate product manufacturers such as semi-finished products and parts will further benefit. However, it may also promote the transfer of labor-intensive industries to ASEAN countries with lower costs, so as to speed up the reconstruction of regional industrial chain and supply chain. In addition, the rule of origin accumulation is conducive to countries in the region to more flexibly adjust the layout of industrial chain supply chain based on resource endowment and market advantages, and promote the formation of a more stable and competitive regional industrial chain division and cooperation system. At the same time, it will further promote the overall investment attraction of petroleum and chemical industry, especially the layout of machinery and electronic equipment. The cumulative rules of origin of RCEP can also effectively offset the negative impact of cptpp rules of origin constraints on China's export enterprises, which is conducive to China's product export, and is more conducive to China's traditional manufacturing enterprises to make up for their shortcomings and open up the global industrial chain.

3.3. Rules of Investment

Investment rules include investment protection, liberalization, promotion and facilitation. Among them, investment liberalization clauses mainly include most favoured nation treatment, negative list of investment, etc.; Investment protection clauses mainly include fair and just treatment, loss compensation, etc; Investment facilitation clauses mainly include dispute prevention and coordination and settlement mechanism of foreign complaints. Its focus is on investment protection and investment promotion.

In the post epidemic era, RCEP's investment rules will be helpful to alleviate the impact of the epidemic on investment in countries in the region, making the investment environment in the region more stable, open and transparent, which is more conducive to attracting investment outside the region. RCEP invests in the manufacturing sector in the form of a negative list, and Japan, Australia and New Zealand are basically fully open in manufacturing except for a few areas. The high-level commitment to opening up further reduces the threshold of market access, helps to promote the integration of upstream and downstream industries in the region, and provides important opportunities for RCEP Member States to attract investment. For the negative list system of RCEP agreement, China's small and medium-sized private enterprises can seize the opportunity, combine their own development advantages, increase the pace of "going global", optimize the investment layout of China's enterprises, and further expand China's foreign investment market. For China's manufacturing industry, it can rely on its own resource advantages to attract foreign investment and promote its own development, but it is more important to improve its international competitiveness and better go global.

All in all, the rules of tariff concession in goods trade, cumulative rules of origin and investment rules will have a certain impact on the relevant industries of China's manufacturing industry. The gradual zero tariff policy of goods trade will have the most significant impact on the trade cost of goods in the region. Secondly, it will further promote the export of the textile industry, but at the same time, the fierce competition will also make the light industry face greater challenges. The cumulative rules of origin may make labor-intensive industries benefit first, which is conducive to promoting the development of relevant industries and promoting the reconstruction of the global industrial chain. Investment rules will play an important role in promoting the introduction of foreign capital into China's manufacturing industry and better going global.

4. GTAP Simulation Analysis

4.1. GTAP Model Introduction and Simulation Scenario Setting

Johansen, a Norwegian economist, established a Computable General Equilibrium model (CGE) based on Wallace's general equilibrium theory and combined with actual economic data. The GTAP model is a global multi-country (regional) multi-sector comparative static CGE model developed by Purdue University, USA. Since its development, it has been widely used in research on global trade, regional trade agreements, energy policy, agricultural policy and so on. Run GTAP and GTAP database are the two main bodies of the model. The data in the model database are mainly from the World Bank Development Indicators, the UN comtrade database, etc.

The quantitative analysis is based on the GTAP 10. The GTAP database covers 65 products and 141 regions. This paper divides the GTAP database into 10 regions, including China (meaning mainland China), Japan, Korea, Australia, New Zealand, India, ASEAN, USA, EU and Rest of the World. The 65 industrial sectors were grouped into agriculture, extractive industries, services and manufacturing. Agriculture includes 20 sectors, extractive industries include 6 sectors, services include 20 sectors and manufacturing is 19 sub-sectors of manufacturing (as shown in Table 1).

Table 1. 19 manufacturing industry segments.

No.	Industry	No.	Industry	No.	Industry
1	TEX	8	FMP	15	NMM
2	WAP	9	ELE	16	OME
3	LEA	10	EEQ	17	MVH
4	LUM	11	P_C	18	OTN
5	PPP	12	CHM	19	OMF
6	I_S	13	BPH	——	——
7	NFM	14	RPP	——	——

Note: The author classifies the industry according to gtap10 database.

To further analyze the impact of RCEP on manufacturing industries at different skill levels, the 19 manufacturing segments were divided into low-technology, medium-high-technology and high-technology manufacturing industries, as shown in Table 2.

In terms of policy simulation, this paper uses the import tariff rate tms as the shock variable (tariffs are the only shock variable, and the impact of other factors such as non-tariff barriers on the model is not considered) to simulate the impact of mutual tariff reductions among members on China's manufacturing output, import and export trade in various sectors after the formal implementation of RCEP.

Three simulation scenarios are set out:

1) 50% tax reduction among RCEP members;

2) 80% tax reduction among RCEP members;

3) 100% tariff reduction among RCEP members.

4.2. Simulation Results and Analysis

1) Output changes of China's manufacturing industry

Table 3 shows that the output changes of China's 19 subdivided manufacturing sectors under different tax reduction schemes. Firstly, under the three tax reduction schemes, the output of China's textile, clothing, leather products and other transportation equipment sectors will increase. Among them, the output of the garment industry increased the most, with changes of 0.83%, 1.33% and 1.66% respectively. Secondly, the change ratio of papermaking and printing, gasoline and coal, chemicals and basic pharmaceutical products is negative, which shows that the tax reduction among RCEP member countries will bring negative effects to these industries. The output change of automobiles and accessories has the greatest negative impact, with a negative change ratio of −0.59%, −0.94% and −1.17%. On the whole, without considering the influence of other factors, with the gradual improvement of trade liberalization and facilitation, the output of China's subdivided manufacturing industry is more and more affected. Among them, the import scale of automobiles and accessories changed by 54.74% and 44.49% respectively.

Table 4 shows that the changes in China's manufacturing output at different technology levels under different tax reduction options after the formal implementation of RCEP. It can be seen that the output change of low-tech manufacturing

Table 2. GTAP 10 manufacturing sector classification.

No.	Industries	Industries Included
1	low-technology manufacturing industries	TEX, WAP, LEA, LUM, PPP, OMF
2	medium-high-technology manufacturing industries	P_C, CHM, BPH, RPP, NMM, I_S, NFM, FMP
3	high-technology manufacturing industries	RPP, EEQ, OME, MVH, OTN

Note: The author classifies the industry according to gtap10 database.

Table 3. China's output changes in manufacturing under three simulation scenarios.

Industries	Simulation 1	Simulation 2	Simulation 3
TAX	0.19	0.31	0.39
WAP	0.83	1.33	1.66
LEA	0.3	0.48	0.6
LUM	−0.04	−0.07	−0.09
PPP	−0.09	−0.14	−0.17
P_C	−0.06	−0.09	−0.11
CHM	−0.38	−0.6	−0.75
BPH	−0.05	−0.08	−0.1
RPP	−0.33	−0.53	−0.66
NMM	−0.02	−0.03	0.03
I_S	−0.13	−0.21	−0.26
NFM	−0.25	−0.4	−0.5
FMP	−0.15	−0.24	−0.3
ELE	−0.3	−0.48	−0.6
EEQ	−0.03	−0.05	−0.07
OME	−0.13	−0.21	−0.26
MVH	−0.59	−0.94	−1.17
OTN	0.19	0.3	0.38
OMF	−0.18	−0.29	−0.36

Data source: GTAP10 simulation results.

Table 4. China's output changes in manufacturing sector at different levels of technology.

Industries	Simulation 1	Simulation 2	Simulation 3
low-technology manufacturing industries	0.41	0.66	0.83
medium-high-technology manufacturing industries	−0.19	−0.3	−0.37
high-technology manufacturing industries	−0.36	−0.58	−0.73

Data source: GTAP10 simulation results.

industry is positive, with changes of 0.41%, 0.66% and 0.83% respectively. The output changes of medium and high-tech manufacturing and high-tech manufacturing are negative, and the negative change range of output of high-tech manufacturing is greater than that of medium and high-tech manufacturing. It shows that medium-high-technology manufacturing industries and high-technology manufacturing industries still lack international competitiveness to a certain extent. With the increasing reduction of import tariffs and the improvement of trade liberalization, it will have a further impact on the output scale of this kind of manu-

facturing industry.

2) Changes in the import scale of China's manufacturing industry when the tariff is zero

Since the tariff of goods in RCEP will be zero eventually, we will mainly discuss the change in the scale of China's manufacturing imports from other countries when the tariff is zero.

Table 5 shows that it will greatly promote the import of China's subdivided manufacturing industries from Japan and South Korea when the tariff is zero. Specifically, the textile, clothing, leather products, automobile and accessories industries have greater changes. Among them, the import scale of automobiles and accessories changed by 54.74% and 44.49% respectively. At the same time, it can be seen that the reduction of tariffs in the region promotes the increase of China's manufacturing imports to countries in the region, while the imports of the United States and the European Union outside the region decrease accordingly. Imports to the US, EU and the rest of the world in sectors such as textiles,

Table 5. Changes in the import scale of China's subdivided manufacturing industry from other countries when the tariff is 0.

	JPN	KOR	AUS	NZL	IND	ASEAN	US	EU	ROW
TEX	43.09	44.51	47.27	−15.74	25.09	−3.33	−7.71	−8.36	−7.89
WAP	83.52	75	91.36	−12.11	77.67	1.81	−4.95	−5.68	−5.24
LEA	58.43	46.7	31.75	−7.77	55.81	1.12	−2.18	−2.8	−2.23
LUM	12.29	18.37	−4.38	−1.83	15.72	1.33	1.97	1.38	1.69
PPP	12.27	23.5	2.61	0.67	37.48	5.78	0.31	−0.15	0.13
I_S	14.92	15.21	12.11	−3.97	15.8	2.23	−2.57	−2.63	−2.56
NFM	21.21	18.45	26	−10.35	30.87	−2.22	−3.99	−4.51	−4.27
FMP	13.69	13.76	22.41	−6.28	33.16	−0.77	1.36	0.73	1.12
ELE	26.65	23.35	29.63	−14.94	39.69	12.36	−8.23	−8.8	−8.5
EEQ	35.87	36.05	41.66	−12.95	34.21	−8.35	−6.67	−7.29	−6.96
P_C	11.16	15.89	−1.83	−9.67	11.53	−3.74	−3.27	−3.76	−3.5
CHM	9.45	18.98	−3.92	−7.96	4.01	−1.55	1.14	0.53	0.91
BPH	31.88	26.78	24.84	−12.95	52.89	−5.72	−5.18	−5.78	−5.48
RPP	13.41	11.68	5.36	−13.51	22.36	−5.86	−4.18	−4.97	−4.53
NMM	19.32	27.63	33.17	−13.63	41.59	−4.72	−4.93	−5.65	−5.42
OME	20.09	10.55	34.05	−9.66	40.97	−3.96	−2.83	−3.54	−3.2
MVH	57.74	44.49	38.24	−14.76	30.03	12.47	−9.07	−9.44	−9.4
OTN	30.87	19.33	98.77	−7.2	50.89	−0.04	0.98	0.33	0.66
OMF	49.33	14.55	46.9	−9.46	17.22	−2.37	−1.42	−2.26	−1.84

Data source: GTAP10 simulation results.

garments, non-ferrous metals and power equipment all showed negative movements, with China's imports of these manufacturing segments shifting to RCEP members. This is because Japan and Korea are advanced material manufacturing centers, Japan has a strong industrial scale and competitive ability in machinery parts and components, and the significant reduction in trade costs will make China's imports of related products increase, and will also promote the development of China's related machinery manufacturing industry.

Table 6 shows the changes in the import scale of low-tech manufacturing, medium and high-tech manufacturing and high-tech manufacturing to countries when the tariff is zero. Firstly, from the perspective of low-tech industries, tariff cuts will increase imports to Japan, South Korea, Australia, India and ASEAN. Among them, the increase in imports to South Korea is the largest. When the tariff is zero, the import scale will change positively by 40.18%. Secondly, from the perspective of medium and high-tech manufacturing industry, the maximum positive change ratio of imports from Japan is 20.01%. Thirdly, from the perspective of high-tech manufacturing industry, the largest positive change in the scale of imports from Australia is 29%. Imports from New Zealand, ASEAN, the United States, the European Union and other parts of the world will be reduced. In general, compared with other countries, the import increase of China's manufacturing industry from Japan, South Korea and India changes greatly. With the deepening of trade relations among member countries, the implementation of RCEP can provide RCEP members with a broader export market, which will play a great role in promoting the friendly bilateral relations between China and RCEP members.

3) Changes in the export scale of China's manufacturing industry to various countries when the tariff is zero

Table 6. Changes in the import scale of China's manufacturing industry from various countries with different technical levels.

	low-technology manufacturing industries	medium-high-technology manufacturing industries	high-technology manufacturing industries
JAP	38.78	20.01	24.29
KOR	40.18	19.04	12.98
AUS	11.48	−0.92	29.00
NZL	−3.13	−8.12	−11.04
IND	28.57	16.39	35.42
ASEAN	0.11	3.29	−4.41
US	−1.65	−2.59	−4.39
EU	−2.56	−3.17	−5.28
ROW	−2.01	−2.79	−4.84

Data source: GTAP10 simulation results.

Table 7 shows that the exports of China's manufacturing industries to Japan, South Korea and Australia will increase when the tariff is zero. For Japan, the change in exports of clothing and leather products will be significantly greater, with changes of 26.29% and 36.03% respectively. RCEP is the first agreement between China and Japan to establish free trade relations, opening up China's export market to Japan, and Japan is an important exporter of clothing in China, so the tariff reduction will greatly promote the export of China's garment industry to Japan. Textile, clothing, leather products change of 33.24%, 41.2%, and 35.76% in South Korea, RCEP will relatively promote the export of these industries. The export scale of metal products, chemical products and basic medical products to ASEAN countries moved −2.78%, −1.34% and −0.12% respectively, probably due to the high similarity with the economic structure of ASEAN countries, these industries in Japan and Korea are more competitive than China, so some countries in ASEAN turned to import from Japan and Korea.

Table 7. Changes in the export scale of China's subdivided manufacturing industry to various countries when the tariff is zero.

	JPN	KOR	AUS	NZL	IND	ASEAN	US	EU	ROW
TEX	5.18	33.24	24.5	2.28	48.76	5.96	−3.05	−3.27	−2.95
WAP	26.29	41.2	23.6	4.65	48.66	15.49	−3.98	−3.22	−2.72
LEA	36.03	35.76	11.14	−3.36	42.77	15.71	−2.77	−4.13	−3.17
LUM	10.71	21.26	22.43	−0.01	36.36	6.15	−3.26	−3.08	−2.95
PPP	3.44	5.42	19.62	1.52	40.46	4.92	−2.5	−2.75	−2.55
I_S	1.01	16.03	0.2	−1.58	26.37	5.88	−1.04	−0.97	−1.01
NFM	1.93	28.14	12.17	−0.13	26.66	0.15	−1.96	−2.22	−2.15
FMP	1.77	28.31	1.1	0.05	29.07	−2.78	−3.91	−3.73	−3.81
ELE	4.5	28.03	21.96	−1.14	27.43	17.79	−1.91	−2.49	−2.02
EEQ	3.3	24.73	15.92	0.59	27.43	13.8	−2.09	−2.48	−2.16
P_C	4.53	3.39	10.14	−2.2	21.29	0.38	−1.51	−2.26	−1.48
CHM	8.47	33.8	28.82	−2.51	48.74	−1.34	−3.22	−3.61	−3.32
BPH	5.05	17.14	23.6	−0.11	39.83	−0.12	−2.34	−3.11	−2.61
RPP	3.74	8.98	3.73	1.3	3.87	2.65	−0.65	−0.63	−0.48
NMM	4.98	31.53	17.34	−1.9	38.23	5.89	−1.77	−2.36	−1.8
OME	6.01	27.7	21.16	−2.12	31.18	2.22	−1.61	−2.38	−1.98
MVH	6.01	32.86	5.31	−6.97	41.1	7.03	0.18	−0.88	0.1
OTN	4.54	17	27.64	−2.09	62.67	15.78	−1.64	−2.54	−1.93
OMF	5.85	23.55	21.34	−1.04	45.02	3.51	−2.87	−3.13	−3.08

Data source: GTAP10 simulation results.

Table 8. Changes in the export scale of China's manufacturing industry to various countries at different technological levels.

	low-technology manufacturing industries	medium-high-technology manufacturing industries	high-technology manufacturing industries
JPN	29.18	3.1	5.51
KOR	36.84	18.29	13.24
AUS	27.99	16.91	−0.65
NZL	5.21	−1.1	−4.00
IND	50.46	31.87	15.43
ASEAN	13.84	4.86	1.78
US	−3.43	−2.49	−1.12
EU	−3.53	−2.73	−1.71
ROW	−3.29	−2.57	−1.14

Data source: GTAP10 simulation results.

As can be seen from Table 8: Firstly, the change ratio of export volume of low-tech manufacturing industry to Japan, South Korea, Australia, New Zealand, India and ASEAN is positive, and the change ratio of export volume to the United States, the European Union and other regions in the world is negative. Secondly, from the perspective of medium and high-tech manufacturing industry, exports to Japan, South Korea, Australia, India and ASEAN will increase, while exports to New Zealand, the United States, the European Union and other regions in the world will decrease. Thirdly, as for the high-tech manufacturing industry, its exports to Japan, South Korea, India and ASEAN will increase, while its exports to Australia, New Zealand, the United States, the European Union and other regions in the world will decrease. On the whole, the export of low-tech manufacturing industry to RCEP members will increase and the export to non-members will decrease, indicating that RCEP will promote the trade transfer effect of China's manufacturing industry. In addition, for the export of Japan and South Korea, the export change of medium and high-tech industries is significantly smaller than that of low-tech industries, and Japan and South Korea still have advantages in industries with high technology level.

5. Conclusions and Recommendations

5.1. Conclusions

The simulation results show that RCEP can significantly promote the development of China's manufacturing industry on the whole. From the perspective of specific industries, the impact of tariff reduction on the output of low-tech manufacturing (textile, clothing and leather products) is positive, while the impact on the output of medium and high-tech manufacturing and high-tech manufac-

turing is negative. In addition, the signing of RCEP will produce an obvious trade creation effect and trade transfer effect. Due to the reduction of intra-regional trade costs, intra-regional import and export trade will increase greatly, and more trade outside the region will transfer to the region.

The implementation of RCEP will also help members to make full use of their industrial competitive advantages. The research of this paper provides some guidance for China to make better use of the endowment advantages of other RCEP members, improve its international competitiveness and promote the transformation and upgrading of China's manufacturing industry. At the same time, the industrial structures of China and many ASEAN countries are similar, so RCEP will aggravate the competition between low-tech manufacturing industries to a certain extent. The research of this paper also provides some ideas for China on how to transform competition into a complementary competition.

5.2. Recommendations

Tariff reductions present both opportunities and challenges for China's manufacturing sector under the RCEP. Therefore, it is particularly important for China to make good use of the dividends of the RCEP to drive the transformation and upgrading of China's manufacturing industry, and promote the high-quality development of the Chinese economy.

China is a core member of the RCEP. China should take its own economic interests as the starting point and strive to achieve win-win cooperation with member countries to promote the further implementation of RCEP, while strengthening its own ability to resist risks in the complex international and domestic environment. Deepen communication and cooperation with Japan and South Korea in high technology level manufacturing industries, and encourage domestic industries to upgrade to high value-added segments such as research and development, design and system integration, so as to mitigate the impact of trade liberalization on China's high technology level manufacturing industries. In addition, the government can formulate relevant policies to provide R&D subsidies and tax breaks for relevant manufacturing enterprises to reduce their costs; at the same time, it can increase the training of professional and highly qualified talents in universities and encourage the combination of industry, academia and research.

As for enterprises, trade in goods, cumulative rules of origin and investment-related measures are an important opportunity and a powerful grip for China's manufacturing industry to move to the middle and high end. Therefore, enterprises should grasp the opportunity. What's more, Enterprises can increase the use of the cumulative rules of origin and make good use of them to expand the scale of production of intermediate goods in the chain. The further improvement of the quality of China's manufacturing industry requires Chinese manufacturing enterprises, especially medium-high and high-tech manufacturing industries, to further improve their own technological innovation and cultivate their

own new advantages in international competition. In addition, Chinese companies should use international global thinking to layout their industries so that products, components and raw materials meet international standards, while also enhancing brand recognition and brand value. Enterprises should carefully sort out their shortcomings, especially to strengthen core technology research and accelerate the development of core components.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Chen, S., & Ni, J. (2014). The Economic Effect of China's Participation in RCEP: Based on the GTAP Model. *Asia-Pacific Economic Review, 2,* 125-133.

Corong, E. L., Hertel, T. W., Mcdougall, R. A. et al. (2017). Dominique Van Der Mensbrugghe. The Standard GTAP Model, Version 7. *Journal of Global Economic Analysis, 2,* 1-119. https://doi.org/10.21642/JGEA.020101AF

Du, Y., & Liu, Y. (2020). The Impacts of RCEP on the Division Structure of world Manufacturing Industry: Based on Gross Value Trade and Value Added Trade. *International Business Research, 4,* 62-74.

Hertel, T. W. (1997). *Global Trade Analysis: Modeling and Applications* (pp. 25-73). Cambridge University Press.

Ianchovichina, E. I., Mcdougall, R. A., & Hertel, T. W. (2000). *A Disequilibrium Model of International Capital Mobility.* https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=399 .

Itakura, K., & Lee, H. (2019). Estimating the Effects of the CPTPP and RCEP in a General Equilibrium Framework with Global Value Chains. In *22nd Annual Conference on Global Economic Analysis*. Global Trade Analysis Project (GTAP).

Li, C., Guo, Z., & He, C. (2018). Potential Impact of China's Mega-RTA Negotiations. *Economic Research Journal, 53,* 132-145.

Li, J., & Hu, J. (2021). The Impact of RCEP Agreement on Macroeconomic and Manufacturing Development—GTAP-Based Simulation Analysis. *Journal of Industrial Technological Economics, 40,* 134-142.

Lu, J., Gao, Y., & Wang, T. (2021). The Impact of Regional Economic Integration on China Manufacturing: Based on the Simulation Analysis of RCEP. *Journal of Soochow University, 42,* 124-135.

Meng, X., Huang, C., & Zhang, X. (2018). The Impacts of RCEP on the Exports of China's Mechanical and Electrical Products: Based on GTAP Simulation. *Asia-Pacific Economic Review, 4,* 26-35.

Ping, L. (2020). The Pace of Asia-Pacific Economic Integration: With the Centre of RCEP. *Asia-Pacific Security and Maritime Affairs, 6,* 111-124.

Qian, J. (2021). Analysis of the Economic Effect and Industrial Output of Regional Comprehensive Economic Partnership. *International Business Research, 42,* 86-96.

Qian, J., & Wang, W. (2019). Research on the "Spoke" Effect of RCEP: From the Perspective of Multiple Axle Drive. *Journal of Shandong Economics and Finance University, 31,* 73-85.

Qiu, B., Zhang, Q., & Sun, S. (2022). Research on the Impact of RCEP on China's Service Trade: Based on the Quantitative Analysis of Structural Model. *Jiangsu Social Sciences,* 105-116.

Rahman, M. M., & Ara, L. A. (2015). TPP, TTIP and RCEP Implications for South Asian Economies. *South Asia Economic Journal, 16,* 27-45. https://doi.org/10.1177/1391561415575126

Xu, H. (2020). RCEP Is a Powerful Tool for Revitalizing the Global Economy and Opposing Protectionism. *China Development Observation, Z6,* 56-58.