

*Estimating the Effects of the RCEP and Its
Impact on China's Supply Chain*



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TABLE OF CONTENTS

TABLE OF CONTENTS	2
TABLE DIRECTORY.....	4
ABSTRACT	7
1. INTRODUCTION	8
1.1 Research Background.....	8
1.2 Research Purposes.....	8
1.3 Research Method.....	9
1.4 Paper Framework	9
2. INTRODUCTION TO RCEP.....	11
2.1 What is Regional Comprehensive Economic Partnership.....	11
2.2 History of RCEP	11
2.3 Economic Environment in China	16
2.4 Interpretation Of Key Rules Of Rcep.....	21
2.4.1 Rules of Origin	21
2.4.2 Tariff Concession.....	23
2.4.3 Non-Tariff Barriers	25
3. MODEL INTRODUCTION AND RESEARCH SCHEME DESIGN.....	27
3.1 Introduction of the Global Trade Analysis Project (GTAP)	27
3.2 Simulation Design and Assumption	29
3.3 Policy Scenario Based on Tariffs And Technical Barriers.....	30
3.3.1 Classification of regions and departments	30
3.3.2 Technical route and scenario setting.....	32
4. DATA COLLECTION AND CLASSIFICATION.....	34
4.1 Changes in Welfare Level and GDP.....	34
4.1.1 Changes in Welfare Level.....	34
4.1.2 Changes in GDP	35
4.1.3 Free Trade Areas Theory of Peter Robson.....	37
4.2 Changes in The Import and Export Scale.....	40
4.3 Changes in The Terms of Trade.....	42
4.4 Departmental output changes.....	45
4.4.1 General overview.....	45
4.4.2 Transport and communication	47
4.5 Simulation results analysis conclusion.....	47
5. RCEP'S ESTIMATED IMPACT ON CHINA'S SUPPLY CHAIN	50
5.1 Overview of the global status of China's supply chain.....	50

5.1.1	The development process of the supply chain	50
5.2	RCEP's Impact on China's Supply Chain: Import and Export Perspective	53
5.2.1	Characteristics of RCEP member countries in the global supply chain.....	54
5.2.2	The impact of RCEP on China's import chain	56
5.2.3	The impact of RCEP on China's export chain	65
5.3	The Impact of RCEP On the Industry Supply Chain: taking the Textile Industry and Steel Industry as examples	72
5.3.1	Textile industry in China	72
5.3.2	Steel Industry in China	80
6.	Conclusion and outlook.....	86
6.1	Summary	86
6.2	Limitation and remarks	98
6.3	Advise On How To Gain A Competitive Edge With RCEP	99
6.3.1	Development of a flexible supply chain model	100
6.3.2	Utilize supply chain management software	104
6.3.3	Using big data and data analysis to predict and monitor the supply chain	105
	REFERENCE	108
	APPENDIX	111

TABLE DIRECTORY

Chart 2-1 Fifteen countries sign up to RCEP.....	11
Chart 2-2 The members of the Regional Comprehensive Economic Partnership)	12
Chart 2-3 Trade grouping involving Asia Pacific nations.....	13
Chart 2-4 2013 RCEP negotiations set of conclusion)	14
Chart 2-5 2021 Macroeconomic Indicators Forecast.....	17
Chart 2-6 J.P.Morgan global manufacturing PMITM.....	18
Chart 2-7 manufacturing PM (seasonally adjusted))	18
Chart 2-8 In 2021, international oil prices will rebound from a low level, and prices will remain at a moderate level.....	19
Chart 2-9 Graphical description of expanded accumulation.....	22
Chart 2-10 Comparison of trade liberalization rates between China and ASEAN, South Korea, Australia and New Zealand.....	24
Chart 2-11 Comparison of Japan’s weighted average tariff rate on China and the rest of the world	24
Chart 3-1 RunGtap software screenshot	27
Chart 3-2 RCEP member countries.....	30
Chart 3-3 The division of departments	32
Chart 3-4 RunGtap software screenshot	32
Chart 3-5 Simulation scenario settings	33
Chart 4-1 Changes in welfare of RCEP member states in three scenarios.....	34
Chart 4-2 Changes in GDP of RCEP member states in three scenarios.....	36
Chart 4-3 The two-countries model of free trade areas theory- SCENARIO I:.....	38
Chart 4-4 The two-countries model of free trade areas theory- SCENARIO II:	38
Chart 4-5 Changes in Viwreg of RCEP member states in three scenarios.....	40
Chart 4-6 Changes in Vxwreg of RCEP member states in three scenarios.....	41
Chart 4-7 Changes in Viwreg of China in three scenarios	42
Chart 4-8 Changes in Vxwreg of China in three scenarios.....	42
Chart 4-9 Changes in Tots of RCEP member states in three scenarios.....	43
Chart 4-10 Changes in Tots of China in three scenarios.....	43
Chart 4-11 Changes in the output structure of various industries in China	45
Chart 4-12 Output growth rate of various industries in China (unit:%)	46
Chart 4-13 Changes in the output structure of transport and communication in China.....	47
Chart 5-1 Network Model of Supply Chain.....	50
Chart 5-2 The timeline of supply chain development.....	51
Chart 5-3 The road map of the three industrial transfers	52
Chart 5-4 China's trade balance with RCEP members (US \$100 million).....	55
Chart 5-5 The transmission path of RCEP's impact on China's import chain.....	56
Chart 5-6 The industrial structure of China's imports to some member countries in 2019.....	58
Chart 5-7 List of supply markets for vehicle imported by China.	60

Chart 5-8 Tariff Rates of Major Imports in China (Base tax rate)	62
Chart 5-9 Tariff Rates of Major Imports in China (Average tax rate for 1-5 years)	63
Chart 5-10 Tariff Rates of Major Imports in China (Average tax rate for 6-10 years).....	63
Chart 5-11 Tariff Rates of Major Imports in China (Average tax rate after 10 years)	64
Chart 5-12 The transmission path of RCEP's impact on China's export chain	65
Chart 5-13 China's export industry structure to some member states in 2019.....	66
Chart 5-14 China's comparative advantage export product advantage (Data Resource: National Bureau of Statistics, General Administration of Customs of China)	69
Chart 5-15 Competitive products within member states with non-zero tariffs	72
Chart 5-16 Proportion of China's trade with RCEP in the textile industry	73
Chart 5-17 Textile and apparel trade between China and RCEP member countries in 2019 (unit: US\$100 million)	74
Chart 5-18 China's major textile and apparel products imported from Japan in 2019.....	75
Chart 5-19 Chinese raw materials and textile companies have achieved full coverage of the upstream/midstream/downstream of the global textile supply chain	76
Chart 5-20 Trade status of China and other RCEP woolen raw materials and products in 2020	78
Chart 5-21 Japan's tariff reduction arrangements for woolen products imported from China...80	
Chart 5-22 China's imports of steel products in 2019 (Unit: Thousand dollars).....	82
Chart 5-23 China's imports of steel products in the first half of 2020 (Unit: Thousand dollars)	82
Chart 5-24 China's exports of steel products in 2019 (Unit: Thousand dollars).....	83
Chart 5-25 China's exports of steel products in the first half of 2020 (Unit: Thousand dollars)83	
Chart 6-1 Graphical description of expanded accumulation.....	87
Chart 6-2 Gtap Agg software screenshot of departments division.....	88
Chart 6-3 Gtap Agg software screenshot of country distribution	88
Chart 6-4 Changes in welfare of RCEP member states in three scenarios.....	90
Chart 6-5 Changes in VGDP of RCEP member states in three scenarios.....	91
Chart 6-5 Changes in QGDP of RCEP member states in three scenarios.....	91
Chart 6-6 Changes in PGDP of RCEP member states in three scenarios.....	92
Chart 6-7 Changes in Vivreg of China in three scenarios (unit:%).....	92
Chart 6-8 Changes in Vxwreg of China in three scenarios (unit:%).....	93
Chart 6-9 Changes in Tots of China in three scenarios (unit:%).....	93
Chart 6-10 Output growth rate of various industries in China (unit:%)	94
Chart 6-11 The transmission path of RCEP's impact on China's import chain.....	95
Chart 6-12 The transmission path of RCEP's impact on China's export chain	96
Chart 6-13 Five elements of flexible supply chain	101
Chart 6-14 Supply chain emergency response roadmap.....	102
Chart 6-15 Eight elements of supply chain management software.....	104
Chart 6-16 Big data supply chain	105
Chart 6-17 The timely delivery of critical medical supplies by drone.....	106

ABSTRACT

Since the 18th century, globalization has been the most magnificent trend in world economic development, and supply chains have become increasingly globalized. The outbreak of COVID-19 in 2020 has a serial shock on the global industrial chain and supply chain, highlighting the vulnerability of the global industrial chain division system. The impact of the epidemic may accelerate the periodic resurgence of globalization, and international trade is likely to incline to the member countries of multilateral or bilateral trade agreements. In the future, more regional trade and production centers will be formed. The smooth launch of Regional Comprehensive Economic Cooperation Agreement (RCEP) is considered a resistance to unilateralism.

This paper aims to explore the impact of RCEP on China's economy and supply chain and put forward suggestions on how to increase the competitiveness of Chinese multinational companies in RCEP. We know that GTAP standard static model has quantifiable characteristics in analyzing various free trade policies and their impacts through literature reading. The model uses China's production, consumption and government as sub-models, inputs data and transforms parameters, and finally simulates the changes of China's social welfare, GDP, import and export after the implementation of RCEP.

The paper also tries to explain how China enters the global industrial chain. That is why China has become a new generation of "world factory" after the third international industrial transfer. Chinese enterprises and their supply chain how to seize the opportunity, improve competitiveness, and deal with the challenges of supply chain risk is also the focus of this paper.

Keywords: RCEP; GTAP model; China's economy; Supply chain.

1. INTRODUCTION

1.1 Research Background

After eight years of negotiations, the "Regional Comprehensive Economic Cooperation Agreement" (RCEP) was finally officially signed on November 15, 2020. The agreement surpassed the EU trade Area to become the world's most extensive trade national economy. RCEP members include 10 ASEAN countries, China, Japan, Republic of Korea, Australia and New Zealand. The 15 member countries account for about 30% of the world's population (2.2 billion people) and 30% of world GDP (\$26.2 trillion) as of 2020, making it the foremost prominent trade bloc in history, exceeding the "Trans-Pacific Partnership Agreement". Although the importance of RCEP is overwhelming, the various benefits that RCEP can bring to China and also the region cannot be determined immediately.

The signing of the RCEP is of great significance to the economic and trade cooperation between regional countries, especially the economic recovery under the epidemic. Taking China, Japan, and South Korea as an example, the epidemic has had varying degrees of impact on the three countries' economies. The signing of RCEP can promote the economic and trade exchanges between the three countries and help advance the method of future China-Japan-Korea trade area negotiations. within the future, tariffs on automobiles, auto parts and chemical products exported from Japan to China are going to be significantly reduced or cancelled. Simultaneously, tariffs on Shaoxing wine and rice wine exported from China and South Korea to Japan will be progressively eliminated. this is often particularly important for the economic and trade cooperation between the three countries within the "post-epidemic era".

RCEP, as an economic and trade agreement covering more fields, also means more significant opportunities and challenges. For example, RCEP requires a greater degree of openness in the service industry. For an economy such as India that relies heavily on the domestic service industry, especially the IT industry, the rashly large-scale opening up may bring enormous consequences on the job market, so India's consideration of relevant provisions will be more complicated. In the end, India had to opt out when there was no consensus within the country for the time being.

1.2 Research Purposes

The purpose of this paper is to explore the impact of RCEP on China's economy and supply chain and to make suggestions on how to increase the competitiveness of Chinese multinational companies in RCEP.

Specifically, we use the general equilibrium model results to predict the future economic and trade changes of China and other RCEP members and try to explain the reasons for the changes. The model uses China's production, consumption and government as sub-models, inputs data and transforms parameters, and finally simulates the changes of China's social welfare, GDP, import and export after the implementation of RCEP.

In addition, after consulting the recent paper from 2017 to present, we also hope to study and analyze China's position in the global supply chain and trace the causes of its international division of labour. After the signing of RCEP, it is bound to impact China's import and export significantly. This paper will also analyze how RCEP affects China's import chain and export chain and hope to put forward reasonable suggestions for multinational companies to deal with this impact.

1.3 Research Method

This thesis uses a combination of qualitative analysis and quantitative analysis to analyze and research related data. The research methods mainly used are as follows;

- **Qualitative analysis:** It mainly uses the methods of comparison, classification, induction and summary to determine the factors affecting China's supply chain in RCEP terms, such as tariff concession, origin principle, etc. In this section, we summarize previous conclusions on the impact of other FTA and then apply these laws to this paper to make a preliminary analysis and judgment on the impact of RCEP on the supply chain and economy.
- **Quantitative analysis:** The GTAP model is mainly used. The GTAP framework uses the production, consumption and government expenditures of various countries and regions as sub-models. After inputting data and converting various parameter coefficients, quantitative data is used to describe various countries' trade relations. Finally, these sub-models can be connected into a multi-country multi-sector equilibrium model. This model can simulate changes in the target country or region's GDP, social welfare, employment rate, imports, and exports before implementing trade policies.

1.4 Paper Framework

The writing idea of this paper is to analyze the background of RCEP according to relevant economic theories, and predict the impact of RCEP signing on China's economy. Then build a model according to the research objectives. Finally, analyze

the collected data, draw conclusions, and verify the expected results.

In the second chapter, the thesis mainly introduces the definition of RECP, the historical evolution of RECP, the background of RECP signing and its profound meaning. At the same time, it briefly introduces China's economic environment. With the launch of covid 19 vaccine, the world economic growth may rebound. The last part of the second chapter is the interpretation of the key terms in RCEP. For example, the principle of origin, tariff concessions, non-technical barriers and so on. The definition of the term, the relevant provisions in RCEP and its impact on supply chain decision-making are explained in detail.

In the third chapter, GTAP is used for quantitative analysis. The analysis methods and model checking methods used in the analysis are briefly described. According to the purpose of the study, we make reasonable assumptions, determine the characteristic variables of the model with tariff changes and technical barriers to trade, and establish the scheme and model.

The fourth chapter is the collation and analysis of the results of GTAP model. Using charts and data comparison, this paper discusses the changes of welfare level and GDP, trade scale, trade and sector output of RCEP member countries (especially China). And through the free trade area theory mentioned by Peter Robson in the economics of international integration to explain the reasons for the changes of GDP and welfare level of various countries. That is, countries with higher labor productivity and lower commodity prices are more likely to benefit from the establishment of FTZs.

In the fifth chapter, this thesis further discusses the impact of RCEP on China's supply chain. First of all, it introduces China's position in the global supply chain and the reasons for establishing the world factory. Then, from the perspective of import and export, this paper expounds the influence of RCEP on China's industrial chain. Taking textile industry and iron and steel industry as examples, the possible impact of RCEP was further analyzed.

The sixth chapter is the conclusion and Reflection Based on the above analysis. It also lists the suggestions for Chinese multinational companies to make better use of RCEP's terms and regulations to build a more flexible and secure supply chain.

2. INTRODUCTION TO RCEP

2.1 What is Regional Comprehensive Economic Partnership

On December 20, 2012, China, Japan, South Korea, India, Australia, New Zealand and the ten ASEAN countries announced the Regional Comprehensive Economic Partnership (RCEP) negotiations at the East Asian Leaders' Meeting. On November 15, 2020, the RCEP signing ceremony was carried out by the video, and the economic and trade ministers of 15 member states formally signed the agreement. The signing of the agreement marks the successful start of the East Asia Free Trade Zone construction with the largest population, the most diverse member structure and the most significant development potential in the world. The signing of RCEP is a victory for multilateralism and free trade.



*Chart 2-1 Fifteen countries sign up to RCEP
(Data Resource: ASEAN)*

2.2 History of RCEP

RCEP originated from the emergence of multiple regional integration arrangements and ideas in the Asia-Pacific region. In 1997, the Asian financial crisis broke the rapid economic development in Asia. Large companies in many countries have closed down, and the political situation in some countries is even turbulent. This economic disaster has made East Asian countries realize that the process of global economic integration will bring rapid economic growth and international competitive advantages. However,

at the same time there may also be huge risks. As a result, countries of East Asian turned to seek regional economic cooperation to cope with risks and challenges.

East Asia is one of the most dynamic regions in the world. East Asia began to conduct economic cooperation in the 1980s and 1990s, especially after the 1997 Asian financial crisis, which accelerated the process of economic integration in the region. Since the goal of building an "East Asian Economic Community" was put forward in 2001^[1], it has gone through nearly 20 years, in which it has experienced a rapid development stage and some encountered bottlenecks. In general, the construction of the East Asian Economic Community has made significant progress and results. Many bilateral and multilateral FTAs (Free Trade Agreements) have been established within East Asia. The regional financial cooperation order has been initially established, forming the ASEAN "10+X" and Multilateral cooperation mechanisms such as the East Asia Summit.

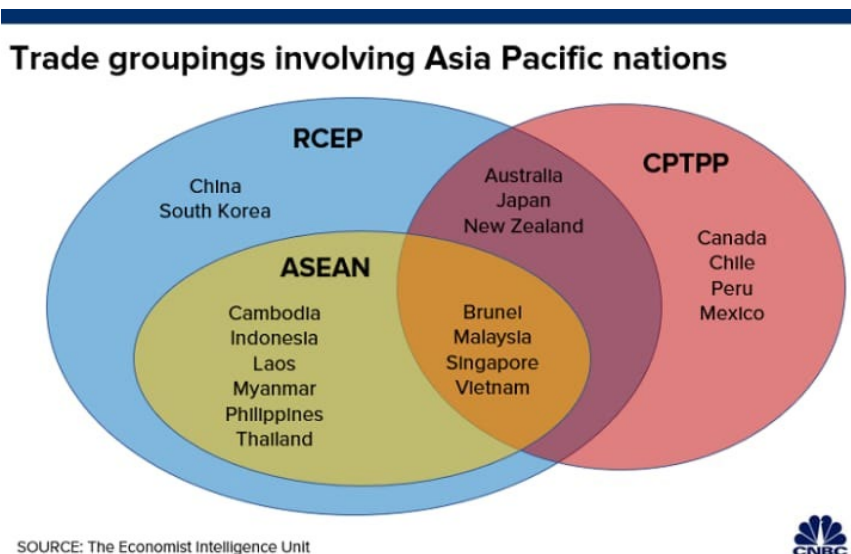


*Chart 2-2 The members of the Regional Comprehensive Economic Partnership)
(Data Resource: Wikipedia)*

The idea of the East Asian Economic Community has first appeared in the concept of establishing the "East Asian Economic Group (EAEG)" , proposed by Malaysian Prime Minister Mahathir in 1990. It was later renamed the "East Asian Economic Forum" start up. The outbreak of the Asian financial crisis in 1997 prompted East Asian countries to accelerate the pace of regional cooperation. At the end of the same year, the first informal meeting of ASEAN and China leaders, Japan and South Korea (9+3 at the time and 10+3 after Cambodia joined ASEAN in 1999) was held in Kuala Lumpur, Malaysia. At the "10+3" Leaders' Meeting in 2000, then China Premier Zhu Rongji proposed to position "10+3" as the main channel for cooperation among East Asian countries, while South Korean President Kim Dae Jung proposed the establishment of an "East Asian Economic Community".^{[1][2]}

In 2001, the "East Asia Vision Group" composed of experts and scholars from East Asian countries submitted a report entitled "Towards an East Asian Community: A Region of Peace, Prosperity, and Progress" to the fifth ASEAN and China, Japan and South Korea Leaders' Meeting at the time. For the first time, the report comprehensively and systematically explained the concept of the "East Asian Community" (EAC) and the blueprint plan for East Asian cooperation.^[2] It recommended the establishment of an East Asian Free Trade Area ("10 +3" Model) based on ASEAN, Japan, China and South Korea (FTAAP) to achieve the goal of establishing an "East Asian Community" through long-term cooperation. The concept and goal of the "East Asian Community" proposed in this report is the first time that ASEAN countries and China, Japan and South Korea have jointly recognized the construction of the "East Asian Community" and the "East Asian Economic Community".^[1] In December of the same year, ASEAN invited China and South Korea leaders to participate in the formal dialogue and cooperation meeting held in Asia and started the "10 + 3" dialogue.

At the end of 2004, the 8th "10+3" Leaders' Meeting held in Vientiane, Laos, decided to promote the establishment of an East Asian Community. The "Kuala Lumpur Declaration" issued by the Ninth "10+3" Leaders' Meeting held at the end of 2005.^[1] It is the first time East Asia Summit officially took the "East Asian Community" and established the "10+3" Leaders' Meeting to "East Asia Free Trade Area (EAFTA)" as the long-term goal of East Asia cooperation. The East Asia Summit (EAS) takes the "Comprehensive Economic Partnership Agreement (CEPEA)" as the goal to advance the process of the East Asian Community.^[1]



*Chart 2-3 Trade grouping involving Asia Pacific nations
(Data Resource: The Economist Intelligence Unit)*

In 2006, it was forwarded to invite India, Australia and New Zealand to join together.^[1] Establish "East Asia Close Economic Partnership" ("10+6" model, CEPEA). On the other side, in 2009, the Obama administration announced that the United States had formally participated in and led the Trans-Pacific Partnership (TPP) negotiation, which aroused great attention from the countries surrounding the Asia-Pacific region. Since then, began the rapid development phase of building the East Asian Community under the ASEAN "10+X" framework for nearly ten years. A large number of bilateral or multilateral free trade agreements and economic partnership agreements have entered the negotiation, establishment and effective phase, and intra-regional trade. The level of investment and financial cooperation has increased substantially. Led by the ASEAN 10+3 mechanism, the ASEAN 10+1, 10+6 mechanism, financial cooperation mechanism, and other bilateral cooperation mechanisms and system construction have also developed rapidly. In November 2011, ASEAN accepted the China-Japan joint proposal led by the ASEAN and agreed to establish three RCEP-related teams (trade in goods, trade in services and investment).

The "East Asia Vision Group" put forward the "East Asian Economic Community 2020 Vision" in another research report submitted to the "10+3" mechanism in 2012, that is, to achieve the goals of the East Asian Economic Community (EAEC) in 2020.^[2] The East Asian Economic Community's ultimate goal is to realize the free flow of goods, goods, services, investment and people in the region and the fair, inclusive, balanced and sustainable development of the region. The promotion of RCEP negotiations has become one of the most important agendas for East Asian economic integration and community building.



Chart 2-4 2013 RCEP negotiations set of conclusion
(Data Resource: ASEAN)

Although all countries are generally optimistic about the broad prospects of RCEP, when the first round of RCEP negotiations was officially launched on May 9, 2013,

the diversity and complexity of the issues involved in the negotiation agenda and the difficulty of advancing the negotiation process were far more than all parties. Due to the large number of member states participating in the negotiations, the considerable differences in economic development levels and other factors have led to significant differences among member states. In addition, the number of negotiation topics and negotiating teams continue to increase, and the progress of the negotiations is plodding.

In 2016, the pressure of TPP accelerated the negotiation process of RCEP. One of the performances is that the frequency of meetings has increased, and the level of meetings has improved. In 2016 alone, there were two ministerial-level meetings and six rounds of negotiations. In 2017, there was one meeting of leaders of RCEP negotiating countries.^[1] Although the RCEP signing date has been delayed again, the negotiations have made substantial progress during the hesitation.

Seeing that RCEP is about to succeed, Trump took office as President of the United States on January 20, 2017 and announced that the United States has officially withdrawn from the TPP agreement three days later. To cope with the economic sanctions imposed by the United States and weaken the adverse effects of the TPP, the RCEP negotiations began to reach an understanding gradually and are committed to actively promoting the progress of the RCEP negotiations. However, due to tariff concessions in the free trade of goods between India and other countries, the negotiating countries still have relatively large differences in areas such as intellectual property rights and electronic commerce other than tariffs. In the end, the negotiations could not be completed in 2018 according to the planned schedule. In 2019, India announced its withdrawal from RCEP negotiations. At the same time, RCEP has concluded all textual negotiations and substantially all market access negotiations and will work to ensure that the agreement is signed in 2020.^[1]

Looking back at the history of RCEP, changes in geopolitics and economic and trade relations can be remarkable. From the earliest advocacy members of the 10 ASEAN countries to Japan's "10 + 6" model, it is clear that for these countries located in Southeast Asia, strengthening their own economic and trade ties is an active choice to deal with the multi-polarization of the world pattern. At the same time, any regional economic and trade arrangement has boundaries. The reason for the difficult RCEP negotiation process is not only because of the considerable differences in economic development among the negotiating members, but also because of the complex political games and many unresolved issues left in East Asia over from history, as well as trade protectionism and ideological trends arising from the tide of anti-globalization. It can be seen that the trend of a peaceful world in the future becomes more and more prominent, and the competition for global free trade rules has just begun.

2.3 Economic Environment in China

The global epidemic will enter the "darkest moment" at the end of 2020. With the launch of the COVID19 vaccine, the global economic growth rate is expected to usher in a sharp rebound in 2021, and the global price trend is unlikely to rise significantly. After the new US government takes office in 2021, China-US relations will most likely be in a "cooling-off period."

In 2021, China's economic operation will enter the "post-epidemic" period and building a new development pattern will be at the core of the policy agenda. Next year, the Chinese government will continue to downplay the goal of GDP growth, and macro control targets such as price index and employment rate will be adjusted to the level before the epidemic. Macroeconomic policies will further return to normalcy, but there will be no sudden tightening of "a sharp turn." Among them, the monetary policy's overall orientation is stable and tight, policy interest rates may remain unchanged, and market interest rates will move up slightly. The overall trend will be high first and then low, guiding the targeted injection of financial resources into the real economy. Stabilizing the macro leverage ratio will be the focus of policy.

The special fiscal measures during the epidemic will be withdrawn, and the fiscal policy will be significantly reduced in 2021. The fiscal deficit rate target will be lowered from over 6% in 2020 to around 3.2%. About 500 billion yuan will also reduce the scale of new local government special bonds.^[3]

In 2021, the restraining effect of the epidemic on economic activities will be fully receded, superimposed on the previous year's low base. The year-on-year GDP growth rate is expected to reach about 0%. Among them, consumption will once again play its role as the main engine of growth. There is still room for growth in fixed-asset investment, mainly driven by manufacturing investment; In anticipation of a decline in market share, China's export growth rate will only increase slightly in 2021. Coupled with the expansion of the service trade deficit, the pull rate of economic growth from external demand will once again turn negative.

The rebound in global economic growth in 2021 will lead to a rebound in commodity prices. The domestic PPI will turn from negative to positive year-on-year, and the annual increase is expected to reach about 0%. The risk of high CPI inflation in 2021 is low, and the annual increase is expected to be controlled at 1.5%-2.0%. In the meantime, there will be no apparent constraints on monetary policy. In 2021, we need to pay close attention to the global epidemic and potential uncertainties in the external environment.^[4]

2021 Macroeconomic Indicators Forecast									
Index	Unit	2018	2019	2020 First Quarter	Second Quarter	Third Quarter	Fourth Quarter	2020 Forecast	2021 Forecast
Global GDP	year-over-year growth %	3.6	2.9	-1.2	-8.5	-5.1	-2.6	-4.4	5.2
China GDP	year-over-year growth %	6.6	6.1	-6.8	3.2	4.9	6	2.2	9
Manufacturing value added	year-over-year growth %	6.2	5.7	-8.4	4.4	5.8	7	2.5	8.5
Total retail sales of consumer goods	year-over-year growth %	9	8	-19.6	-3.8	-0.4	5.1	-3.9	18.5
Fixed asset investment	year-over-year growth %	5.9	5.4	-16.1	3.8	8.8	10.2	3.2	7.6
Infrastructure investment	year-over-year growth %	3.8	3.8	-16.4	8.1	6.4	6.5	3.6	3.7
Real estate investment	year-over-year growth %	9.5	9.9	-7.7	8	11.8	11.2	7.1	8.2
Manufacture fixed asset investment	year-over-year growth %	9.5	3.1	-25.2	-4.9	1.6	8.2	-2.3	12.2
Export amount USD	year-over-year growth %	9.9	0.5	-13.4	0.1	8.8	16.3	3.2	4
Import amount USD	year-over-year growth %	15.8	-2.7	-3	-9.7	-3	4.6	-1	6
CPI	year-over-year growth %	2.1	2.9	4.9	2.7	2	-0.2	2.5	1.5
PPI	year-over-year growth %	3.5	-0.3	-0.6	-3.3	-2	-1.5	-1.9	2
One-year MLF interest rate	End value	3.3	3.3	3.15	2.95	2.95	2.95	2.95	2.95
M2	year-over-year growth %	8.1	8.7	9.1	11.1	10.7	10.6	10.7	9.2

Chart 2-5 2021 Macroeconomic Indicators Forecast

(Data Resource: JPMorgan, HIS Markit, National Bureau of Statistics of China)

At the end of 2020, two vaccines have completed the third phase of trials, and the clinical effects are better than expected. Medical experts predict that as early as 2021, vaccines from many countries, including China, will enter the vaccination stage. Although there are still uncertainties in the global production, distribution, and transportation of vaccines in the future, vaccines' advent is still expected to bring the global epidemic to the next stage. The global daily new cases will enter a trend of decline. The impact on the global economy will also recede.

The severe impact of this round of epidemic on the global economy was mainly concentrated in the second quarter, and the large-scale blockade measures brought about a "shutdown" effect. Since then, with the gradual unblocking of various economies, the global economy began to repair marginally in the second half of the year. Since July, the JPMorgan Chase Global PMI Index has returned to above the line of prosperity.^[4]

In January 2021, China's Manufacturing Purchasing Managers Index (PMI) was 51.3 per cent, down by 0.6 percentage point from last month, which was above the threshold for eleven consecutive months, indicating that the manufacturing industry continued to expand but the pace slowed down.^[4]

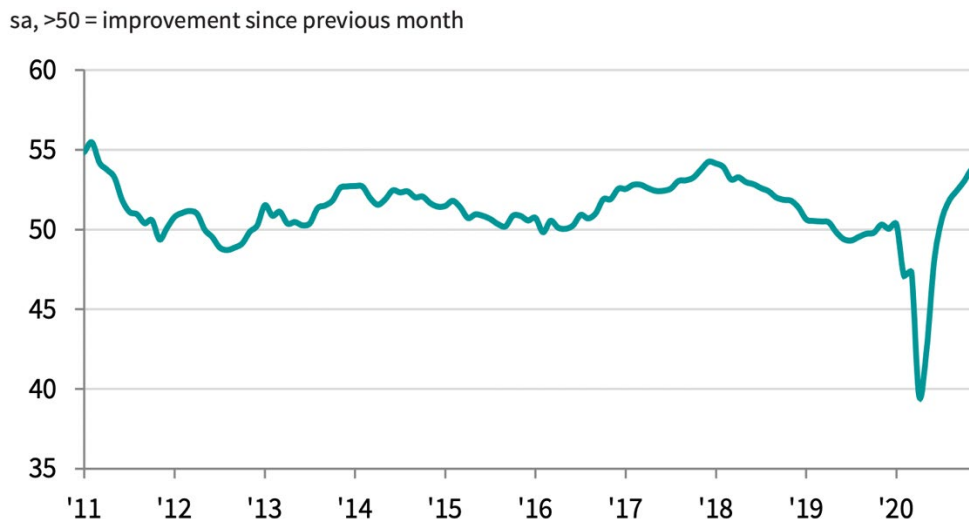


Chart 2-6 J.P.Morgan global manufacturing PMITM
 (Data Resource: J.P.Morgan, HIS Markit, National Bureau of Statistics of China)

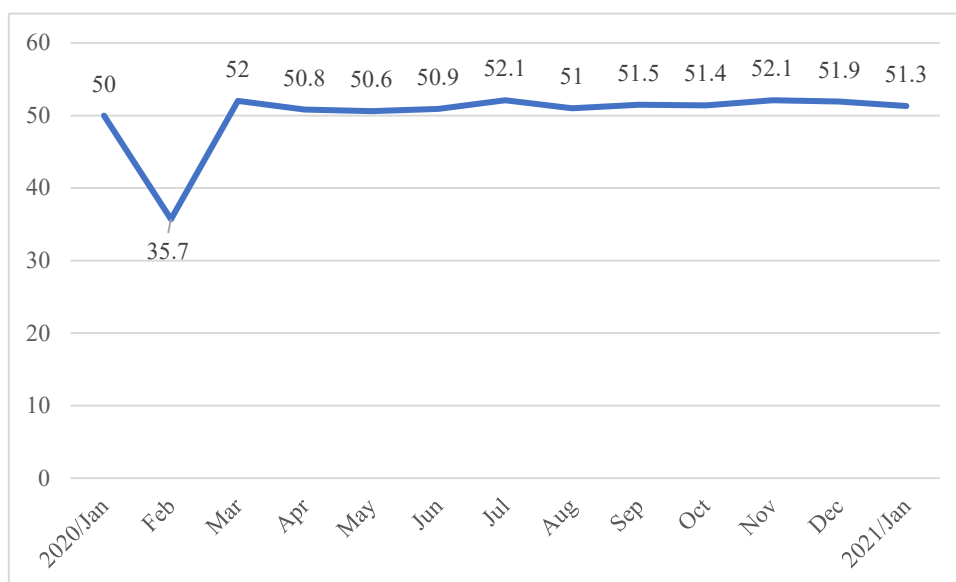


Chart 2-7 manufacturing PM (seasonally adjusted)
 (Data Resource: J.P.Morgan, HIS Markit, National Bureau of Statistics of China)

The International Monetary Fund (IMF) predicts that the global economy will decline by 4.4% year-on-year in 2020, a drop far exceeding the 2009 global financial crisis's impact^[5]. In anticipation of mass vaccination, the IMF predicts that the global economy will rebound sharply by about 5.2% in 2021. Based on the global macroeconomic trend in the fourth quarter, estimates that the global economy will shrink by 4.0% year-on-year in 2020, and the rebound in 2021 will be around 4.7%. In 2021, the GDP growth rate of developed economies represented by the United States, Japan and Europe will be relatively low. Most emerging economies except China will not be able to return to their pre-epidemic economic scale in 2021. This means that

the global economic rebound in 2021 will remain weak overall.

After experiencing large-scale fiscal and monetary stimulus policies worldwide in 2020, global price increases in 2021 are expected to remain relatively limited. After the global economic recession in 2020, which caused the annual average international crude oil price to plunge 32.1% year-on-year (predicted value), the IMF predicts that the international oil price will only rise by 12.0% in 2021. The price trend of this crucial commodity will largely influence the global price level. Based on factors such as the correlation between oil prices and CPI shown by historical data, we estimate that the global CPI will increase by 3.4% year-on-year in 2021. That is only 0.3 percentage points higher than in 2020, which is still lower than the increase in 2019 and is generally in an intermediate state.^[5]

This means that while the epidemic has intensified the polarization between the rich and the poor and the large-scale stimulus policies have pushed up asset bubbles more, the balance of supply and demand for ordinary goods and services is difficult to tilt the direction of high inflation.

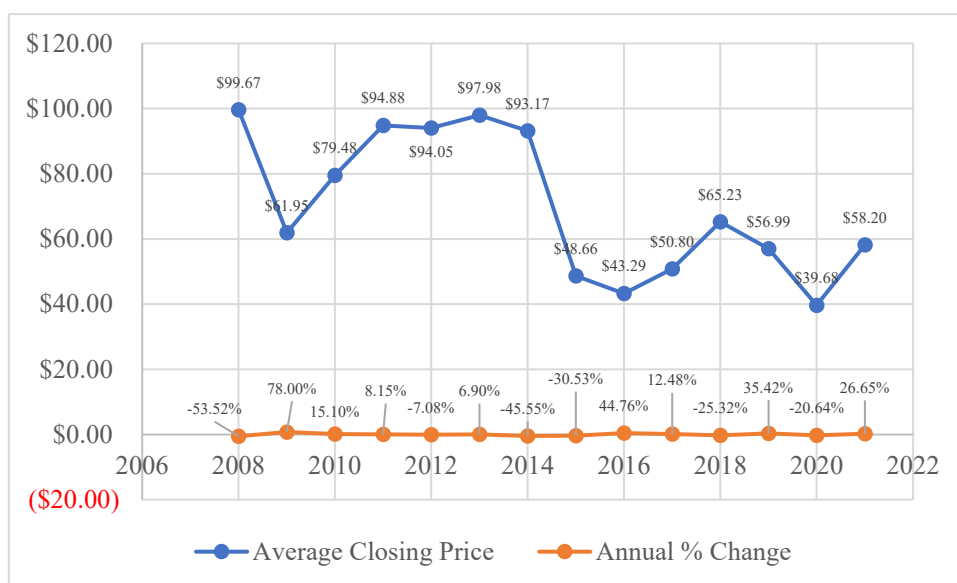


Chart 2-8 Tendency and change rate of international oil prices from 2008 to 2021
(Source: IMF, Golden Credit Rating)

It is worth mentioning that, as the external factor that has the most significant impact on China's domestic macroeconomic operation from 2018 to 2019, the China-US trade war will come to an end with the end of the current US President Trump's term. The newly elected US President Biden has repeatedly stated that the trade war is not an effective way to resolve China-US economic and trade disputes.

Although the existing tariff measures will not be cancelled in the short term, the risk of imposing new tariffs after the Biden administration takes office on January 20,

2021 can be eliminated. Simultaneously, it is inferred based on history laws that after the new presidents of the United States take office, China-US relations usually experience a "cooling-off period" of about one year.

2.4 Interpretation of Key Rules of RCEP

2.4.1 Rules of Origin

One problem that may arise from free trade agreements is trade deviation. Suppose there is no standard external tariff between the member countries. In that case, enterprises will enter the free trade area at the lowest tariff import point and then ship from the free trade area to the destination without additional tariff charges, which will lead to the transfer effect of tariff revenue. That is to say, this kind of trade deviation transfers the tariff revenue to the country with the lowest tariff in the free trade area. The countermeasure to deal with this kind of trade deviation is the principle of origin, which stipulates the preconditions of tariff-free trade for goods in free trade areas. If a free trade agreement wants to provide benefits to a member country, it is necessary to determine whether the goods are products of free trade zone member states to determine whether they are eligible for preferential treatment. At the same time, the free trade agreement also encourages manufacturers outside the boundaries of the agreement to locate production activities within the member states' borders to take advantage of the preferential treatment of goods produced in that country. These rules are collectively referred to as the rule of origin in trade agreements, which plays an essential role in shaping the global supply chain.^[6]

The goal of RCEP is to coordinate and consolidate the rule of origin. However, there are at least 22 different existing principles of origin among the parties to RCEP. How to streamline and harmonize the principle of origin is an urgent problem for RECP. The third chapter of the Legal Text of the RCEP Agreement specifies the goods' rules of origin in detail. It contains detailed rules (rules of origin and operating certification procedures), Annex 3A (product-specific rules)¹ and Annex 3B (minimum information requirements).² The judgment of the origin in RCEP is basically the same as the international standards, and it is still based on the principle of substantial change but more flexible.

According to the definition of Article 3.2 in Chapter III, the following goods are identified as originating goods:

- a) Goods wholly obtained or produced in a Party;
- b) produced in a Party exclusively from originating materials from one or more of the Parties;
- c) produced in a Party using non-originating materials, provided the good

¹*Product specific rules of origin*, which is a detailed explanation of article 2.3 C in Chapter 3, also includes the rules of origin used in article 5205 of the 6-digit tax items.

² *Minimum information requirements* lists the information required by certificate of origin and declaration of origin, unifies and further simplifies the relevant standards.

satisfies the conditions for ‘substantial conversion’.

The rules for judging ‘substantial conversion’ are explained in detail in *Chapter-3-Annex-3A*. Three basic methods can be used to determine whether a ‘substantial transformation’ has occurred.

- 1) Change in tariff classification (referred to as ‘CTC’ in this Annex);
- 2) Value Percentage Criteria: the good must have a regional value content (referred to as ‘RVC’ in this Annex) of no less than 40 per cent;
- 3) Specified input and/or process.

Simultaneously, the Legal Text of the RCEP Agreement also explains the principle of expanded accumulation. Using expanded accumulation can help overcome some of the problems associated with incoherent FTA. When countries have overlapping FTA, but not all countries are in the same block, expanded accumulation appears. For example, RCEP Party A and non-Party B have signed other FTAs and imported cotton yarn at a duty-free price and made it into the fabric. When the fabric is exported to RCEP Party C and produced as raw material, the fabric is considered to be the original ingredient according to Article 3.2 in Chapter III.

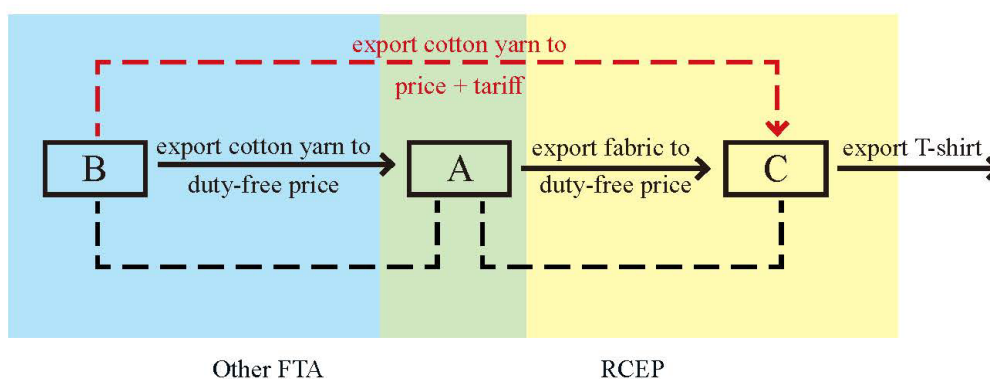


Chart 2-9 Graphical description of expanded accumulation

In addition, RCEP has added a form of declaration of origin in the origin operation certification program, which recognizes the declaration of origin issued by approved exporters and manufacturers. This measure has dramatically simplified the procedures for confirming the confirmation of the origin and Promoted the transformation of the official responsibility of certification procedures to enterprises' reputation.

Rules of origin itself do not determine how to build a supply chain, but it injects political or geographical requirements into the construction of the supply chain. A Balanced rule of origin can encourage enterprises to make long-term supply chain decisions. In order to obtain preferential treatment, the company replaces suppliers from non-member countries with suppliers from member countries even if the location is not an ideal economical one.^[7]

Consumers must experience lower prices and enterprises to obtain investment reports to flexibly determine production and procurement locations according to labour costs, market proximity and trade rules. However, when the cost of complying with the rules outweighs the benefits of preferential tariff treatment, profit-driven companies will abandon the rules of origin.

2.4.2 Tariff Concession

Tariffs are taxes levied by the government when importing goods and services from other countries or regions to increase the price of imported goods and reduce their competitiveness. Generally, tariffs are regarded as a mean of restricting trade in certain countries or reducing imports of certain types of goods and services. At the same time, tariffs are also the primary source of government revenue. The pros and cons of tariffs have always been the focus of debate. Economists generally believe that tariffs have a negative impact on economic growth and economic welfare, and tariffs have always been considered an effective means to protect the infant industry and anti-dumping. However, it is undeniable that tariffs are one of the most widely used methods of trade protectionism.

In terms of tariff concession, the number of zero-tariff products in RCEP is more than 90%, and most of the tariff is reduced to zero immediately or within ten years. This ensures that the tariff reduction effect of RCEP within a certain period will be more significant, and the liberalization of trade in goods can be realized faster. In the second chapter of the legal text of the RCEP agreement, the paper explains several problems: reducing customers, accelerating tariff commitments, and tariff differences. The schedule of tariff commitments in the annexe specifies the time and level of tariff reduction for various commodities. This agreement stipulates that two or more parties can accelerate or improve the existing tariff commitment schedule based on mutual agreement to realize trade liberalization better.^[8]

As China and ASEAN, Australia and New Zealand have had free trade agreements, and the bilateral tariffs have been significantly reduced. Overall, the tariff promised by China and the three parties are not lower than the effective tariff currently implemented. For example, in 2019, China's effective tariff to Australia is 0.7%, while 21 years after RCEP came into effect, China's average committed tariff rate to Australia is 0.9%. ¹For China and South Korea, the China-South Korea Free Trade Area Agreement were launched in May 2012. At present, China's effective tariff rates to South Korea and South Korea to China are respectively 4.1% and 9.3%. According

¹ Data source: CICC *Research on RCEP: how much tariff has RCEP reduced?*

to RCEP's commitment, the relevant tariff rates will be lower than the effective tariff rates in 6 and 4 years respectively. The signing of RCEP is the first time that China and Japan have reached bilateral tariff concessions. The current effective tariff rates of China to Japan and Japan to China have increased from 7.5% and 4.7% respectively. According to RCEP's commitments, two years and one year after RCEP's effective, the tariff rate is beginning to be lower than the currently effective tariff rate.^[9]

COUNTRY	PERIOD	TAX LIBERALIZATION RATE IN CHINA	TRADE LIBERALIZATION RATE IN CHINA	PRODUCTS WITHOUT TAX REDUCTION	TAX LIBERALIZATION RATE AMONG RCEP	TRADE LIBERALIZATION RATE AMONG RCEP	PRODUCTS WITHOUT TAX REDUCTION AFTER RCEP
Australia	15 year	96.8%	97.0%	Grain, oil, sugar, cotton, tobacco, wood, paper products, urea, organic light-emitting diodes	100.0%	100.0%	None
New Zealand	12 year	97.2%	96.3%	Grain, oil, sugar, cotton, tobacco, wood, paper products, copper	100.0%	100.0%	None
South Korea	20 year	91.0%	85.0%	13% of tax items for agricultural products, automobiles and their parts, lithium batteries, televisions, organic light-emitting diodes, high-speed rail products	92.0%	91.0%	More than 200 agricultural products such as rice, automobile and its parts, some steel and chemicals, etc.
ASEAN	10 year	94.3%	93.2%	Grain, oil, sugar, cotton, tobacco, coffee, rubber, some chemicals, wood, paper products, some textiles, televisions, automobiles and its parts	88-100%	88-100%	Motorcycles, plastic products, glass, building materials, automobiles

Chart 2-10 Comparison of trade liberalization rates between China and ASEAN, South Korea, Australia and New Zealand

(Data Resource: “An analysis of the impact of China's entry into RCEP on China's economy and related industries under the background of Sino US trade friction” Guotai Junan Securities)

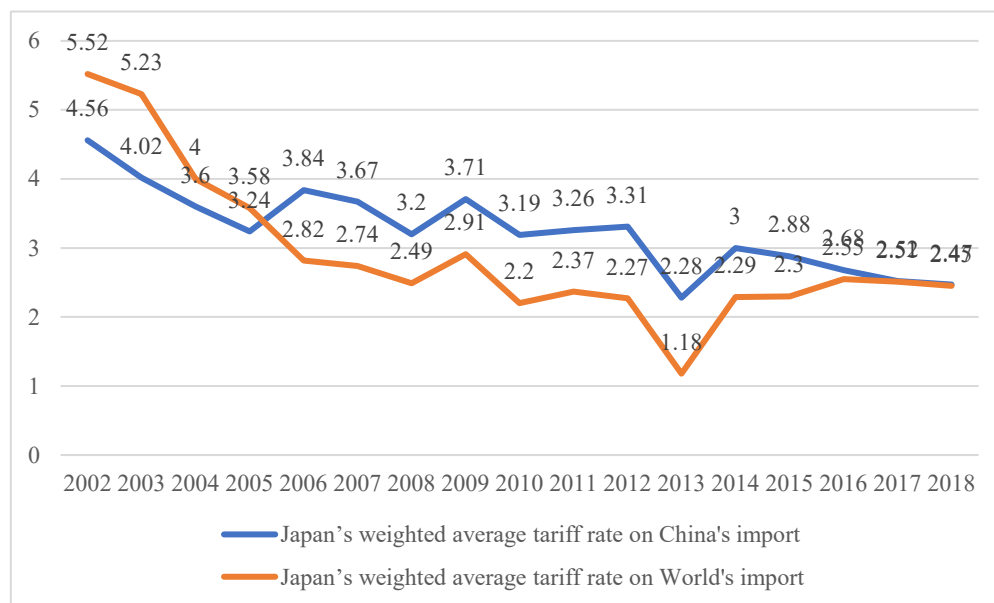


Chart 2-11 Comparison of Japan's weighted average tariff rate on China and the rest of the world from 2002 to 2018

(Data Resource: Wits trade database of the World Bank,)

Under the effect of tariffs and the rules of origin, the strategic supply chain management decisions can be influenced by two aspects: supplier selection and factory location. These strategic decisions are relatively inflexible once made, but

tariff regulation itself is a kind of human interference and has uncertainty. This contradiction is the main source of supply chain problems and risks. At the same time, the reduction and exemption of tariffs can directly reduce the purchase cost of goods and raw materials in the region, increase corporate profits, promote a decline in the price of finished products, and promote healthy competition of enterprises.

2.4.3 Non-Tariff Barriers

The traditional regional trade agreements generally reduce tariffs as the main content and involve less in the reduction of non-tariff barriers. With the vigorous promotion of WTO and other multilateral mechanisms, the global tariff level has been greatly reduced. Nowadays, there is not much room for tariff reduction. Non-tariff barriers have become the most critical barriers in the current international trade system. Non-tariff Measures refer to all import restriction measures other than the tariff, usually including quantitative restriction measures and non-tariff measures that create barriers to other trade. Quantitative restrictions are embodied in import quota systems, import license, automatic export restrictions, and quantitative foreign exchange control. Other non-tariff measures include technical barriers to trade, technical health inspection standards, customs valuation, etc. Tariff measures reduce imported goods' competitiveness by increasing the cost of imported goods, thus indirectly restricting imports. Non-tariff measures directly restrict imports. Compared with tariff measures, non-tariff measures are more targeted and often change. Some non-tariff measures are set for certain products of some countries.^[10]

RCEP aims to substantially eliminate restrictions and discriminatory measures in trade between RCEP parties and gradually realize trade liberalization. The non-tariff measures of RCEP can be summarized as the following points:

1) Abolish and prevent any form of agricultural export subsidies and abolish quantitative restrictions

The second chapter of RCEP *trade in goods* stipulates: abolishing agricultural export subsidies; and comprehensively abolishing the restrictions of non-tariff measures such as quantity restrictions, import licensing procedures, and import and export related fees and procedures.

2) Reasonable sanitary and Phytosanitary Measures

In addition to the rights and obligations already declared in the WTO Agreement on Sanitary and Phytosanitary Measures, Chapter 5 of the RCEP *Sanitary and Phytosanitary Measures* strengthens the risk analysis and review of pest-free and low-endemic areas.

3) Introduce technical consultation mechanism

Chapter 19 of the RCEP *Dispute Settlement* provides effective and transparent procedures for resolving disputes arising from the agreement. It also clearly stipulates the choice of venues for dispute settlement, consultations between the parties to the dispute, mediation or mediation, the establishment of expert groups, third-party rights, etc.

4) Customs clearance procedures and trade facilitation

The fifth chapter of RCEP, *Customs Procedures and Trade Facilitation*, stipulates: Passing provisions to ensure the predictability, consistency and transparency of customs laws and regulations. Provisions to promote effective management of customs procedures and rapid customs clearance of goods aim to create an environment that promotes the regional supply chain.

Non-tariff measures may impact procurement and execution costs and may affect the industry's supply chain structure. For example, the importing country's product standards increase the additional cost of the product, and the transportation cost of the export product to the port and the export procedure to the port will increase the cost by increasing the price. For the supply chain that needs to be produced in different countries in multiple stages, its complicated supply chain network makes its parts need to go back and forth multiple times. If its non-tariff measures, tariffs and logistics costs cannot be reduced to a certain level, this supply chain model will be challenging to operate.

3. MODEL INTRODUCTION AND RESEARCH SCHEME DESIGN

3.1 Introduction of the Global Trade Analysis Project (GTAP)

The first two chapters focused on RCEP and its critical rules. However, when analyzing what impact RCEP can bring quantitatively, it is necessary to introduce an essential tool—GTAP to define and refine these impacts. There are so many industries, elements, actors and countries involved in RECP that only a Computable General Equilibrium (CGE) model can be thoroughly detailed and in-depth. The standard GTAP model proposed by Hertel (1997) and developed by Purdue University is utilized for this analysis.

GTAP (the Global Trade Analysis Project) is a global network of researchers. ^[31]The association generated the GTAP Data Base which is a central element of GTAP and widely used to study proactive international economic policy around various issues. It is a large-scale database that is renewed periodically by the association members including known global institutions like the WTO, World Bank and European Commission. ^[31]

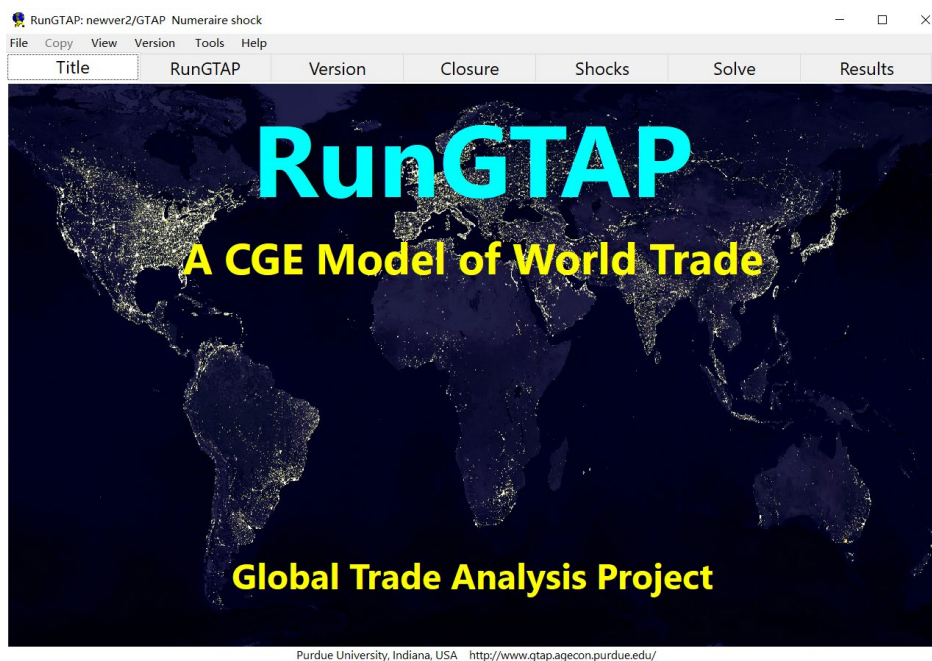


Chart 3-1 RunGtap software screenshot

The data from this database are vital and core structural for global economic policy models and related applications, especially regional economic integration that this article intends to research. Also, because of its ability to simulate the impact of multi-country and multi-sector changes in trade policies, the model can accurately and quantitatively display the implication of the signing of regional trade agreements not only on members but also on non-member countries.

This model's application is to facilitate researchers to conduct rather than reduce the time in data collection. At the same time, there are some limitations, mainly focusing on three points:

- 1) Compare base period limits. The tenth edition of the GTAP database is now six years old, with a 2014 base year. If the analysis used data from the past to simulate the future situation from the present point of view, the results of the simulation are subject to error.
- 2) The substitution elasticity in the GTAP database only varies by product category, not by country. Such a setting is overly simplified and contrary to the actual situation. However, due to the limitation of not estimating the import substitution elasticity of individual economies, this assumption can only be used.
- 3) The standard GTAP model is not for dynamic effect analysis but static. Moreover, it is assumed that all markets are perfectly competitive and that returns to scale are fixed for production which is not impractical.

For future development of the GTAP model, consider adding capital accumulation, economic growth and the setting of an imperfectly competitive market or increasing returns to scale, make the model more realistic.

Commonly, there are five factors in the GTAP model: land, technical workforce, unskilled labour, capital and natural resources, along with three typical actors: the private sector, the government sector and the manufacturer. ^[13]

In the case of estimating the effects, this tool employed in the context is one of the methodological/data contributions of this paper. This framework uses production, consumption, and government expenditures in China as sub-models. After inputting data and converting parameter coefficients, quantitative data can describe various kinds of trade relations in China. Finally, these sub-models can be connected to a multi-sector equilibrium model. The equilibrium model can be used to simulate variation in social welfare, gross domestic production, imports and exports of China

before the pursuit of trade policies and make a scheme to take corresponding measures. The base simulation in this study and data analysis will be detailed in the next part.

3.2 Simulation Design and Assumption

This section will list the key enactment in the process of using the GTAP model. For principal consideration, these choices make sure that the GTAP model is in a global economic model rather than a regional scope.

GTAP is global: it does not only cover a specific set of countries but the entire world. In this simulation, countries other than the 14 countries studied are included in the rest of world (ROW). In addition, each area follows a standard template, although it varies according to the raw data and the flexibility of key behaviors.

GTAP is a general equilibrium model. Unlike the partial equilibrium model, it is not limited to one sector or a part of the sector. At the same time, it is also have distinction with the macroeconomic model. It does not treat all production and consumption as a single commodity or a tiny number of stereotypes (for example, exportable and importable, or tradable and non-tradable). On the contrary, it represents the economy of many commodities produced by many sectors.

GTAP is a relatively static model. What GTAP simulation shows is not the change over time, but the difference between the different possible states of the global economy-the basic situation and policy situation at a fixed point in time, or two points in time (base period and future forecast period). This simulation will set two states as before and after the implementation of the RCEP policy.

GTAP is based on the input-output accounting framework. This framework is complete because all sources and uses of each economic good have been taken into account. Their inputs have also been included in production. Regardless of where the costs or benefits come from, they are accounted for using specific products or major factors.

As a relatively general and broad-based general equilibrium model, GTAP has proven to be successful based on the assumption below. We use it here as a tool to quickly participate in actual policy analysis.

3.3 Policy Scenario Based on Tariffs And Technical Barriers

3.3.1 Classification of regions and departments

Since the purpose is to analyze the impact of RCEP on China's supply chain from a macro perspective, this simulation involves 15 regions and 11 major departments. The region comprises 14 RCEP members including China and a broad category of other regions in the world. These 14 RCEP member countries include Australia, China, Indonesia, Japan, the Republic of Korea, Thailand, Malaysia, New Zealand, Singapore, Vietnam, Brunei, Myanmar, the Philippines, and Laos. The rest of the world (ROW) will act as a regional group.



*Chart 3-2 RCEP member countries
(Source: Wikipedia)*

According to the United Nations SITC-3 classification^[14] and considering the

different impacts of technical barriers to trade on various industries. And the comparative advantages of each country and region, the 57 departments in the database are regrouped into the following 11 major departments: grains crops, meat livestock and meat products, extraction mining and extraction forestry, production food, textile and clothing, light manufactory, heavy manufactory, utilities and construction, transport and communication, other service and capital goods.

	Department	The industry included
1	Grains crops	Rice, wheat, other grains, vegetables and fruit, nuts, oil crops, sugar crops, plant fibers, other ingredients
2	Meat livestock and meat products	cattle, sheep, horses, other animal products, milk, wool mulberry cocoons, forestry, fisheries, slaughter of raw meat, meat products
3	Extraction mining and extraction forestry	Coal, crude oil, natural gas, other minerals
4	Production food	Edible fats, dairy products, processed rice, sugar, other food products, beverages and tobacco
5	Textile and clothing	Textiles, clothing products industry
6	Light manufactory	Leather products, wood products, paper and products, petroleum and coal products, chemical rubber plastic products, other manufacturing industries
7	Heavy manufactory	Motor vehicles and spare parts, other transport equipment, electronic equipment, other machinery and equipment, mineral products, steel, non-ferrous metals, metal products
8	Utilities and construction	Electricity, natural gas manufacturing and distribution, water, construction
9	Transport and communication	Trade, other transport, maritime transport, air transport, communications
10	Other services	Financial services, insurance, business services, entertainment and other services, public administration, national defense, health, education, housing
11	Capital goods	Capital goods are assets that companies use to produce products that other businesses can use to create finished goods. Manufacturers of automobiles, aircraft, and machinery fall within the capital goods sector because their products are subsequently used by companies involved in manufacturing, shipping, and providing other

		services.
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Chart 3-3 The division of departments

(Source: The authors organize the categories through the GTAP database)

3.3.2 Technical route and scenario setting

This part will mainly depict the upgrading of regional trade agreements with the changes of tariff barriers and technical barriers. Although regional trade upgrades also include investment agreements, intellectual property protection and so on, it is not possible to simulate results through shocks for the time being because these elements are not yet relevant in the GTAP model.

After collecting and reclassifying the original data, first step separates them according to the assumed changes in trade policy. The next step sets specific shocks of exogenous variables, and then uses the Johansen method and RunGTAP software to enter perform general equilibrium simulation solution.

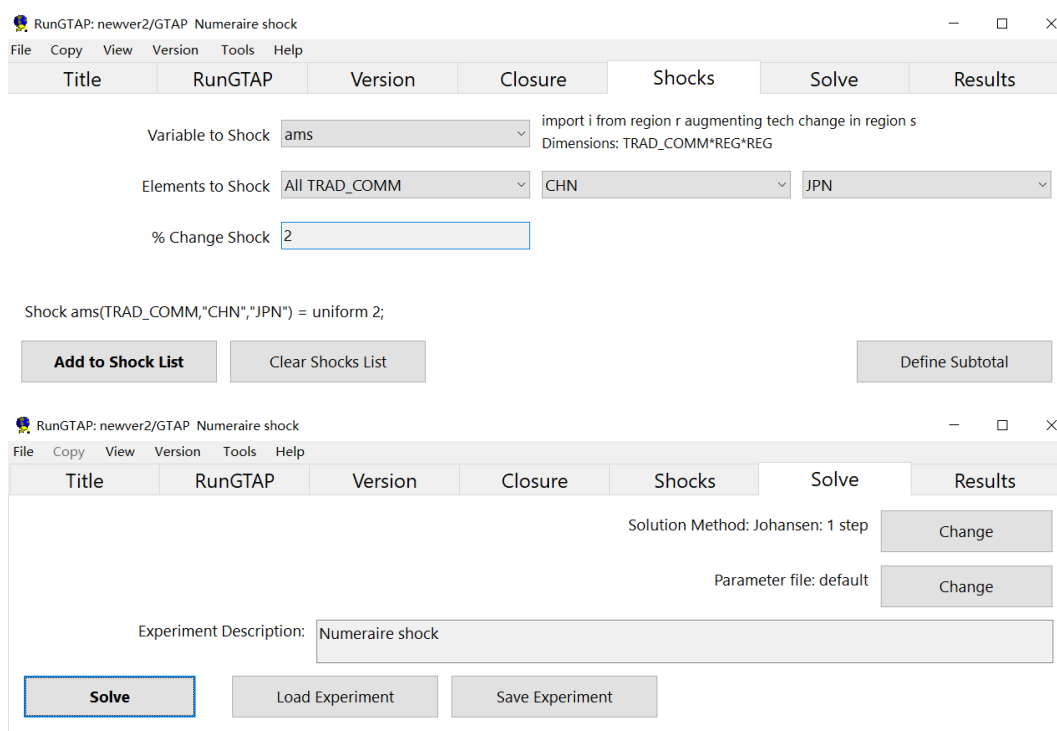


Chart 3-4 RunGtap software screenshot

Considering that one of the goals of RCEP is to eliminate tariffs between member states, the base simulation in this study therefore assumes that tariffs on imports of all commodities have been completely eliminated among RCEP member partner.

In this case, this part sets simulation scenario 1: Tariffs in RCEP member states are

reduced to zero to show that each country's economic performance after the RCEP negotiation is reached and effectively implemented.

Furthermore, based on Scenario 1, the technical barriers to trade between RCEP member countries are obviously divided. Under this framework, in order to find how technical trade barriers will affect each country, the specific simulation scenario settings are made and shown in *Chart 3-5 Simulation scenario settings*.

	Tariffs between RCEP member states	Technical barriers to trade
Simulation scenario 1	0	Unchanged
Simulation scenario 2	0	Reduced by 2%
Simulation scenario 3	0	Reduced by 10%

Chart 3-5 Simulation scenario settings

In addition, on how to quantify the impact of technical barriers to trade in RunGTAP software, this study draws on the practice of Hagemeyer & Michalek (2010). It uses the *ams* variable in the GTAP database to represent changes of technical barriers. By changing this variable, we can simulate the changes in the economic effects of reducing technical barriers to trade on member states.

4. DATA COLLECTION AND CLASSIFICATION

4.1 Changes in Welfare Level and GDP

4.1.1 Changes in Welfare Level

Welfare, in short, is the level of happiness of a group. It is sometimes considered the sum of utility (personal happiness). The regional equivalent changes generated in the simulation of GTAP model can be used to represent the overall social welfare. Equivalent change is to change the utility of consumers to the income level adjustment when the event occurs, and its impact on consumer welfare is the same as that of price under the condition of constant income. The value of EV is measured in 1992 dollars per million, and its calculation formula is as follows:

$$EV = u(r) \times INC(r) / 100$$

Where $u(r)$ represents the percentage change in per capita capital welfare. $INC(r)$ is the initial equilibrium value of regional expenditure (and must be equal to income).^[11]

	WELFARE VARIATION		
	SCENARIO 1	SCENARIO 2	SCENARIO 3
1 CHN¹	11541.74	36491.5625	136290.81
2 JPN	21959.65	36371.5195	94018.98
3 KOR	10021.29	20129.6836	60563.26
4 AUS	3034.48	8946.0557	32592.33
5 NZL	372.06	1232.8156	4675.82
6 VNM	-646.06	3662.3884	20896.19
7 THA	-78.25	4422.6763	22426.38
8 SGP	-69.58	4077.4187	20665.42
9 PHL	-248.42	1819.4314	10090.84
10 MYS	-560.01	3598.78	20233.93
11 LAO	-20.74	199.7314	1081.6
12 IDN	-464.18	3229.7129	18005.3
13 KHM	-75.02	216.7802	1383.97
14 BRN	-6.61	173.7565	895.23
15 RESTOFWORLD	-24238.47	-48899.6523	-147544.27
SUM	20521.88	75672.6604	296275.79

*Chart 4-1 Changes in welfare of RCEP member states in three scenarios
(Data Resource: GTAP Calculation)*

¹ 1 CHN: China, 2 JPN: Japan, 3 KOR: South Korea, 4 AUS: Australia, 5 NZL: New Zealand, 6 VNM: Vietnam, 7 THA: Thailand, 8 SGP: Singapore, 9 PHL: Philippines, 10 MYS: Malaysia, 11 LAO: Laos, 12 IDN: Indonesia, 13 KHM: Cambodia, 14 BRN: Brunei, 15 ROW: REST OF WORLD.

From the data in the table, we can draw two conclusions:

1) Tariff reduction is beneficial to the overall welfare of the world and the free trade zone.

In the three scenarios, the overall welfare in the free trade zone changes positively. Although the overall welfare of countries outside the free trade zone is decreasing, the overall welfare of the whole world is increasing. From scenario 1 to scenario 3, with the gradual reduction of TBT, the welfare level of the whole world gradually increases.

2) Technical barriers are the main barriers. The higher the degree of reduction, the more the overall welfare will improve.

In scenario 1, only the tariff level is reduced. Only China, Japan, South Korea, Australia, and New Zealand in the free trade zone have increased welfare levels, while the welfare levels of other countries have decreased. Among them, the welfare level of China, Japan and South Korea has increased significantly. This may be related to the fact that the RCEP is the first free trade agreement reached by China, Japan and South Korea. The reduction in tariff levels is greater than that with other countries. In scenario 2 and scenario 3, when TBT is reduced by 2% and 10% respectively, the welfare level of ASEAN countries has been greatly improved, indicating that trade barriers are the main barriers between RCEP countries.

4.1.2 Changes in GDP

Gross domestic product (GDP) is macroeconomic statistical data used to measure the total economic output of a country. It refers to a monetary measurement of the market value of all final goods and services produced in a specific period. GDP is usually used as an indicator of international comparison and economic development and is generally regarded as the most powerful statistical indicator of countries' development and progress in the world.

GDP is usually divided into real GDP and nominal GDP. Real GDP refers to the total amount of money calculated based on the market price of a specific base year for the final products and services that the country's residents have won in a year. Because it excludes the effects of price changes in different years, real GDP is considered to reflect the actual changes in real output in the gross domestic product during this period. The nominal GDP is a macroeconomic analysis of the value of goods and services using current prices. In other words, changes in nominal GDP reflect both changes in actual output and changes in prices. Therefore, it is usually used in the international market to compare the economic conditions of countries.

The formula of nominal GDP is the sum of the private expenditures, government

expenditures, investment expenditures, exports of international trade, transport services and net trade at world prices.^[12]

$$\begin{aligned}
 \text{Nominal GDP} = & \sum_c [PpAc,r * QpAc,r + PgAc,r * QgAc,r + PiAc,r * QiAc,r] \\
 & + \sum_m PdSm,r * QsTm,r \\
 & + \sum_c \left[\sum_d PFOBc,r,d * QXSc,r,d - \sum_d PCIFc,s,r * QXSc,s,r \right]
 \end{aligned}$$

The relationship between real GDP and nominal GDP is as follows:

$$\text{Real GDP} = \text{Nominal GDP}/R$$

Where R means the GDP deflator. GDP deflator can be used to measure changes in the prices of all goods and services in the economy.

In the GTAP database, there are three GDP variables: PGDP, QGDP and VGDP. QGDP represents the real GDP and PGDP represents the GDP deflator. The relationship between them is:

$$PGDP_{(r)} = VGDP_{(r)} - QGDP_{(r)} , \quad PGDP_{(r)} = \text{Nominal GDP}/QGDP^{[1]}$$

	VGDP			QGDP (Real GDP)			PGDP		
	S 1	S 2	S 3	S 1	S 2	S 3	S 1	S 2	S 3
1 CHN¹	0.13	0.47	1.82	0.13	0.35	1.26	0.01	0.12	0.55
2 JPN	2.35	3.29	7.05	0.10	0.31	1.18	2.25	2.97	5.87
3 KOR	1.89	3.36	9.24	0.29	0.79	2.78	1.59	2.57	6.46
4 AUS	0.54	1.53	5.48	0.13	0.37	1.32	0.41	1.16	4.16
5 NZL	0.68	1.51	4.84	0.03	0.33	1.54	0.64	1.18	3.30
6 VNM	-0.43	2.82	15.82	0.40	2.22	9.51	-0.83	0.60	6.31
7 THA	-0.15	1.55	8.34	0.10	0.91	4.13	-0.25	0.64	4.21
8 SGP	-0.13	1.59	8.46	0.01	0.80	3.93	-0.14	0.79	4.53
9 PHL	-0.60	1.16	8.17	0.11	0.62	2.68	-0.70	0.53	5.49
10 MYS	-0.49	1.01	7.02	0.02	0.87	4.28	-0.51	0.14	2.74
11 LAO	-0.77	2.52	15.69	0.58	1.93	7.36	-1.35	0.59	8.33
12 IDN	-0.58	0.07	2.67	0.05	0.38	1.69	-0.63	-0.31	0.98
13 KHM	-1.74	0.11	7.51	0.33	2.14	9.36	-2.08	-2.03	-1.85
14 BRN	-0.32	1.19	7.22	0.00	0.54	2.69	-0.32	0.65	4.53
15 RESTOFWORLD	-0.33	-0.60	-1.69	-0.01	-0.02	-0.06	-0.32	-0.58	-1.63
SUM	0.05	21.57	107.64	2.27	12.55	53.65	-2.23	9.02	53.98

Chart 4-2 Changes in GDP of RCEP member states in three scenarios
(Data Resource: GTAP Calculation)

¹ 1 CHN: China, 2 JPN: Japan, 3 KOR: South Korea, 4 AUS: Australia, 5 NZL: New Zealand, 6 VNM: Vietnam, 7 THA: Thailand, 8 SGP: Singapore, 9 PHL: Philippines, 10 MYS: Malaysia, 11 LAO: Laos, 12 IDN: Indonesia, 13 KHM: Cambodia, 14 BRN: Brunei, 15 ROW: REST OF WORLD.

Through the data simulated by GTAP, we can draw two conclusions:

- 1) **The signing of RCEP will make the real GDP of all member countries in the region grow positively, and its growth will increase with the reduction of technical barriers.**

In the three scenarios, Vietnam, Laos, Cambodia and South Korea have larger real GDP changes, and their GDP is positively affected by RCEP. And with the reduction of technical barriers, the degree of benefit is greatly improved. The real GDP changes of China are 0.13, 0.35 and 1.26 respectively (*Chart 4-2 Changes in GDP of RCEP member states in three scenarios*). That is to say, the impact of RCEP on China's real GDP is not so obvious compared with other countries.

- 2) **If PGDP is positive, it means that the commodity price of an economy is on the rise. That is to say; the economy has entered the stage of inflation. On the contrary, when PGDP is negative, it means that the commodity price of an economy is on the decline. If it is negative for two consecutive quarters, it means that the economy has entered the stage of deflation.**

In scenario 1, although the nine ASEAN countries' real GDP is increasing, their GDP deflator is negative. That is to say, the commodity prices of the nine ASEAN countries are generally falling. However, the commodity prices of the other five countries rose in general. With the reduction of technical barriers, Vietnam, Thailand, Singapore, the Philippines, Malaysia, Laos, and Cambodia gradually come out of deflation and enter the inflation stage.

4.1.3 Free Trade Areas Theory of Peter Robson

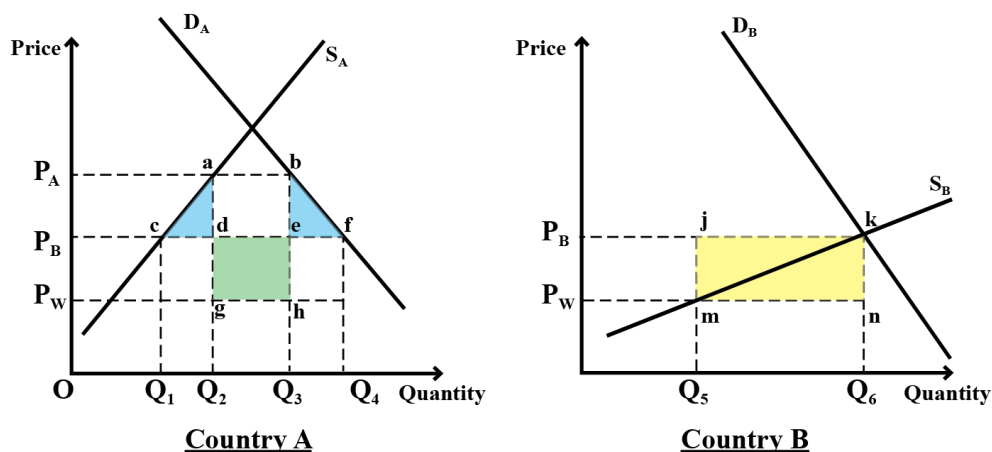
The two-countries model of free trade areas theory that Peter Robson mentioned in the book *The Economics of International Integration* can reasonably explain the reason of RCEP regional economic growth.^[13]

4.1.3.1 scenario assumption of free trade areas theory

Chart 4-3 The two-countries model of free trade areas theory- SCENARIO I and *Chart 4-4* show the demand supply curves of country A and country B for a given product M. Suppose that the labor productivity of product M in country A is lower than that in country B, and the elasticity of product supply curve in country B is higher than that in country A, so the price P_A of product M in country A is higher than that in country B, and the supply curve S_A is steeper than S_B . P_W is the lowest world price of product M. Let us assume two scenarios:

SCENARIO I: There is no free trade zone between A and B.

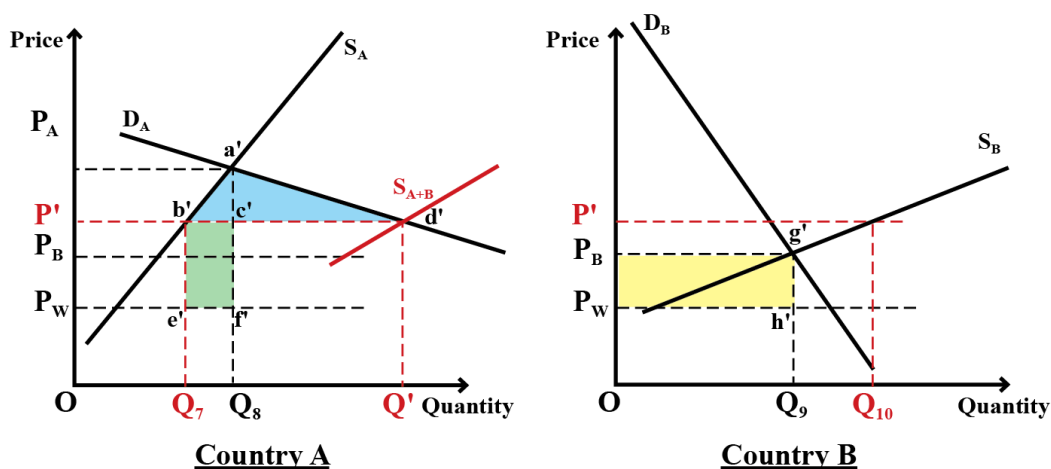
Country A's demand for products is OQ_3 , and its supply is OQ_2 , so it can be concluded that its supply gap is Q_2Q_3 . To meet the needs of consumers, country A imports products M from countries with the lowest prices in the world and imposes a tariff $P_W P_A$. Country B reaches the Equilibrium Point of supply and demand at the price P_B , and the quantity is OQ_6 .



*Chart 4-3 The two-countries model of free trade areas theory- SCENARIO I
(Data Resource: "The Economics of International Integration")*

SCENARIO II: A free trade zone is established between A and B.

Since A and B belong to the same free trade zone, country A will not impose tariffs on goods imported from country B. That is to say, country A imports product M from country B at a price P_B . At this time, country A's supply of goods M in quantity is reduced to Q_1 , and demand rises to Q_4 , and its supply and demand gap is Q_1Q_4 .



*Chart 4-4 The two-countries model of free trade areas theory- SCENARIO II
(Data Resource: "The Economics of International Integration")*

4.1.3.2 analysis of free trade areas theory

- 1) **When the supply of country B can meet the demand of country A, that is, $OQ_6 > Q_1Q_4$, assuming $Q_5Q_6 = Q_1Q_4$ (Chart 4-3 The two-countries model of free trade areas theory- SCENARIO I)**

For country A, S_{acd} represents the production effect of country A, and S_{bef} represents the consumption effect of country A, which together constitute country A's trade creation. S_{abde} said that the internal transfer from national income to consumer income is not a loss of direct social income. S_{degh} represents the difference between initial tariff revenue and internal transfer, that is, the trade transfer cost incurred by country A. Whether country A can benefit from the establishment of a free trade zone depends on whether its trade creation is greater than trade transfer.

As for country B, it imports Q_5Q_6 goods M from the country with the lowest price in the world, and the tariff income from this is S_{jmnk} . This shows that after B and A established a free trade zone, B has gained additional benefits.

- 2) **When the supply of country B cannot meet the demand gap of country A, that is, $OQ_6 < Q_1Q_4$, the result is shown in Chart 4-4 The two-countries model of free trade areas theory- SCENARIO II.**

For country A, because country B's supply cannot meet the demand gap, a free trade zone equilibrium price P' will be formed, that is, the price corresponding to when $Q_7Q' = OQ_{10}$. Its trade creation is S_{acd}' , and the additional tariff revenue obtained is S_{befc}' .

For country B, because country B can still import from other parts of the world, the price of product M in country B is still P_B . Country B can still get the tariff income of the yellow area.

4.1.3.3 conclusion of free trade areas theory

From the above analysis, it can be concluded that country B with higher labor production efficiency and lower commodity prices is more likely to benefit from the establishment of a free trade zone, while for country A with lower labor production efficiency, the change in its welfare level depends on country B. Whether the supply volume of China and the trade creation generated by the establishment of the free trade zone can cover the loss of trade transfer. This can explain why the indicators of China, Japan, South Korea, Australia and New Zealand are always higher than those of ASEAN countries in the analysis of GTAP. The average labor productivity of the former is higher than the latter, so it can get more benefits from the establishment of

RCEP.

4.2 Changes in the Import and Export Scale

Value of Imports into Region r Evaluated at World (cif) Prices			
(unit: %)	SCENARIO 1	SCENARIO 2	SCENARIO 3
1 CHN ¹	2.7799	4.1017	9.39
2 JPN	4.5828	6.5008	14.17
3 KOR	4.9837	6.8865	14.5
4 AUS	2.9676	5.1336	13.8
5 NZL	1.5293	3.3148	10.46
6 VNM	3.8652	5.5067	12.07
7 THA	1.1589	3.3674	12.2
8 SGP	-0.2973	1.0485	6.43
9 PHL	0.6343	2.8288	11.61
10 MYS	0.1556	2.1776	10.27
11 LAO	2.6072	5.116	15.15
12 IDN	1.1323	3.1115	11.03
13 KHM	2.5945	3.4276	6.76
14 BRN	-0.1348	1.1021	6.05
15 RESTOFWORLD	-0.4396	-0.851	-2.5

Chart 4-5 Changes in $Vivreg^2$ of RCEP member states in three scenarios
(Data Resource: GTAP Calculation)

Value of Exports From Source r Evaluated at World (fob) Prices			
(unit: %)	SCENARIO 1	SCENARIO 2	SCENARIO 3
1 CHN	1.74	2.4674	5.38
2 JPN	2.5761	3.251	5.95
3 KOR	3.0363	4.0857	8.28
4 AUS	1.7014	2.8906	7.65
5 NZL	1.1396	2.303	6.96
6 VNM	2.9864	3.0073	3.09
7 THA	0.732	1.7792	5.97
8 SGP	-0.2411	1.1176	6.55
9 PHL	0.9503	1.818	5.29
10 MYS	0.0669	1.4864	7.16
11 LAO	1.6003	1.894	3.07

¹ 1 CHN: China, 2 JPN: Japan, 3 KOR: South Korea, 4 AUS: Australia, 5 NZL: New Zealand, 6 VNM: Vietnam, 7 THA: Thailand, 8 SGP: Singapore, 9 PHL: Philippines, 10 MYS: Malaysia, 11 LAO: Laos, 12 IDN: Indonesia, 13 KHM: Cambodia, 14 BRN: Brunei, 15 ROW: REST OF WORLD.

² $Vivreg$ =value of imports into region r evaluated at world (cif) prices

12 IDN	1.0236	2.6884	9.35
13 KHM	1.9761	2.3459	3.83
14 BRN	-0.0979	0.5567	3.17
15 RESTOFWORLD	-0.1302	-0.3145	-1.05

*Chart 4-6 Changes in V_{xwreg}^1 of RCEP member states in three scenarios
(Data Resource: GTAP Calculation)*

Chart 4-5 and 4-6 shows the changes in the import and export scale of relevant countries and regions under the three scenarios. The following are specific to scenarios 1,2 and 3.

Scenario 1: with the tariff reduction to 0 among RCEP member countries, intraregional trade is remarkably promoted, and the level of imports and exports of each member country increases significantly. In terms of imports, South Korea increased the most, by 4.98%, followed by Japan at 4.58%, Vietnam at 3.87%, Australia at 2.97%, China at 2.78%, Laos at 2.61% and Cambodia at 2.59% (*Chart 4-5 Changes in V_{iwreg} of RCEP member states in three scenarios*), except for Singapore and Brunei, two countries with slightly negative growth, other regions are experiencing positive growth.

In terms of exports, South Korea grew the most, with a growth rate of 3.04%, followed by Vietnam 2.99%, Japan 2.58%, Cambodia 1.98%, China 1.74%, Australia 1.70%, Laos 1.60%, New Zealand 1.14% (*Chart 4-6 Changes in V_{xwreg} of RCEP member states in three scenarios*), while excluding Singapore and Brunei. Except for the slight negative growth in the two countries, the other regions are all experiencing positive growth.

On the whole, the complete elimination of tariffs in the RCEP region has a significant effect on the import and export scale of member countries, and the growth rate is as high as about 5%. Among them, Singapore and Brunei, the two hostile growth countries, may be related to their national characteristics. A country with a small land area and a small population. Under this scenario, China's import and export scale has increased by about 2%. It can be seen that the achievement of RCEP will obviously promote the expansion of China's import and export trade scale.

Scenario 2-3: as can be seen from *Chart 4-5 Changes in V_{iwreg} of RCEP member states in three scenarios* and *Chart 4-6 Changes in V_{xwreg} of RCEP member states in three scenarios*, with the gradual reduction of technical barriers to trade in the region, the growth level of the import and export trade scale of each member country shows a trend of gradual increase. South Korea, for example, saw 6.89 per cent and 4.09 per cent growth in exports and imports when TBT was reduced by 2 per cent, and 14.50

¹ V_{xwreg} = value of exports from source r evaluated at world (fob) prices

per cent and 8.28 per cent, respectively, when TBT was decreased by 10 per cent. In China's case, from scenario 1 to scenario 3, the import scale's growth rate changed from 2.78% to 9.39%, and the growth rate of the export scale changed from 1.74% to 5.38%.

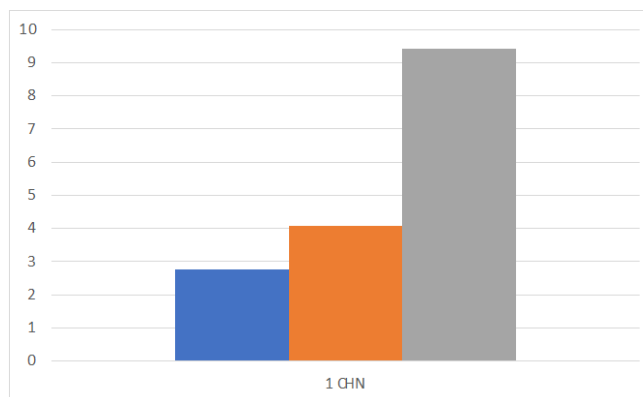


Chart 4-7 Changes in Vwreg of China in three scenarios
(Data Resource: GTAP Calculation)

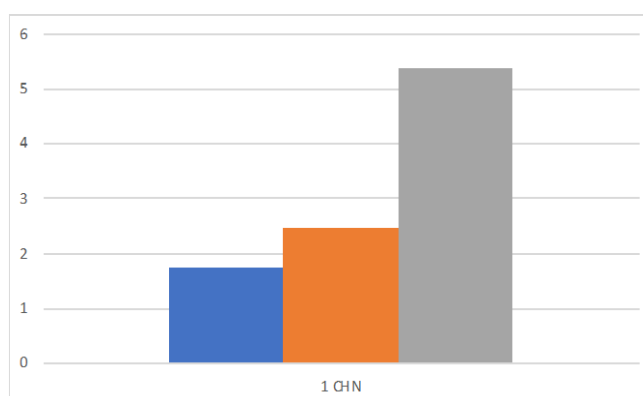


Chart 4-8 Changes in Vxwreg of China in three scenarios
(Data Resource: GTAP Calculation)

Chart 4-7 Changes in Vwreg of China in three scenarios and Chart 4-8 Changes in Vxwreg of China in three scenarios show the change in the scale of China's import and export trade under three scenarios. It can also be seen that with the gradual reduction of TBT within the RCEP region, China's import and export trade is also gradually increasing the scale of growth.

4.3 Changes in The Terms of Trade

Value of Exports From Source r Evaluated at World (fob) Prices			
(unit: %)	SCENARIO 1	SCENARIO 2	SCENARIO 3

1 CHN¹	-0.1112	-0.0693	0.1
2 JPN	1.8625	2.3435	4.27
3 KOR	0.9646	1.4687	3.48
4 AUS	0.3948	1.2575	4.71
5 NZL	0.5926	1.0868	3.06
6 VNM	-0.7627	-0.275	1.68
7 THA	-0.2032	0.236	1.99
8 SGP	-0.0371	0.4663	2.48
9 PHL	-0.4418	0.1876	2.71
10 MYS	-0.2835	0.1501	1.88
11 LAO	-0.7566	0.1576	3.81
12 IDN	-0.4793	-0.1182	1.33
13 KHM	-0.6634	-0.6611	-0.65
14 BRN	-0.1551	0.8037	4.64
15 RESTOFWORLD	-0.1237	-0.2443	-0.73

*Chart 4-9 Changes in Tots² of RCEP member states in three scenarios
(Data Resource: GTAP Calculation)*

From Chart 4-9, scenario 1 to scenario 3, with the gradual reduction of technical barriers to trade within the RCEP region and the removal of tariffs to 0, the growth rate of the scale of trade among RCEP member countries is gradually increasing, at the same time, the terms of trade are improving. The simulation results of the GTAP model show the change rate of terms of trade (Tots), $tots = psws - pdws$, where psws is the change rate of the export price index and pdws is the change rate of the import price index.

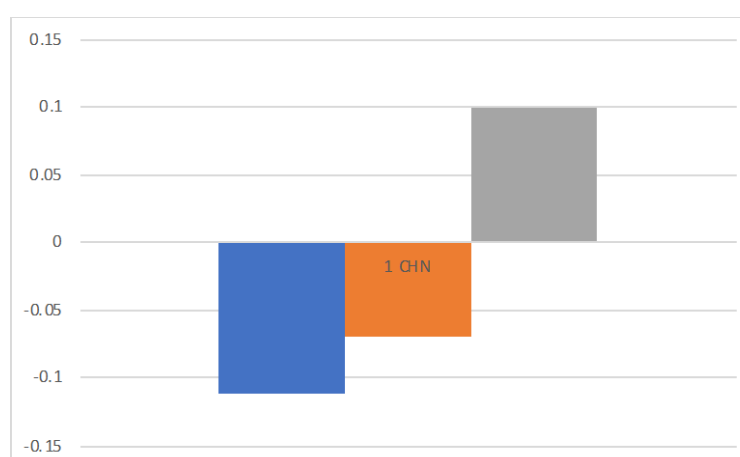


Chart 4-10 Changes in Tots of China in three scenarios

¹ 1 CHN: China, 2 JPN: Japan, 3 KOR: South Korea, 4 AUS: Australia, 5 NZL: New Zealand, 6 VNM: Vietnam, 7 THA: Thailand, 8 SGP: Singapore, 9 PHL: Philippines, 10 MYS: Malaysia, 11 LAO: Laos, 12 IDN: Indonesia, 13 KHM: Cambodia, 14 BRN: Brunei, 15 ROW: REST OF WORLD.

² Tots=terms of trade for region r

(Data Resource: GTAP Calculation)

Chart 4-10 Changes in Tots of China in three scenarios shows the simulation results that under scenario 1 China's terms of trade deteriorated before it joined RCEP. Still, under scenario 2-3, with the gradual reduction of technical barriers to trade within the region, China's terms of trade gradually improved, and in scenario 3, to achieve a positive change. China's exports are mainly concentrated in ASEAN (14.4%), followed by Japan (5.7%), South Korea (4.4%), Australia (1.9%), and New Zealand (0.2%). The distribution of imports is similar, mainly concentrated in ASEAN (13.6%), followed by South Korea (8.4%), Japan (8.3%), Australia (5.8%), and New Zealand (0.6%). In ASEAN countries, China's main trading partners are concentrated in Vietnam, Singapore, Malaysia, Thailand and Indonesia. From the export product structure perspective, China's exports to RCEP members account for a relatively high proportion of electrical equipment, chemical products, and available equipment. Imports show a certain degree of difference. China imports more chemicals and resource products from the ASEAN region. In electrical equipment, China mainly uses parts and components for ASEAN and South Korea, while for Japan, it uses mostly capital goods and finished products.

Since the Sino-US trade friction, the trade war has led to an increase in uncertainty in China's trade chain that is highly dependent on the United States. The establishment of RCEP is expected to reduce China's direct export dependence on the United States, thereby enhancing the export trade chain's stability. According to data from the General Administration of Customs, RCEP is an integral part of China's foreign trade. The total trade volume between China and RCEP member countries accounted for more than 30% of the total trade volume, and the total exports accounted for more than 27%. Among them, ASEAN is currently one of the most important trading partners. Since the Sino-US trade friction in 2018, China and ASEAN's trade volume has gradually exceeded the trade volume between China and the United States. Although this gap has narrowed during the epidemic, ASEAN still accounts for 15% of China's exports from January to September 2020. In the future, with the implementation of the RCEP agreement, the degree of trade integration between China, ASEAN, Japan, and South Korea will be further enhanced, and the process of value chain establishment will also be smoother. Relatively stable trade relations help reduce the uncertainty of China's foreign trade.

For political, economic and other reasons, China must advance the negotiation process of RCEP. Still, in this process, China should also make great efforts to reduce the technical barriers to trade in the RCEP region to avoid the deterioration of China's terms of trade, to reduce TBT to the level of scenario 3 in order to improve China's terms of trade.

4.4 Departmental output changes

4.4.1 General overview

When analysing departmental output changes, the main variable used is qo which is set as REG *ACTS^[13] in the GTAP code. The composite index of output from departmental activity, $qo_{a,r}$, in percentage change form, can be calculated as a combination of an intermediate demand bundle, $qint_{a,r}$, with the value added bundle, $qva_{a,r}$. It does not represent the level Q of production, but the percentage differential, $dQ/Q \times 100$, shown the base period output, simulation period output, the variation and the growth rate of output according to different sectors in different countries. Finally, we list the variation and the growth rate of output in the scenario 1, 2, 3 to study the impact of the policy on departmental output, as shown in the table:

(unit: billion dollars, %)		Scenario 1		Scenario 2		Scenario 3	
	Department	Ch ¹	Sim ²	Ch	Sim	Ch	Sim
1	Grains crops	2529.75	0.2348	1562	0.145	-2308.75	-0.21
2	Meat livestock and meat products	-316.25	-0.0514	-205	-0.0333	240	0.04
3	Extraction mining and extraction forestry	-1371	-0.1565	-4841.31	-0.5528	-18722.8	-2.14
4	Production food	1970.375	0.1913	2248.25	0.2183	3359.81	0.33
5	Textile and clothing	11482.5	0.9648	7237.25	0.6081	-9743.75	-0.82
6	Light manufactory	-8518.25	-0.3077	-8532.25	-0.3082	-8588.25	-0.31
7	Heavy manufactory	-24657	-0.2665	-41165	-0.4449	-107199	-1.16
8	Utilities and construction	10888.5	0.3387	22327.25	0.6945	68082.5	2.12
9	Transport and communication	-183.5	-0.0062	355.75	0.0121	2512.25	0.09
10	Other services	-488.5	-0.0101	3936	0.0817	21635.5	0.45
11	Capital goods	21237	0.4652	43239.5	0.9472	131248.5	2.88
	Total change	12573.63		26162.44		80516.01	

*Chart 4-11 Changes in the output structure of various industries in China
(Data Resource: GTAP Calculation)*

¹ The variation from base period to simulation period (unit: billion dollar)

² Growth rate from the base period to the simulation period (unit: %)

The changes in the output structure of each industry are shown in *Chart 4-11 Changes in the output structure of various industries in China*. As a whole, it shows that all these scenarios will bring a positive impact on Chinese industry output based the fact that all the total changes are all positive in scenario 1(12573.63 billion dollars), scenario 2(26162.44 billion dollars) and scenario 3(80516.01 billion dollars).

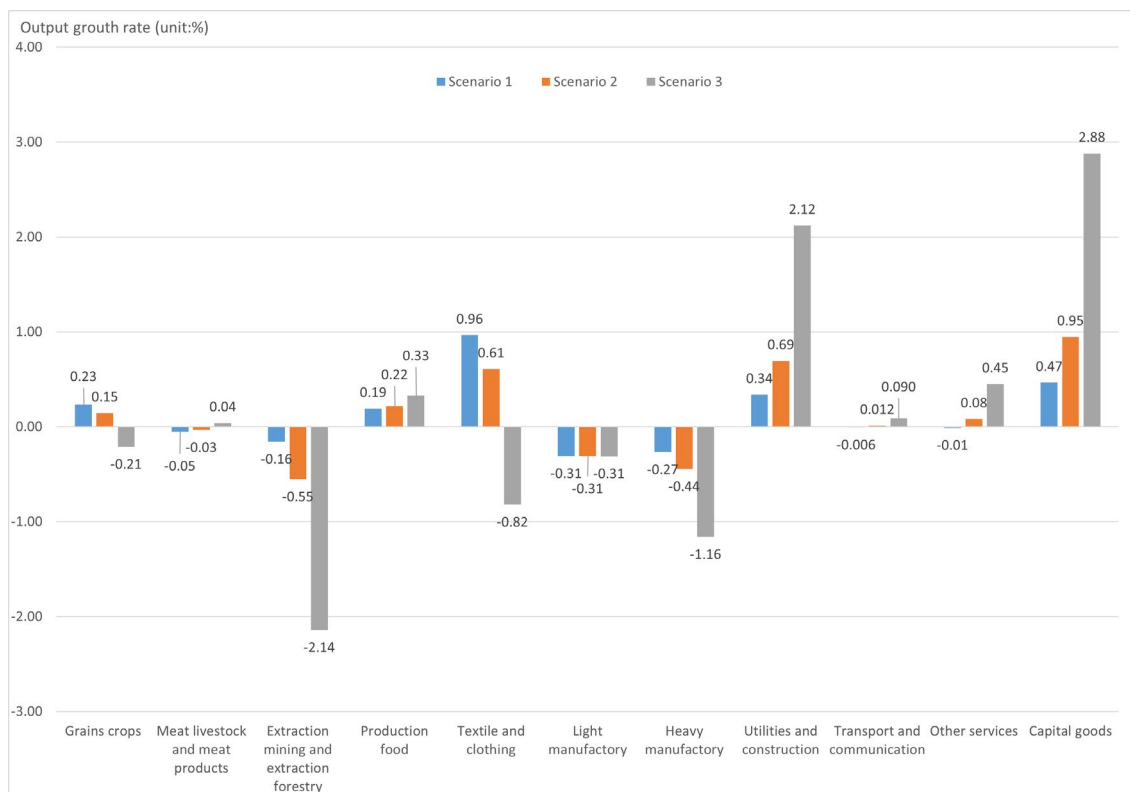


Chart 4-12 Output growth rate of various industries in China (unit:%)
 (Data Resource: GTAP Calculation)

Among them, the output growth rate of *Production food* (0.19%, 0.22%, 0.33%), *Utilities and construction* (0.34%, 0.69%, 2.12%), *Other services* (-0.01%, 0.08%, 0.45%) and *Capital goods* (0.47%, 0.95%, 0.88%) have increased; the output of *Extraction mining and extraction forestry* (-0.16%, -0.55%, -2.14%), *Light manufactory* (-0.31%, -0.31%, -0.31%), and *Heavy manufactory* (-0.24%, -0.44%, -1.16%) will sustainably decrease; *Meat Livestock and meat products* and *Transport and communication* remain basically unchanged.

Also, the China's various industries will also be in an active development trend with the implementation of policies. In the scenario 1, there are 5 of 11 departments are growing. In scenarios 2 and 3, the number will be enhanced, with 7 and 6 sectors growing respectively.

At the same time, different tariff and technical barrier policies do have a enormous

impulse on departmental output, which is more significant in *Textile and clothing* and *Grains crops*. In scenario 1, the output growth trend can reach 0.23% (*grains crop*) and 0.96% (*textile and clothing*), which are the highest. When the technical barrier is reduced by 2%, the ground rate is reduced accordingly to varying degrees (0.15%, 0.61%). But when the technical barrier is further reduced by 10%, the two sectors will have negative growth, and the *grain crops* will become -0.21% and *textile and clothing* become -0.82%.

4.4.2 Transport and communication

Compared with other industries, the growth rate of *Transport and Communication* is relatively stable but still showing a growing trend. Due to the large base period industry value of *Transport and Communication*, the growth can reach US\$2512.25 billion in Scenario 3.

(unit: billion dollars, %)	Scenario 1		Scenario 2		Scenario 3	
	Ch ¹	Sim ²	Ch	Sim	Ch	Sim
Transport and communication	-183.5	-0.0062	355.75	0.0121	2512.25	0.09

Chart 4-13 Changes in the output structure of transport and communication in China (Data Resource: GTAP Calculation)

4.5 Simulation results analysis conclusion

To conclude all above, the comprehensive simulation results can draw the following conclusions:

- 1) The establishment of RCEP can improve the overall welfare of member states, especially China, and with the asymptotic reduction of TBT, the welfare level of the whole world progressively gains. Technical barrier is the main barrier to get high welfare for the lower the degree of reduction, the less the overall welfare will enhance.
- 2) Implementation of assorted policies will make the real GDP of all member countries in the region grow positively, and its pace will upgrade with the reduction of technical barriers. With the reduction, Vietnam, Thailand, Singapore, the Philippines, Malaysia, Laos, and Cambodia gradually come out of deflation and enter the inflation stage. After China joined RCEP, the GDP growth rate is

¹ The variation from base period to simulation period (unit: billion dollar)

² Growth rate from the base period to the simulation period (unit: %)

not too high, but due to China's massive GDP base, the absolute value of growth is considerably high. The import and export share will boost as well, but some trade conditions will be sacrificed. Therefore, the trade surplus will be further diminished.

- 3) With the gradual reduction of TBT within the RCEP region, China's import and export trade is also gradually enlarging the scale of growth. Increase, which to a specific extent shows that the division of labor is getting more and more meticulous, makes full use of the comparative advantages of various regions. Once the RCEP is established, the member countries will achieve a mutually beneficial and win-win situation in the region. However, the product trade structure of the RCEP member states is slowly converging. With the exception of some countries and departments, the import and export structures of products in each country will gradually be resembling. The industrial structure upgrade of the countries in the region will accelerate, which will be accompanied by the shift of the international industrial structure. This may become an inferiority of integration to some degree, causing structural obstacles. Although China and its partner countries are mutually complementary, they still have similarities with many countries in terms of resource endowments, industrial structure, and economic development stage, especially the ASEAN countries. Regarding the structure of export products, China and some newly industrialized countries in ASEAN still dedicate to low-tech labor-intensive products. The commonness of industrial structure tremendously hinders the further development of bilateral trade. How China transforms this contest into the complementary competition is an inevitable requirement for China in the future to expand cooperation with other countries in RCEP and promote its economic development.
- 4) China's terms of trade have deteriorated before it joined RCEP. Still, the implementation of such policies as tariffs and technical barriers will bring positive conversion.
- 5) From the perspective of specific industrial output, after China joined RCEP, Production food, Utilities and construction, Other services, Capital goods, Meat Livestock, and meat products and Transport and communication have all increased, and the other's have been hit. The growth rate of Transport and Communication is relatively stable but still showing a growing trend.
- 6) At the same time as the overall growth of China's trade, part of our country's industrial output will be impacted to different degrees, focusing on the negative effects brought about by the fields of Extraction mining and extraction forestry, Light manufactory, and Heavy manufactory. This shows that China lacks competitive advantages in these types of the manufacturing industry. Under the

impact of trade liberalization, such manufacturing companies will face certain challenges.

5. RCEP'S ESTIMATED IMPACT ON CHINA'S SUPPLY CHAIN

5.1 Overview of the global status of China's supply chain

5.1.1 The development process of the supply chain

The supply chain is considered to be a very complex network chain model. The supply chain involves all activities in the process, from production to the delivery of final products and services. It covers the entire process from raw material supply chain, parts supply chain, product manufacturer, distributor, retailer to the final customer.

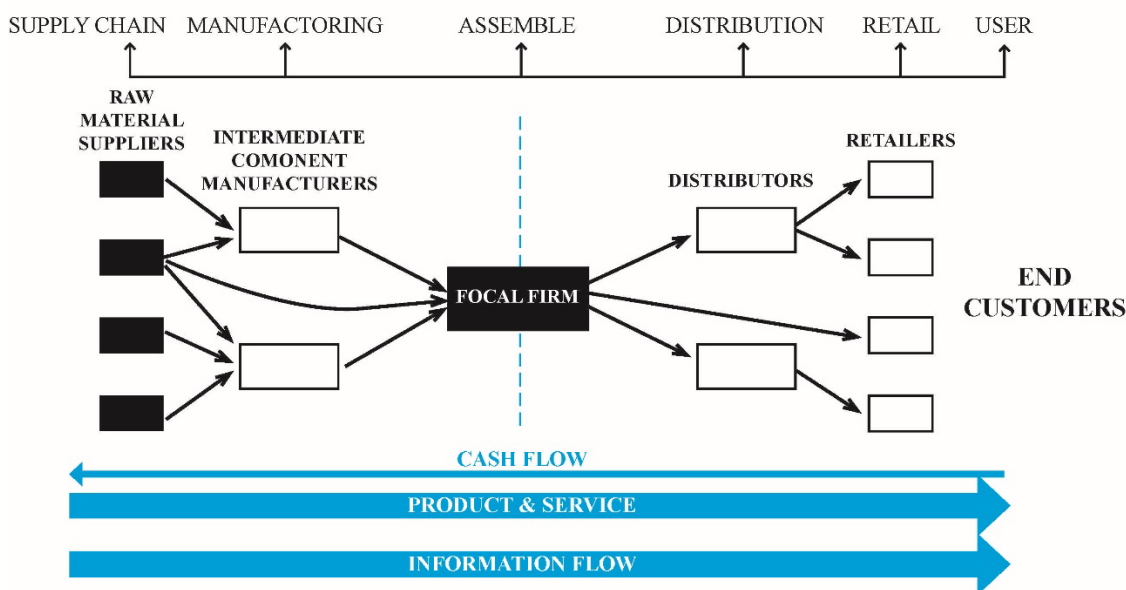


Chart 5-1 Network Model of Supply Chain

The concept of the supply chain was put forward in the 1980s. It is generally believed that it evolved from the value chain proposed by Michael Porter in competitive advantage. In the past 100 years, with the development of technology and transportation mode, the supply chain has gradually developed from local regional supply and manufacturing to globalization. Before the industrial revolution, most supply chains were localized. For example, farmers harvest cotton, spin and weave cloth, and then make clothes for sale to consumers. Even the Silk Road through Central Asia and the spice road in the Indian Ocean only bring the cost to the final destination. Due to the high transportation cost, long-distance trade is limited to spices, weapons, luxury goods and other high-value goods. Before the industrial revolution,

most supply chains were localized. For example, farmers harvest cotton, spin and weave cloth, and then make clothes for sale to consumers. Even the Silk Road through Central Asia and the spice road in the Indian Ocean only bring the cost to the destination. Due to the high transportation cost, long-distance trade is limited to spices, weapons, luxury goods and other high-value goods. All these histories promote the process of supply chain globalization. Enterprises need to choose the most competitive partners around the world according to their own needs. Trade agreements like RCEP can promote the global supply chain by promoting trade facilitation.

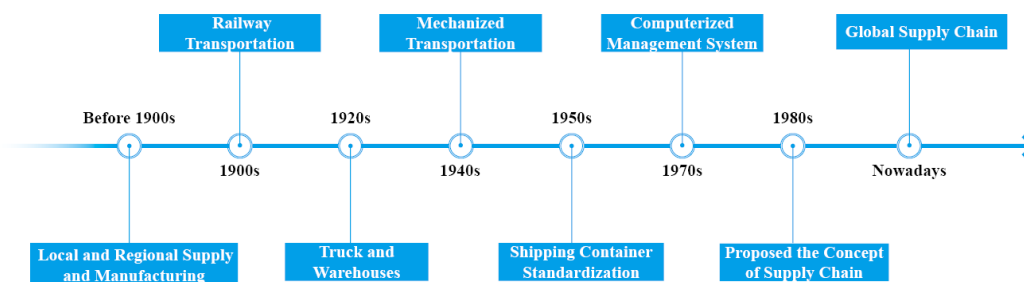


Chart 5-2 The timeline of supply chain development

The global supply chain refers to the worldwide procurement, production, and consumption that have been closely linked, forming an international division of labour system. After World War II, globalization's development made the division of labour of industry and products more detailed. With the change of competitive advantages in various countries, traditional industries have experienced three significant industrial transfer and upgrading.

- 1) The first industrial transfer was in the 1950s when the United States moved textile and steel manufacturing to Japan and Germany. The United States' industrial form has developed from labor-intensive to semiconductor, communication, and other technology-intensive industries. The first industrial transfer made Japan a world factory at that time.
- 2) The first industrial transfer was in the 1950s when the United States moved textile and steel manufacturing to Japan and Germany. The United States' industrial form has developed from labor-intensive to semiconductor, communication, and other technology-intensive industries. The first industrial transfer made Japan a world factory at that time.
- 3) The first industrial transfer was in the 1950s when the United States moved textile and steel manufacturing to Japan and Germany. The United States' industrial form has developed from labor-intensive to semiconductor, communication, and other

technology-intensive industries. The first industrial transfer made Japan a world factory at that time.

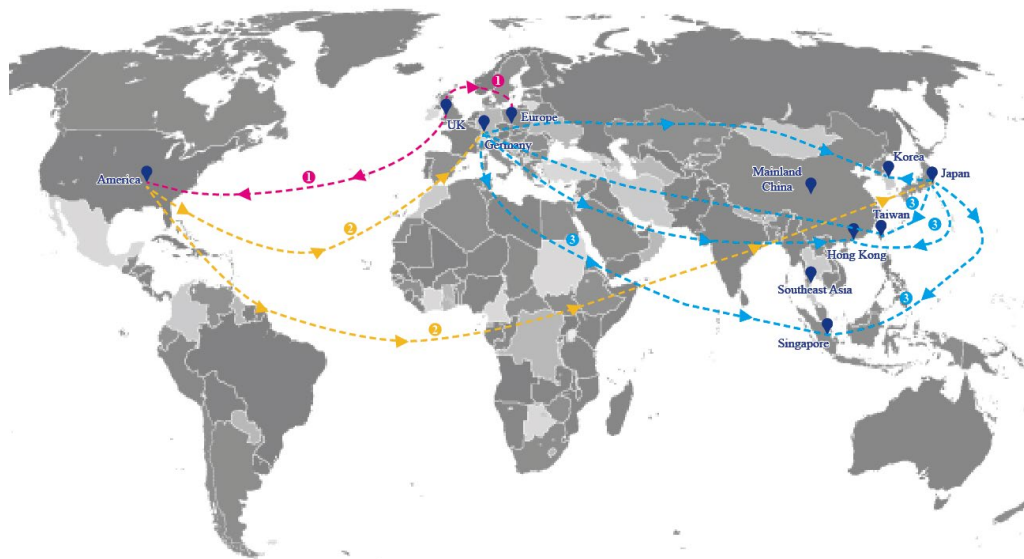


Chart 5-3 The road map of the three industrial transfers

China has become the world's factory thanks to international trade. With the development of science and technology and globalization, the traditional international division of labour in commodity trade exchange has been broken. In short, the original trade was mainly inter-industry trade, such as shoes made in China and planes made in the United States. China trades shoes for planes. And the trade now has changed into Intra industry trade; whether it is aircraft or shoes, the labour-intensive links in the production process can be outsourced to countries with relatively cheap labour. Therefore, the way of the international division of labour extends from inter-industry division to Intra industry product division and factor division. In the process of orderly replacement of industries, the global industrial structure has formed a particular linkage effect. China's advantages in the labour force, industrial supporting facilities and market scale make China one of the critical regions to undertake industrial transfer. Therefore, when China becomes the world factory, it is the inevitable result of global industrial upgrading and industrial transfer. In the current era, China's industrial structure's relevance and interaction with other countries in the world are increasing, and China has become an important part of the global industrial chain.

Just as in every industrial transfer, to adapt to high-tech industries' development and promote industrial upgrading, developed countries transfer labour-intensive industries and processing and manufacturing industries to developing countries. At this time, China is also seeking opportunities for industrial transfer and upgrading. In the past three industrial transfers, the local industries are all industries with global competitiveness. For example, the United States has transferred its steel and textile industries to Japan and Germany. However, its aircraft manufacturing, medical

devices, bioengineering and other industries are still leading the world. Japan and Germany will transfer the textile and garment industries, and the remaining automobile manufacturing, precision instruments and electronics industries still occupy the significant share of the global market. However, different from the previous three industrial transfers, China should not only deal with the migration of labour-intensive industries to Vietnam, Indonesia and other regions, but also deal with the phenomenon that developed countries in the field of high-end manufacturing and consumer goods transfer their production lines back to their own countries. For example, General Electric's washing machine and refrigerator business all moved back to the United States from China, which not only reduced the transportation cost and efficiency, greatly shortened the delivery time but also brought new jobs to the U.S. manufacturing industry.^[15]

The signing of RCEP will also have a specific impact on China's industry. The formal impact will promote the completion of technological upgrading of related industries to cope with competition from other countries, thereby enhancing China's industrial chain's development level. In the face of all the above crises, the way out for China's manufacturing industry is no longer a simple transformation into a high-tech industry but an upgrade of the entire industry supply chain. For example, my country's clothing industry's whole supply chain process from product design, raw material procurement, warehousing and transportation, order processing, manufacturing, wholesale operations, and terminal sales takes 180 days. In comparison, the entire process of the same Spanish company ZARA only takes 12 days. The cost of stocking a piece of clothing for 12 days is much lower than the cost of storing for 180 days. Therefore, the way to save expenses lies in efficiently integrating the supply chain within the industry.^[16]

5.2 RCEP's Impact on China's Supply Chain: Import and Export Perspective

China has close trade relations with RCEP member countries. The signing of RCEP can reduce the cost of China's imports and expand China's exports. Under the RCEP framework, member countries will be more closely linked and may be given priority under the same conditions. According to their comparative advantages, the pattern of division of labor among member countries is expected to be strengthened. RCEP brings member countries closer together and makes their comparative advantages more attractive to member countries, which may become the priority exchange of resources. The economies of RCEP member countries vary greatly. Factors of production such as labor, resources, and capital directly constrain each country's economic growth and market potential. Therefore, China's export to RCEP member

countries in the future is likely to maintain a ‘Strong is always strong, weak is always weak’ situation.

In 2019, China’s exports to Japan, the Republic of Korea, Vietnam, Singapore, and Malaysia accounted for nearly 70 percent of China’s total exports to RCEP member countries, amounting to \$143.2 billion, \$111 billion, \$98 billion, \$55 billion and \$52.5 billion respectively. Imports from South Korea, Japan, Australia, Malaysia, and Vietnam accounted for about 80 percent of RCEP’s total imports, with the US \$173.5 billion, US \$171.5 billion, US \$119.6 billion, US \$71.6 billion, and US \$64 billion, respectively.¹ China’s imports and exports to RCEP member countries account for 36.7% and 26.7% of China’s total imports and exports, respectively.^[17]

China has a trade deficit with South Korea, Japan, Australia, New Zealand, Malaysia and a trade surplus with ASEAN countries. China mainly imports medium-and high-end machinery and equipment, chemicals, minerals, and raw materials from Japan and South Korea, minerals and raw materials from Australia, and some equipment and minerals and raw materials from ASEAN. At the same time, its exports to Japan and South Korea mainly include labor-intensive products such as textiles and furniture and electromechanical products. The export to ASEAN is predominantly mechanical and electrical products, and China’s dominant industries also dominate the export category to Australia. RCEP member countries mainly supply raw materials, energy, and other intermediate products to China. Australia, South Korea, Japan, and Malaysia were the biggest beneficiaries. China does the final assembly and exports the finished product to the United States or the European Union.

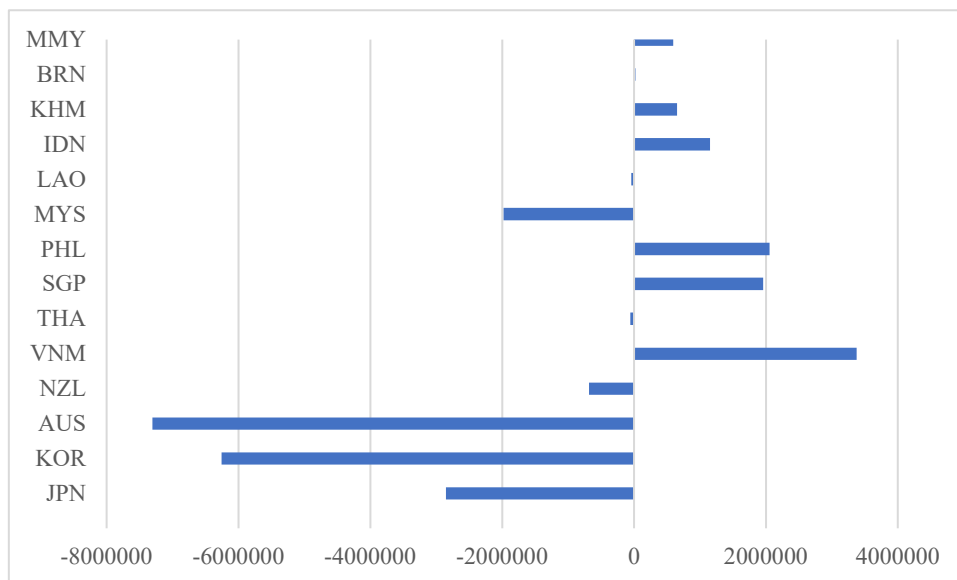
5.2.1 Characteristics of RCEP member countries in the global supply chain

In accelerating the flow of technology, capital, and labor, Japan and Korea will be the leading providers of capital and technology in the member countries. As developed economies, capital accumulation is relatively strong and has a solid technological and innovation base in electronics and automobiles.

China offers both technology and scale. China has the largest manufacturing sector globally and the longest and most complete supply chain in the world. It is also the most critical supply chain hub in the Asia-pacific region, connecting the economic pulse of all countries in the region. Simultaneously, China’s innovation capacity has been gradually strengthened with the “Innovation-driven development” strategy put forward. In 2018, China received 1.54 million patent applications, accounting for 46.4 percent of the global total.^[18]

¹ Data source: National Bureau of Statistics of China

Compared with other countries under RCEP, ASEAN has significant labor cost advantages and a vast potential consumer market, so it is expected to become the preferred area for labor-intensive enterprises to adjust their business layout. Australia and New Zealand, as big countries of resources and agriculture and animal husbandry, have apparent style, and their advantages focus on raw material resources and agricultural and animal husbandry products.



*Chart 5-4 China's trade balance with RCEP members (US \$100 million)¹
(Data Resource: National Bureau of Statistics of China)*

Under the terms of the RCEP tax deduction clause, it will help China expand its advantages in surplus industries and its disadvantages. China is relatively competitive in the textile and mechanical and electrical products sectors from an industry perspective, with a surplus of US \$50.8 billion and US \$7.4 billion respectively in 2019. Mineral products, base metals, chemicals, plastics, optical and medical devices, transport equipment, and other areas are trade deficits, especially mineral products deficit more than 120 billion US dollars, followed by base metals deficit of 60 billion US dollars.²

¹ 1 CHN: China, 2 JPN: Japan, 3 KOR: South Korea, 4 AUS: Australia, 5 NZL: New Zealand, 6 VNM: Vietnam, 7 THA: Thailand, 8 SGP: Singapore, 9 PHL: Philippines, 10 MYS: Malaysia, 11 LAO: Laos, 12 IDN: Indonesia, 13 KHM: Cambodia, 14 BRN: Brunei, 15 ROW: REST OF WORLD.

² Data source: General Administration of Customs of China

5.2.2 The impact of RCEP on China's import chain

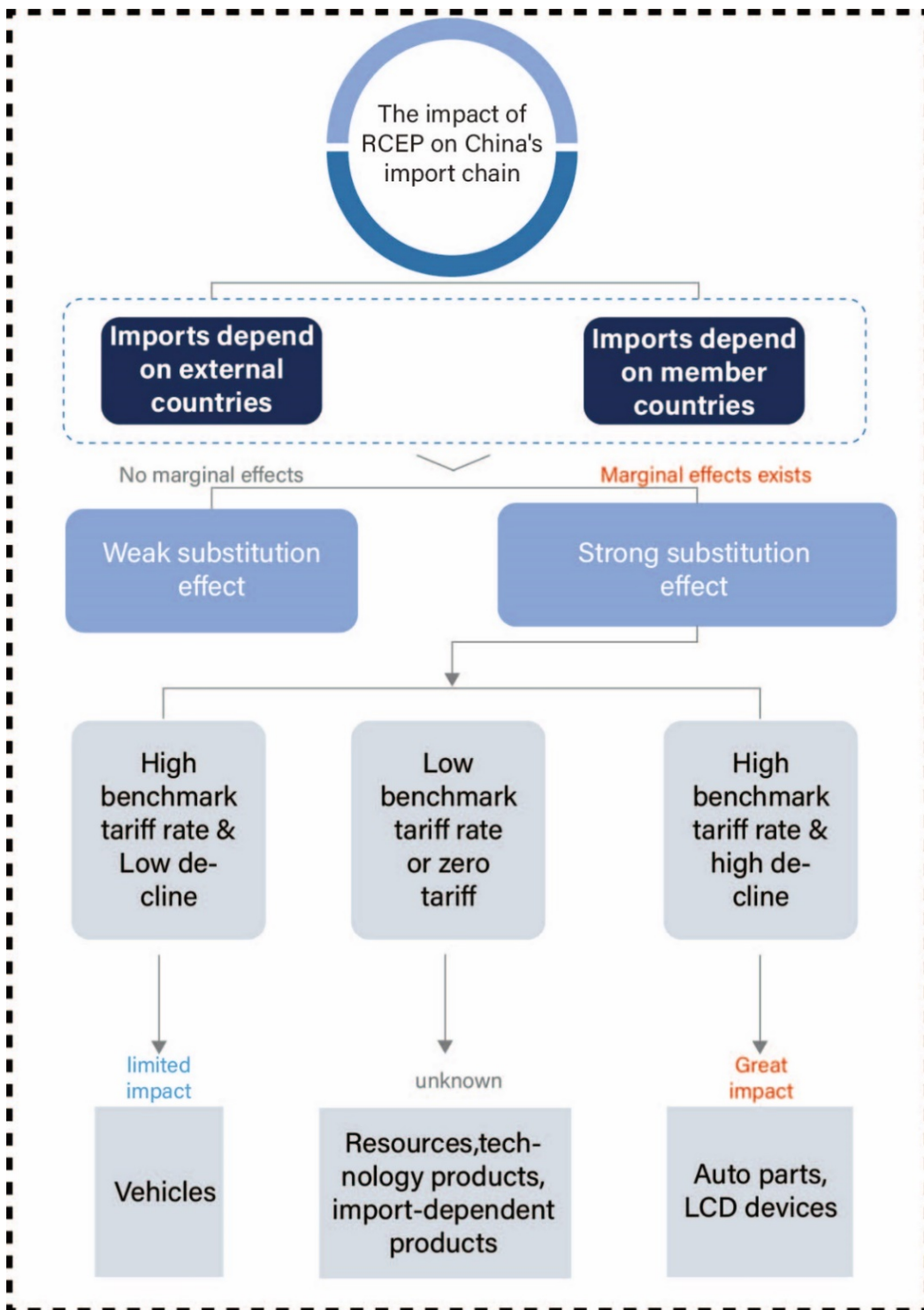


Chart 5-5 The transmission path of RCEP's impact on China's import chain

China has a trade deficit with RCEP member countries as a whole. The degree of import dependence is higher than that of export dependence, highlighting different resource endowments and the industrial division of labor. From the import point of view, the signing of RCEP will influence China's supply chain in two ways:

complementary effect and intensifying competition, ‘Opportunity and challenge coexist.’

First, the signing of RCEP will reduce the tariff costs among member countries, providing low-cost materials and equipment for countries that rely on the supply chain's downstream enterprises, thus creating a complementary effect.

However, the reduction of tariffs will also pose external challenges to some industries in various countries. The lower prices of imported products after the reduction of tariffs may impact domestic suppliers. Along the above two influence paths, combined with import source, tariff reduction, and adjustment rhythm, we can judge the potentially favorable areas and need to guard against risks. From the perspective of shock prevention, the following tariff reduction should be further screened for the products with a higher base tariff rate. If the tariff is lowered slightly, the trade protection effect will be more substantial, and the corresponding domestic industry will be less impacted. If the tariff reduction is significant, we should pay attention to the potential competitive pressure. From the point of cost reduction, we can look for the potential benefit from the downstream of the supply chain where the products with the tariff reduction are located.

5.2.2.1 Overview

RCEP member countries account for a high share of China's imports, and the impact of the future tariff rate adjustment will be more obvious.

With the implementation of RCEP in the future, the internal trade of the member countries will increase. In this context, member countries are expected to expand the scale of exports to China. On the supply side, member countries replace the government of Origin's market share outside RCEP with a lower tariff advantage; on the demand side, falling prices could further stimulate Chinese counterpart demand expansion. But at the same time, falling import prices could also put competitive pressure on local suppliers, with the related downstream industries expected to benefit. Overall, the products with the resonance of supply and demand and their downstream industries are more sensitive to tariff changes.

- 1) The substitution effect on the supply side is weak for the products dependent on RCEP, and the members do not have the export advantage, such as soybean, copper ore, medicine, crude oil, and so on. Drug needs R & D technology, copper ore, crude oil need rich natural resources reserves, and soybean needs suitable farming conditions and large-scale planting base.^[20] Even with the tariff reduction, it is still difficult to form trade substitution for the major exporting countries, and the degree of supply-side substitution is lower, and the marginal impact of RCEP on China's supply chain-related imports is rather less.

2) For those products whose imports depend on RCEP and which do not have the export advantage or the balance of the original benefit, the substitution effect at the supply side is strong. The related industries and downstream industries are greatly affected by the tariff. Specifically, RCEP member countries have significant export advantages in products such as telephone and communication equipment, automatic data processing equipment, and components of liquid crystal devices, it accounts for 84.8%, 84.8%, and 88.8% of China’s total imports of corresponding products, respectively.¹ If the scale effect of the tariff is further reduced, its market share will be further expanded. For products such as integrated circuits, iron ore, oil and gas, automobiles, gold, semiconductor equipment, semiconductor device, auto parts, and so on, RCEP’s internal and external countries account for the majority of China’s imports. If the tariffs of RCEP member countries are further lowered in the future and regional trade exchanges are closer. It is expected to enhance relative competitiveness further and obtain a larger share. [20]

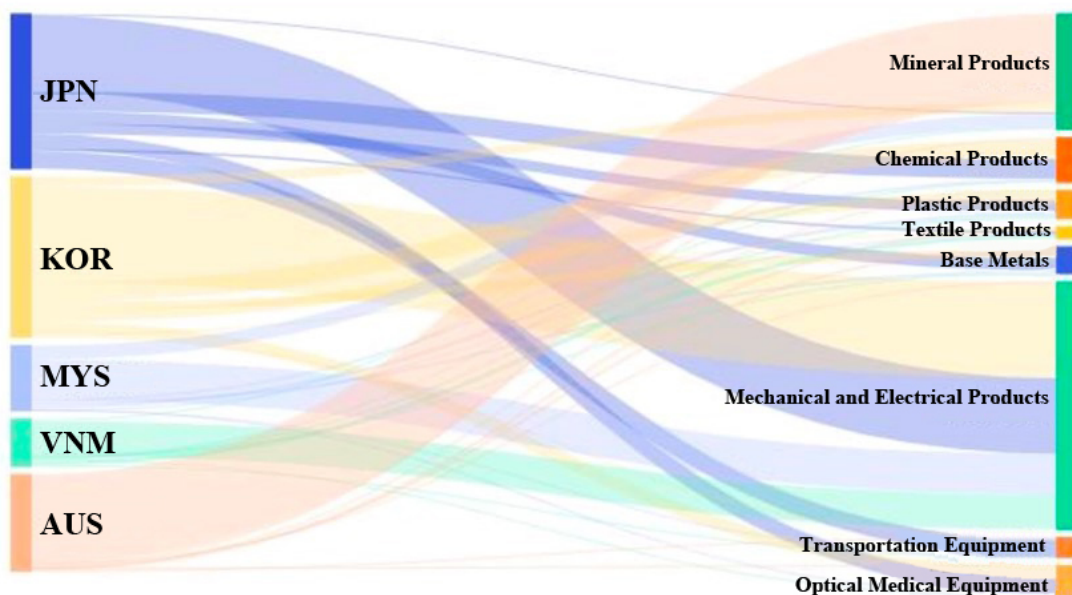


Chart 5-6 The industrial structure of China's imports to some member countries in 2019²

In general, the primary sources of China’s imports are: South Korea, Japan, Australia, Malaysia, Vietnam, and other five countries have significant differences in their imports, and South Korea and Japan have a strong position in the field of mechanical and electrical products, second, Malaysia and Vietnam have also become preferred locations for multinational companies in the electronics industry. Australia’s main advantage is minerals, which accounted for about 70 percent of China’s total imports

¹ Data source: General Administration of Customs of China

² JPN: Japan, KOR: South Korea, AUS: Australia, VNM: Vietnam, MYS: Malaysia.

in 2019.¹

It can be seen that China imports the most significant proportion of products from Japan and South Korea, and these industries happen to be the most characteristic and advantageous export industries of Japan and South Korea. Japan has the highest proportion of exports of automobiles, has unique advantages in semiconductor equipment, has relatively concentrated exports of profitable products, and has the highest proportion of exports of cars, ships, spare parts, integrated circuits, and semiconductor equipment. The export structure is characterized by high technology-intensive and high added value. In particular, Japan has a significant comparative advantage, with exports of US \$98.04 billion in 2019, the highest among RCEP member countries and accounting for 40.4 percent of their top 10 exports. Besides, Japan has a unique advantage in the RCEP countries, with exports of US \$22.64 billion, or 9.3 percent of its top 10 exports, while Singapore, the second-largest member, exports only US \$8.54 billion.²⁰

The export structure of integrated circuits in South Korea is similar to that of Japan, and the export products of South Korea are relatively concentrated. The proportion of exports of integrated circuits, vehicle and ship parts, telephone and communication equipment, petroleum products, etc., is the highest. The export structure is similar to that of Japan. Specifically, South Korea has the most significant advantage in the field of integrated circuits, with exports of \$79.08 billion in 2019, accounting for more than 31.5 percent of its top 10 exports, followed by automobiles, with exports of \$40.46 billion, accounting for 16.1 percent of its top 10 exports. South Korea, by contrast, is similar to Japan in that its niche is concentrated in high value-added manufacturing. In addition, as a refining and chemical power, South Korea has an advantage in the field of petroleum products, which is its third-largest export product, accounting for 15.6 percent of the top 10 exports in 2019, or US \$39.24 billion.²⁰

5.2.2.2 Three impact scenarios of import expansion on the domestic supply chain

After the signing of RCEP, the import tariff of some Chinese products will be lowered. The products can be divided into three categories according to the base tariff rate and the range of change: Products with higher base tariff rate and less reduction, which are better protected and import shocks are relatively limited; Products with a lower or zero-base tariff, with less scope for further downward tariff movement or import-dependent products; Products with a higher base tariff and a more significant decline over time. Based on the third classification, we observe the adjustment range of taxation in three stages: 1 ~ 5 years, 5 ~ 10 years, and ten years later.

¹ Data source: National Bureau of Statistics of China

In the *Chart 5-8 Tariff Rates of Major Imports in China (Base tax rate)*, *Chart 5-9 Tariff Rates of Major Imports in China (Average tax rate for 1-5 years)*, *Chart 5-10 Tariff Rates of Major Imports in China (Average tax rate for 6-10 years)*, *Chart 5-11 Tariff Rates of Major Imports in China (Average tax rate after 10 years)*, the following conclusion can be shown below:

1) China imposes a higher benchmark tariff rate on imported vehicles, and the subsequent reduction under the framework of RCEP is relatively small, which is expected to have a limited impact on the local vehicle industry.

Specifically, China imports cars from Japan and South Korea accounted for 26% of China’s imported vehicles, of which Japan accounted for 23.8%, and China’s car sales range, but very little exports to Japan and South Korea, Japan and South Korea have an advantage over China’s car industry¹. For Japan, a significant exporter of automobiles, China’s tariff remains unchanged at 25 percent; for South Korea, the tax will be reduced from 25 percent to an average of 24.3 percent after ten years; and for Australia and New Zealand and ASEAN, the tariff reduction will be relatively significant, from 25% to an average of 20%-21% after ten years². Considering that China imports fewer vehicles from Australia and ASEAN, the vehicle exports of these countries do not have a very significant advantage to China, so RCEP tariff adjustment has a limited impact on the domestic automobile industry.



*Chart 5-7 List of supply markets for vehicle imported by China.
 (Data Resource: ITC)*

¹ Data source: General Administration of Customs of China
² Data Resource: RCEP office document

- 2) *The scope for tariff reduction is limited and the impact is weak for products with low or zero-base tariff rates, such as some resources (iron ore, gold) and technology (integrated circuits, automatic data processing equipment, telephone and communication equipment, semiconductor device, semiconductor equipment), etc., import-dependent products are in the majority.*

There is little room for tariffs to fall further on products that currently have zero base rates. Such as integrated circuits, iron ore, gold, automatic data processing equipment, semiconductor device, oil, gas, etc., local counterpart industries are less affected by tariff adjustment under the RCEP framework. There is still a certain tariff rate downward space for non-zero benchmark tax rates of products, such as telephone and communications equipment and semiconductor equipment. Specifically, taking semiconductor production equipment as an example, China's semiconductor equipment imports amounted to US \$26.6 billion in 2019¹, and the benchmark tariff rate imposed on each member country was 1.1%, according to China's tariff schedule; in 10 years, the benchmark import tariff rate of semiconductor production equipment has been gradually lowered to zero. The tariff adjustment of 1.1 Pct hardly constitutes the core pricing logic of high-value semiconductor equipment in the margin. The impact on home-made semiconductor equipment remains to be seen.²

- 3) *Pay attention to the industries with large marginal adjustment of tariff, such as LCD devices, auto parts, etc.*

According to the rhythm of tariff reduction, the impact on related industries will vary, 1–5-year average tariff reduction of the sector more vulnerable in the short term. Specifically, the auto parts 1–5-year decline is slight. The three stages of the average decrease of 2.3%, 2.2%, and 2.1%, showing an even downward trend, tariff impact is expected to be released evenly, the corresponding industry competition gradually intensified. LCD devices steadily reduced tariffs on Japan and South Korea by an average of 3.1% and 2.4% in the first five years, respectively, and on Australia and New Zealand and ASEAN by more than 5% in the first five years²⁴, however, it is still unable to avoid the competitive pressure brought by the large-scale tariff adjustment to domestic enterprises. Still, it is also expected to accelerate the competitiveness of domestic-related industries.

HS CODE	PRODCUT	JPN	KOR	AUS	NZL	ASEAN
8542	integrated circuit	0.0%	0.0%	0.0%	0.0%	0.0%
2709	crude	0.0%	0.0%	0.0%	0.0%	0.0%
2601	Iron Ore and Concentrate	0.0%	0.0%	0.0%	0.0%	0.0%
2710	Oil and gas	0.0%	0.0%	0.0%	0.0%	0.0%
8703	Automobile	25.0%	25.0%	25.0%	25.0%	25.0%

¹ Data source: General Administration of Customs of China

² Data Resource: RCEP official documents

7108	Gold	0.0%	0.0%	0.0%	0.0%	0.0%
8517	Telephone and communication equipment	0.6%	0.6%	0.6%	0.0%	0.0%
1201	Soybeans	3.0%	2.4%	2.4%	3.0%	3.0%
2603	Copper ores and concentrates	0.0%	0.0%	0.0%	0.0%	0.0%
8471	Automatic data processing equipment	0.0%	0.0%	0.0%	0.0%	0.0%
9013	Liquid crystal device	7.8%	7.8%	7.8%	7.8%	7.8%
8486	Semiconductor equipment	1.1%	1.1%	1.1%	1.1%	1.1%
8541	Semiconductor device	0.0%	0.0%	0.0%	0.0%	0.0%
8708	Auto parts	10.0%	10.0%	10.0%	10.0%	10.0%
7403	Copper, refined copper and copper alloys	1.7%	0.0%	1.7%	1.7%	1.7%
3004	Treatment or preventive drugs	5.1%	5.1%	5.1%	5.1%	5.1%
3901	Ethylene polymer in primary form	6.5%	6.5%	6.5%	6.5%	6.5%

*Chart 5-8 Tariff Rates of Major Imports in China (Base tax rate)
(Data Resource: RCEP official documents)*

HS CODE	PRODCUT	JPN	KOR	AUS	NZL	ASEAN
8542	integrated circuit	0.0%	0.0%	0.0%	0.0%	0.0%
2709	crude	0.0%	0.0%	0.0%	0.0%	0.0%
2601	Iron Ore and Concentrate	0.0%	0.0%	0.0%	0.0%	0.0%
2710	Oil and gas	0.0%	0.0%	0.0%	0.0%	0.0%
8703	Automobile	25.0%	24.9%	21.5%	21.5%	20.6%
7108	Gold	0.0%	0.0%	0.0%	0.0%	0.0%
8517	Telephone and communication equipment	0.3%	0.2%	0.0%	0.0%	0.0%
1201	Soybeans	3.0%	2.4%	2.4%	3.0%	3.0%
2603	Copper ores and concentrates	0.0%	0.0%	0.0%	0.0%	0.0%
8471	Automatic data processing equipment	0.0%	0.0%	0.0%	0.0%	0.0%
9013	Liquid crystal device	4.7%	5.4%	2.6%	2.6%	1.4%
8486	Semiconductor equipment	0.7%	0.6%	0.2%	0.2%	0.0%
8541	Semiconductor device	0.0%	0.0%	0.0%	0.0%	0.0%
8708	Auto parts	8.3%	8.6%	7.3%	7.4%	6.8%
7403	Copper, refined copper and copper alloys	0.0%	0.0%	0.3%	0.3%	0.1%

3004	Treatment or preventive drugs	3.3%	0.3%	0.4%	0.4%	0.3%
3901	Ethylene polymer in primary form	6.3%	6.2%	5.7%	5.7%	5.7%

*Chart 5-9 Tariff Rates of Major Imports in China (Average tax rate for 1-5 years)
(Data Resource: RCEP official documents)*

HS CODE	PRODCUT	JPN	KOR	AUS	NZL	ASEAN
8542	integrated circuit	0.0%	0.0%	0.0%	0.0%	0.0%
2709	crude	0.0%	0.0%	0.0%	0.0%	0.0%
2601	Iron Ore and Concentrate	0.0%	0.0%	0.0%	0.0%	0.0%
2710	Oil and gas	0.0%	0.0%	0.0%	0.0%	0.0%
8703	Automobile	25.0%	24.7%	21.4%	21.4%	20.5%
7108	Gold	0.0%	0.0%	0.0%	0.0%	0.0%
8517	Telephone and communication equipment	0.3%	0.2%	0.0%	0.0%	0.0%
1201	Soybeans	3.0%	2.4%	2.4%	3.0%	3.0%
2603	Copper ores and concentrates	0.0%	0.0%	0.0%	0.0%	0.0%
8471	Automatic data processing equipment	0.0%	0.0%	0.0%	0.0%	0.0%
9013	Liquid crystal device	2.4%	2.3%	1.0%	1.0%	0.7%
8486	Semiconductor equipment	0.3%	0.2%	0.1%	0.1%	0.0%
8541	Semiconductor device	0.0%	0.0%	0.0%	0.0%	0.0%
8708	Auto parts	6.1%	6.3%	5.2%	5.3%	4.5%
7403	Copper, refined copper and copper alloys	0.2%	0.0%	0.1%	0.1%	0.0%
3004	Treatment or preventive drugs	1.2%	0.1%	0.1%	0.1%	0.1%
3901	Ethylene polymer in primary form	6.0%	5.6%	4.3%	4.3%	4.3%

*Chart 5-10 Tariff Rates of Major Imports in China (Average tax rate for 6-10 years)
(Data Resource: RCEP official documents)*

HS CODE	PRODCUT	JPN	KOR	AUS	NZL	ASEAN
8542	integrated circuit	0.0%	0.0%	0.0%	0.0%	0.0%
2709	crude	0.0%	0.0%	0.0%	0.0%	0.0%

2601	Iron Ore and Concentrate	0.0%	0.0%	0.0%	0.0%	0.0%
2710	Oil and gas	0.0%	0.0%	0.0%	0.0%	0.0%
8703	Automobile	25.0%	24.3%	21.2%	21.2%	20.4%
7108	Gold	0.0%	0.0%	0.0%	0.0%	0.0%
8517	Telephone and communication equipment	0.3%	0.2%	0.0%	0.0%	0.0%
1201	Soybeans	3.0%	2.4%	2.4%	3.0%	3.0%
2603	Copper ores and concentrates	0.0%	0.0%	0.0%	0.0%	0.0%
8471	Automatic data processing equipment	0.0%	0.0%	0.0%	0.0%	0.0%
9013	Liquid crystal device	1.1%	0.6%	0.4%	0.4%	0.4%
8486	Semiconductor equipment	0.0%	0.0%	0.0%	0.0%	0.0%
8541	Semiconductor device	0.0%	0.0%	0.0%	0.0%	0.0%
8708	Auto parts	3.4%	4.6%	3.2%	3.3%	2.5%
7403	Copper, refined copper and copper alloys	0.0%	0.0%	0.0%	0.0%	0.0%
3004	Treatment or preventive drugs	0.0%	0.0%	0.0%	0.0%	0.0%
3901	Ethylene polymer in primary form	5.5%	5.4%	2.9%	3.0%	3.0%

Chart 5-II Tariff Rates of Major Imports in China (Average tax rate after 10 years)
(Data Resource: RCEP official documents)

5.2.3 The impact of RCEP on China's export chain

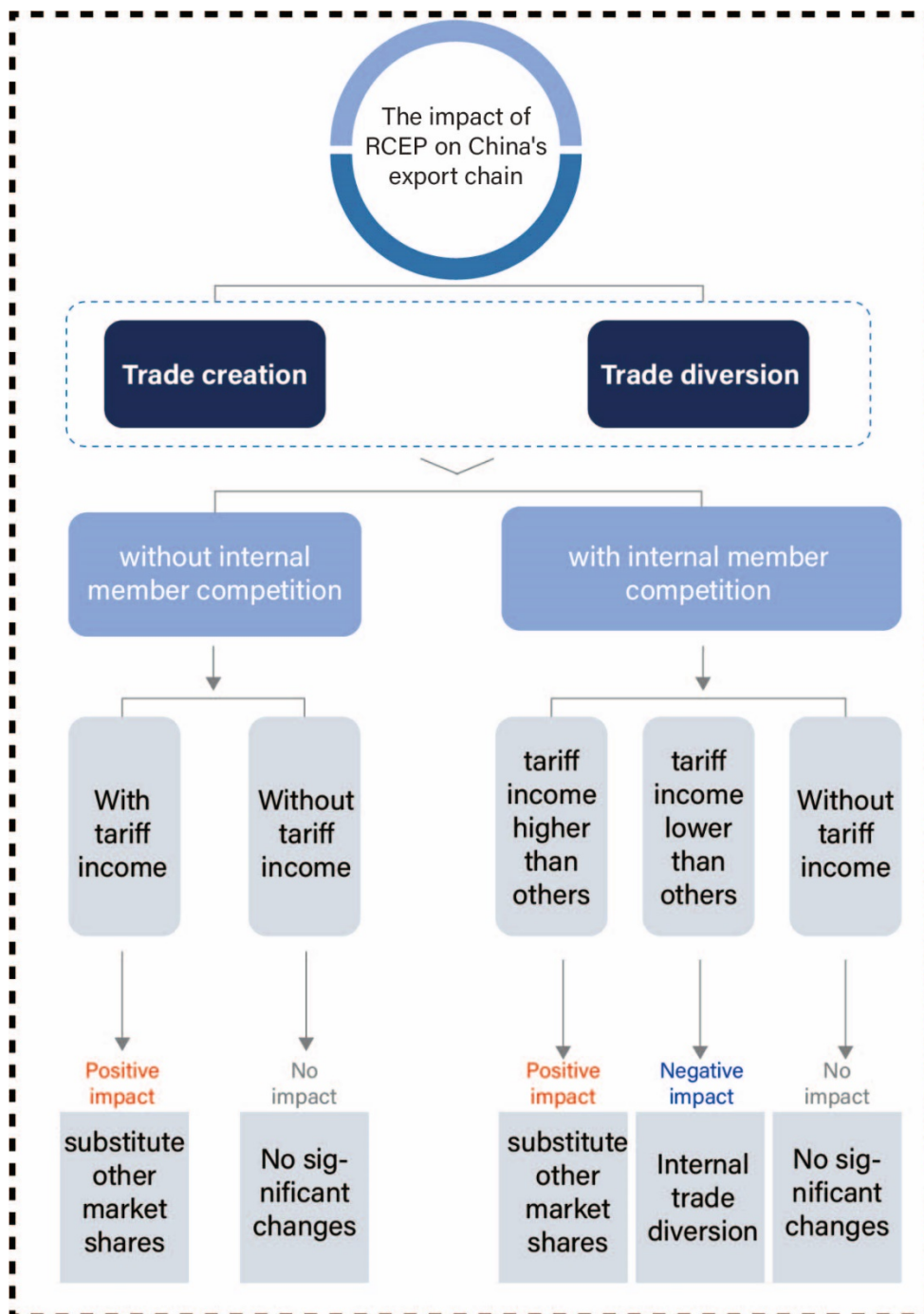


Chart 5-12 The transmission path of RCEP's impact on China's export chain

The signing of RCEP will bring about trade creation and trade transfer effect, and there are two transmission paths of external substitution and internal competition.^[23]

First, the signing of an RCEP would reduce tariffs and Non-tariff barriers to trade between member countries. The resulting cost reductions would create more trade

between member countries and encourage the transfer of trade from nonmember countries to member countries. This is the external substitution, to the industrial chain assumes the positive influence.

However, the same trade goods may exist to the relative export advantages of several member countries, thus forming a competitive relationship, which is called internal competition, which may bring the internal transfer of trade and have a negative impact on the industrial chain of a particular country.

5.2.3.1 Overview

At present, RCEP member countries have formed a relatively complete industrial chain of mechanical and electrical products. Since each country has developed a comparative advantage in the upstream and downstream, the signing of the agreement will further accelerate the flow of technology, services, capital, and other factors, and the comparative advantage is further amplified. China’s export advantage is mainly due to two factors:

- A. First, in the context of the electronic industry chain's globalization, as a global manufacturing center, China functions as a ‘Transit station.’
- B. Second, with China’s investment in the business environment, production efficiency has gradually replaced traditional labor. From export products, China’s exports to the top five RCEP exporting countries are mainly concentrated in electromechanical products, including electrical machinery, electrical, audio, and video equipment and their accessories, machinery, appliances, and spare parts, etc. Next are textile products, base metals, and chemical products.^[25]

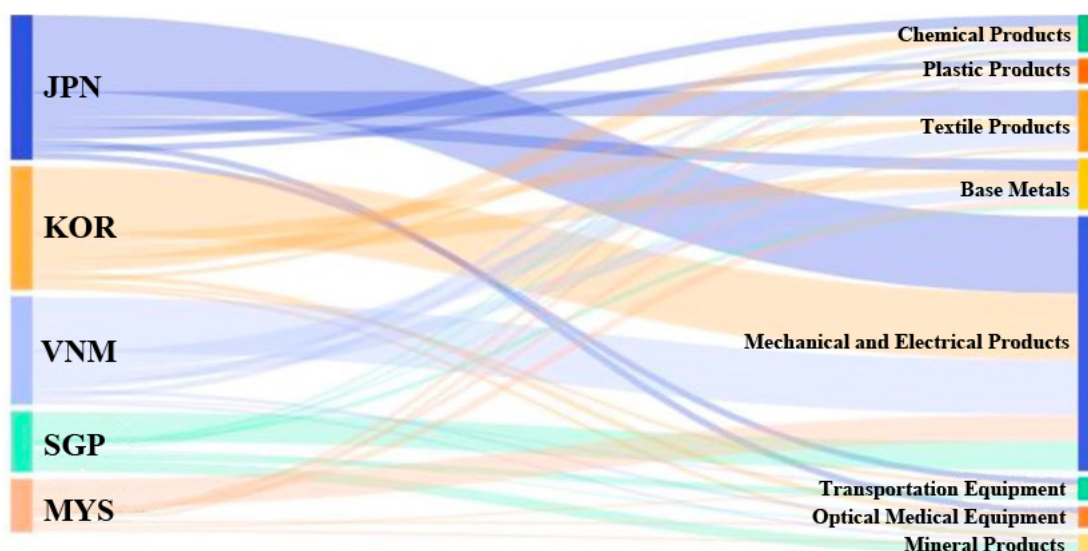


Chart 5-13 China's export industry structure to some member states in 2019¹

¹ JPN: Japan, KOR: South Korea, VNM: Vietnam, SGP: Singapore, MYS: Malaysia.

5.2.3.2 Three impact scenarios of export expansion on the domestic supply chain

Analysis of the impact on China's supply chain, we need to identify three factors: whether China has an export advantage over member countries; whether the export advantage industries are subject to competition from other member countries; whether the industries with export advantage will meet the tariff reduction of the importers. For those industries where there is no strong internal competition among members, and where tariff cuts exist, they are expected to expand exports and drive up the prosperity of related industrial chains; for those industries where there is internal competition among members, in contrast to the tariff situation of the competitors, if there is a tariff advantage, it is expected to expand exports; otherwise, there may be a shift of export shares within the members, which has a negative impact on the industrial chain.

According to *Chart 5-14 China's comparative advantage export product advantage* (Data Resource: National Bureau of Statistics, General Administration of Customs of China) the content can be concluded in these points:

- 1) **China has an export advantage to member countries. China's export advantages are: concentration in telephone and communication equipment, automatic data processing equipment, integrated circuits, semiconductor device, petroleum products, clothing, household appliances, furniture, etc..**

Statistics show that China's export advantage is concentrated in telephone and communication equipment, automatic data processing equipment, integrated circuits, semiconductor device, petroleum products, clothing, household appliances, furniture, etc. Still, it has internal heterogeneity in different countries. Among them, China's exports to ASEAN countries and Japan are massive, and the relevant advantages should be more attention to.

- A. On the Japanese side, China's export advantages are concentrated in automatic data processing equipment, telephone and communication equipment, auto parts, semiconductor device, clothing, furniture, etc. China's export advantage to Japan is in line with labor division in the value chain between the two countries. For example, Japan's export advantage is semiconductor equipment, China's export advantage to Japan is semiconductor device, and Japan's export advantage is complete automobile vehicle, china's export advantage to Japan is auto parts.^[24] In particular, China's top exports to Japan were automatic data processing equipment, telephone, and communication equipment, accounting for 50.6 percent of the total value of the top 10 exports, with exports of \$9.75 billion and

\$8.93 billion in 2019. Exports of manufactured goods such as auto parts, semiconductor devices, display equipment (monitors, projectors, receivers, etc.), and printing equipment are also relatively large. In addition to manufactured goods, China's light industrial, household appliances, and furniture products such as garments, air conditioners, and luggage also enjoy export advantages, such as US \$4.61 billion in exports of clothing products to Japan, accounting for 12.5 percent of the top 10 percent.¹

- B. On the Korean side, China's export advantages are highly concentrated, mainly in integrated circuits, telephone, and communication equipment. China's exports to South Korea are mainly concentrated in integrated circuits and telephone and communications equipment, with US \$15.35 billion and US \$8.9 billion respectively in 2019, accounting for 38.1 percent and 22.1 percent of the top 10 exports, respectively. China also has an advantage in automatic data processing equipment and liquid crystal devices such as telescopes, lasers, and liquid crystal display, with exports of US \$3.93 billion and US \$2.09 billion in 2019, accounting for 9.8% and 5.2%, respectively.²⁶
- C. In Australia and New Zealand, automatic data processing equipment and telephone and communication equipment remain China's most significant advantages. China's export of petroleum products, furniture and semiconductor device to Australia, furniture and fertilizer toys, clothing, and other exports to New Zealand has an advantage. In 2019, China's exports of automatic data processing equipment to Australia and New Zealand were the most advantageous, with US \$3.37 billion and US \$260 million, accounting for 22.9 percent and 20.7 percent of its top 10 exports respectively, exports to Australia and New Zealand totaled US \$2.74 billion and US \$160 million respectively, accounting for 18.6 percent and 12.5 percent of the top 10. Besides, China has an export advantage over Australia in oil products, furniture, semiconductor device, seats and display equipment, household products (furniture, seats, lamps), chemical fertilizers, plastic products, wheeled toys, clothing (clothes, women's suits) and other new export advantages. However, it is worth noting that compared with Australia, China's exports to New Zealand are smaller, so New Zealand's influence, weight is not high.²⁶
- D. Among the ASEAN countries, China's export advantages are concentrated in integrated circuits, telephone, communication equipment, automatic data processing equipment, petroleum products, etc. Specifically, China's IC exports to Vietnam and Malaysia are the most advantageous, with exports of US \$9.92 billion and US \$6.26 billion respectively in 2019, accounting for 33.1 percent and 40 percent of the top 10 percent, respectively. China's telephone and

¹ Data source: National Bureau of Statistics, General Administration of Customs of China

telecommunication equipment exports to Thailand and Indonesia are the most advantageous, with exports of US \$3.26 billion and US \$3.56 billion respectively in 2019, accounting for 31.4% and 36% of the top 10, respectively. In 2019, the export volume of petroleum products to Singapore and the Philippines was US \$8.46 billion and US \$3.26 billion, respectively, accounting for 29.2% and 26.9%. Besides, China’s competitive products also include mainly carbon products, non-alloy steel products, and other raw material products, as well as upstream parts such as wires and machine parts, automatic data processing equipment, automotive parts, semiconductor device, LCD devices, cleaning equipment, storage equipment, ships and other industrial products, shoes, textiles (knitting, weaving), cotton products, furniture and other light industry, furniture products.¹

China's bilateral export advantages	JPN	KOR	AUS	NZL	VNM	MYS	THA	SGP	IND	PHL
1	Automatic data processing equipment 8471	integrated circuit 8542	Automatic data processing equipment 8471	Automatic data processing equipment 8471	integrated circuit 8542	integrated circuit 8542	Telephone and communication equipment 8517	Oil and gas 2710	Telephone and communication equipment 8517	Oil and gas 2710
2	Telephone and communication equipment 8517	Telephone and communication equipment 8517	Telephone and communication equipment 8517	Telephone and communication equipment 8517	Telephone and communication equipment 8517	Telephone and communication equipment 8517	Automatic data processing equipment 8471	Telephone and communication equipment 8517	Automatic data processing equipment 8471	integrated circuit 8542
3	Auto parts 8708	Automatic data processing equipment 8471	Oil and gas 2710	Furniture 9403	Brakel 6006	Oil and gas 2710	Non-alloy steel products 7210	integrated circuit 8542	Woven fabric 5407	Telephone and communication equipment 8517
4	Clothing 6110	Liquid crystal device 9013	Furniture 9403	Seat 9401	Semiconductor device 8541	Automatic data processing equipment 8471	Auto parts 8708	Automatic data processing equipment 8471	Oil and gas 2710	Plastic shoes 6402
5	Semiconductor device 8541		Semiconductor device 8541	Lamp 9405	Stainless steel 7225	Lamp 9405	Oil and gas 2710	Ship 8901	Building products 7308	Cotton fabric 5208
6	Ladies suit 6204		Seat 9401	Fertilizer 3105		Liquid crystal device 9013	Cleaning equipment 8414	Semiconductor device 8541	Non-alloy steel products 7210	Non-alloy steel products 7210
7	Display screen 8528		Display screen 8528	Plastic products 3923		Furniture 9403	Mechanical parts 8473		Liquid crystal device 9013	
8	Printing Equipment 8443			Wheel toy 9503		Carbon products 8545	Storage equipment 8523		Wire 8544	
9	A/C 8415			Clothing 6110					Vegetable 703	
10	Trunk 4202			Ladies suit 6204						

Chart 5-14 China's comparative advantage export product advantage
 (Data Resource: National Bureau of Statistics, General Administration of Customs of China)^{2 3}

2) **Export products that are not subject to competition from member countries and benefit from external substitution: optional consumer goods such as**

¹ Data source: National Bureau of Statistics, General Administration of Customs of China
² 1 CHN: China, 2 JPN: Japan, 3 KOR: South Korea, 4 AUS: Australia, 5 NZL: New Zealand, 6 VNM: Vietnam, 7 THA: Thailand, 8 SGP: Singapore, 9 PHL: Philippines, 10 MYS: Malaysia, 11 LAO: Laos, 12 IDN: Indonesia, 13 KHM: Cambodia, 14 BRN: Brunei.
³ Using the HS four-digit code as the criterion, and will account for more than the top 10 products exports 5% of the total value of products as an export advantage. More than 20% of the top 10 is a high advantage, dark color; more than 10% of the top 10 is a moderate advantage, sub-dark; a 5% or more of the top 10 is a slight advantage, light color.

clothing, women's suits, knitted fabrics, suitcases, seats, lamps, wheeled toys, etc. and intermediate manufactured goods (wires, carbon products, non-alloy steel products, plastics, construction products, machine parts, display equipment, storage equipment).

The import countries do not exempt these products from duty at present, but the industries that will benefit more from the tariff dividends under the RCEP in the future. These include optional consumer goods (garments, knitted fabrics, suitcases, lamps, etc.) and mid-range manufactured goods (machine parts, cleaning equipment, storage equipment, etc.).

In the case of consumer goods, tariff reductions were generally significant and more evenly distributed. China's exports to Japan and New Zealand amounted to US \$2.14 billion and US \$85.75 million, respectively¹, exports to Japan are particularly large, with the average tariff (HS 4-digit arithmetic average) falling from the base rate of 10.8 percent to 8.7 percent after 1-5 years and then to 2.0 percent after 10 years, with an average decline of 2-3 percent every five years. Export tariffs on New Zealand fell from a base rate of 10 percent to 0.2 percent 10 years later. Average tariffs on \$1.91 billion worth of luggage exported per day dropped from 9.6% to 3.0% in 10 years, with an average decline of about 2% every five years. Exports of lamps and lanterns to Malaysia amounted to 1.07 billion yuan, with the average tariff reduced from 13.9% of the benchmark to 0.1% after 10 years, or about 4% every five years. China's exports of needles and knitted fabrics to Vietnam amounted to US \$2.19 billion. The average tariff fell from 12% to 4.4% in 1-5 years and then gradually decreased to 2.4%. For such products, tariff dividends are expected to be released slowly over time.²

In the case of intermediate manufactured goods, most of the reduction in tariffs is concentrated in the first 1-5 years. For Thai exports of US \$550 million machine parts, tariffs will be reduced from the base rate of 4.2% to 0% within 1-5 years. China's average tariffs on Thai exports of cleaning equipment (such as vacuum pumps, fans, etc.) and storage equipment (such as CDs, tapes, etc.) of 660 million yuan and US \$540 million fell from 9.8% and 7.2% of the benchmark to 4% and 2.2% within one to five years.³¹ These industries are expected to reflect tariff dividends more quickly after the implementation of RCEP.

3) Export products that may be subject to internal competition: internal transfer effect is not obvious, China and other member countries face mostly the same tariffs, and mostly zero tariffs.

Only Telephone and communications equipment or by a small impact, but the effect is limited. China's export advantages to RCEP member countries, may also be the export advantage of other RCEP member countries. Under the same trade framework

¹ Data source: National Bureau of Statistics, General Administration of Customs of China

² Data Resource: RCEP office document

may form a new member of internal competition, that is, there is an internal transfer of trade within the RCEP from China to other member countries. Then to China's related export industry chain hurts the existence of internal competition in the product screening.

There are two types of Chinese export products with internal competition:

- A. the first category is products in which China enjoys export advantages to most member countries, including automatic data processing equipment, integrated circuits, telephone and communication equipment, and petroleum products,
- B. the other category is products where China has an export advantage only to certain countries, including semiconductor device, auto parts, furniture, ships, printing equipment, stainless steel and so on, competition is relatively mild.

Furthermore, analyze the import tariffs of importing countries on products from China and competing countries if:

- a) China currently enjoys a lower tariff, but its tariff advantage disappears in the future.
- b) The tariff reduction in the future is less than that of the competitors, and there may be an internal shift in trade. It is found that the vast majority of products with the internal competition are long-term zero-tariff products, which will remain unchanged after the signing of RCEP, including integrated circuits, automatic data processing equipment, semiconductor device, printing equipment, etc. The market supply and demand of such products will not change dramatically because of the implementation of RCEP, and the competition pattern will not change much.
- c) For other products, including furniture, petroleum products, auto parts, although there are tariff barriers, the tariff adjustment of importing countries to each member country is the same. The direction and range are equal, so the market supply and demand and competition pattern will not change dramatically.

In the *Chart 5-15 Competitive products within member states with non-zero tariffs*, with the notable exception of telephone and communications equipment, Vietnam's benchmark tariff on Chinese imports was 0.6 per cent, with a commitment to cut it to 0.1 per cent in 10 years, while Vietnam's benchmark rate on imports from South Korea and Singapore was 0.58 per cent and 0.02 per cent in 10 years.

Vietnam's benchmark import tariff to China is higher and less reduced than that of its competitors, so there is a risk of a share shift. But Vietnam is only the sixth-largest

importer of Chinese telephone and communications equipment, with imports of \$7.69 billion in 2019, well below the \$54.06 billion of the top-ranked United States, so the impact on China's overall industry is limited.^[24]

HS code	Product	Import country	Member countries competing with China	Base tax rate	Average tax rate for 1-5 years	Average tax rate for 6-10 years	Average tax rate after 10 years
8517	Telephone and communication equipment	KOR ¹	CHN	0.60%	0.00%	0.00%	0.00%
			VNM	0.60%	0.00%	0.00%	0.00%
			SGP	0.60%	0.00%	0.00%	0.00%
		VNM	CHN	0.60%	0.40%	0.30%	0.10%
			KOR	0.58%	39.00%	0.23%	0.20%
			SGP	0.58%	39.00%	0.23%	0.20%
9403	Furniture	AUS	CHN	5.00%	0.60%	0.50%	0.20%
			VNM	5.00%	0.60%	0.50%	0.20%
		NZL	CHN	4.30%	2.50%	0.80%	0.00%
			VNM	4.30%	2.50%	0.80%	0.00%
2710	Oil and gas	MYS	CHN		0.30%	0.20%	0.00%
			KOR		0.30%	0.20%	0.00%
			SGP		0.30%	0.20%	0.00%
8708	Auto parts	THA	CHN	26.50%	26.00%	25.10%	23.50%
			KOR	26.50%	26.00%	25.10%	23.50%

*Chart 5-15 Competitive products within member states with non-zero tariffs
(Data Resource: RCEP office document)*

5.3 The Impact of RCEP On the Industry Supply Chain: taking the Textile Industry and Steel Industry as examples

5.3.1 Textile industry in China

The textile industry has long been a pillar of China's economy thanks to its advantage in factor endowment and market scale. The textile sector's trade volume has increased by 27.11 times during the past 25 years (from the Reform and Opening). In 2005, textile

¹ 1 CHN: China, 2 JPN: Japan, 3 KOR: South Korea, 4 AUS: Australia, 5 NZL: New Zealand, 6 VNM: Vietnam, 7 THA: Thailand, 8 SGP: Singapore, 9 PHL: Philippines, 10 MYS: Malaysia, 11 LAO: Laos, 12 IDN: Indonesia, 13 KHM: Cambodia, 14 BRN: Brunei, 15 ROW: REST OF WORLD.

exports took up 15.4% of China's total exports and 24.4% of the world's total exports in textiles. The production and exports of Chinese textile products are the largest in the world. [26]

Nonetheless, China’s textile industry is facing various difficulties, such as excessive resource reliance, low technology and value-added, indisposition in trade structure and highly concentrated export markets. More and more trade sanctions against China’s textile products are particularly noteworthy as they cast tight restrictions on China’s competitive advantage in this industry. [26]

5.3.1.1 Analysis of the impact on the textile industry

Taking the textile industry as an example, Japan and Korea are the important import source countries of functional fabrics, chemical fiber textiles and garments, textile dyes, etc. Besides, Australia and New Zealand also provide many high-quality types of wool and other textile materials for China.

According to Chinese customs statistics, the total volume of China’s textile and apparel import and export trade with other RCEP member countries reached US \$88.26 billion in 2019, accounting for about 28.8 percent of the total volume of foreign exchange in the same year. Of this total, China exported US \$76.19 billion worth of textiles and clothing to the above-mentioned countries, accounting for 27.1 percent of the industry’s exports to the world. At the same time, China imported US \$12.07 billion worth of textiles and clothing from these countries, accounting for 47.4 percent of the industry’s total imports in the whole year.¹

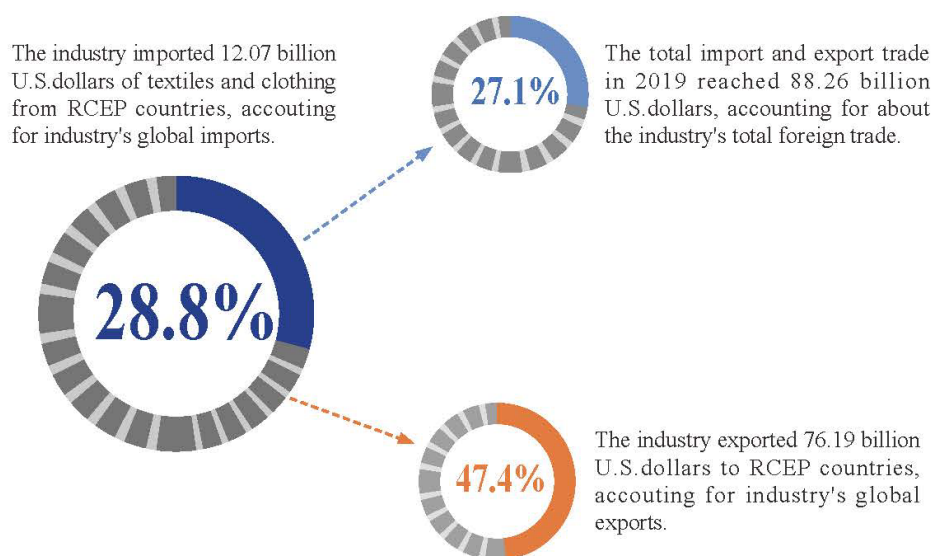
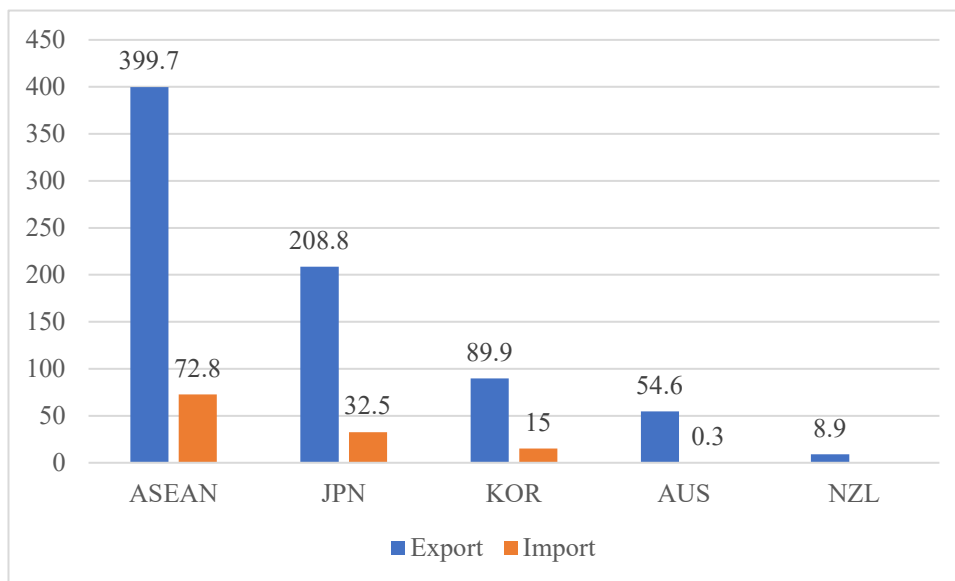


Chart 5-16 Proportion of China's trade with RCEP in the textile industry
(Data source: General Administration of Customs of China)

¹ Data source: General Administration of Customs of China



*Chart 5-17 Textile and apparel trade between China and RCEP member countries in 2019 (unit: US\$100 million)¹
(Data source: General Administration of Customs of China)*

The original import tax rate of 5% to 8% for the main categories of products imported by our industry from Japan will basically be reduced to zero in 11, 16, or 21 years. For example, the original 8% tax rate of textile machinery products such as shutterless air-jet looms and flat weft knitting machines imported from Japan will be reduced to zero within 11 or 16 years after the RCEP takes effect², which will help the industry to accelerate industrial innovation and upgrading and improve production efficiency.

¹ JPN: Japan, KOR: South Korea, AUS: Australia, NZL: New Zealand, ASEAN: the Association of Southeast Asian Nations.

² Data Resource: RCEP office document

Tax code	Product	Imported from Japan in 19 years (million dollars)	Percentage	Current tax rate	Tax reduction method
84463050	Shuttleless air jet loom	2.17	93.70%	8	B16
54076100	Woven fabrics with a polyester content of more than 85%	1.53	41.10%	8	B21
55033000	Synthetic staple fiber	1.37	68.30%	5	U
59119000	Textiles for other specialized technical purposes	0.88	32.40%	8	B11
56074200	Dyeing woven fabric with 85% nylon content	0.77	31.90%	8	B21
56031290	Non-woven fabrics made of chemical fiber filaments	0.76	40.50%	8	B11
84472020	Flat Weft Knitting Machine	0.75	85.90%	8	B11
60063200	Dyed knitted or woven fabrics of other synthetic fibers	0.65	20.70%	8	B21
54083200	Other dyed man-made filament yarn woven fabrics	0.48	74.60%	8	B16
55121900	Other synthetic staple fiber spun woven fabrics	0.41	32.40%	8	B21

*Chart 5-18 China's major textile and apparel products imported from Japan in 2019
(Data source: RCEP office document)*

South Korea is an important trading partner of China's textile industry in East Asia and one of my country's textile and apparel export markets. In 2019, my country's textile and apparel exports to South Korea were 8.99 billion U.S. dollars, accounting for about 3.2% of the total industry exports that year. In the same year, my country imported US\$1.502 billion in textiles and apparel from South Korea, accounting for 5.9% of the industry's total annual imports.¹ As far as South Korea is concerned, my country is also its most significant source of textile and apparel imports, accounting for more than 1/3 of South

¹ Data source: General Administration of Customs of China

Korea's total annual textile and apparel imports.

The China-Korea FTA came into effect in 2015. Various concession rules have been implemented for five years, and most textile and apparel products have enjoyed tariff reduction or exemption. The signing of the RCEP has little impact on the existing textile and apparel trade tariffs between the two countries.

China's listed textile and garment companies have achieved full coverage of the upstream, midstream, and downstream of the global brand supply chain.

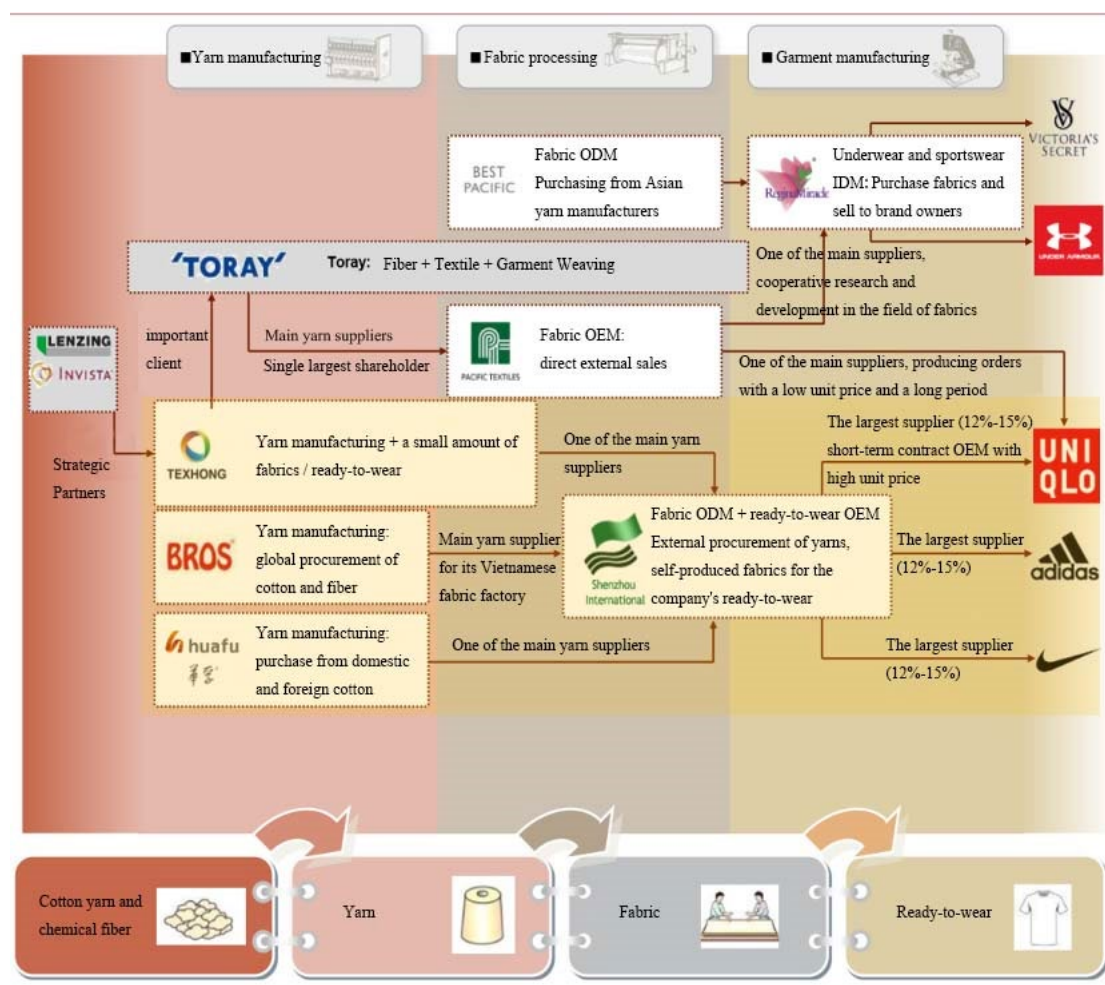


Chart 5-19 Chinese raw materials and textile companies have achieved full coverage of the upstream/midstream/downstream of the global textile supply chain

(Data source: China Textile International Production Capacity Cooperation Enterprise Alliance)

For example, Fast Retailing Group, the parent company of Uniqlo, has more than half of its sewing workshops and fabric factories located in China. In contrast, a quarter is located in Southeast Asia. The production of American brands Nike and Gap in China currently only retains 23% and 21%. The Inditex Group, the Swedish apparel group H&M and the Spanish brand ZARA from Europe has only put less than 30% of its production in China.

On the other hand, Chinese apparel companies have also taken steps to shift their supply chains overseas, especially in ASEAN countries. For example, Ningbo Shenzhou International, the country's largest vertically integrated knitting OEM manufacturer, has four major foreign brands: Uniqlo, NIKE, ADIDAS, and PUMA. At present, Shenzhou International has three textile and garment factories in Vietnam and Cambodia, and there are many local cooperative manufacturers. During the worst period of the domestic epidemic in the first half of this year, as its overseas production bases maintained normal production operations, it effectively guaranteed the essential production capacity of Shenzhou International at that time.

Simultaneously, with the improvement of China's local design capabilities, the design industry's demand for global fabrics is also increasing. Traditional European suppliers such as Italy are still the steamed buns that everyone is chasing after, which undoubtedly increases the contact between China's textile and garment industry and the outside world. South Korea and Japan are the leading importers of textile raw materials for ASEAN countries. After the signing of RCEP, once the tariff barriers between countries are eliminated, it is expected to expand further the export of textile raw materials from China, Japan, and South Korea to the three ASEAN countries, thereby further strengthening the current low-end garment manufacturing concentrated in ASEAN countries, while the export of raw materials is concentrated in China and Japan.

The RCEP area covers the entire industrial chain from wool production to product consumption. Australia and New Zealand are the main producing areas of wool. China and ASEAN are the central woolen processing and manufacturing industries, and China, Japan, and South Korea are all important consumer markets for woolen products.

The wool textile industry chain among the various member states is very closely linked. China is the largest export market for Australia and New Zealand wool, ASEAN and Japan are the second and fourth export markets for China's woolen products, and ASEAN is Japan's second-largest import market.

In 2020, the total trade volume of woolen raw materials and products between China and other RCEP member countries exceeds 33%. Among them, under the promotion of the China-ASEAN bilateral trade agreement, the economic and trade cooperation between China and ASEAN has developed rapidly. In 2019, ASEAN surpassed the United States to become China's second largest trading partner in textiles and apparel. Japan's share in the export market is in a continuous and slow decline, ranking fourth after the European Union, the United States and ASEAN, and second in the single market. The orderly and convenient development of intra-regional trade is particularly important for the woolen industry.^[27]

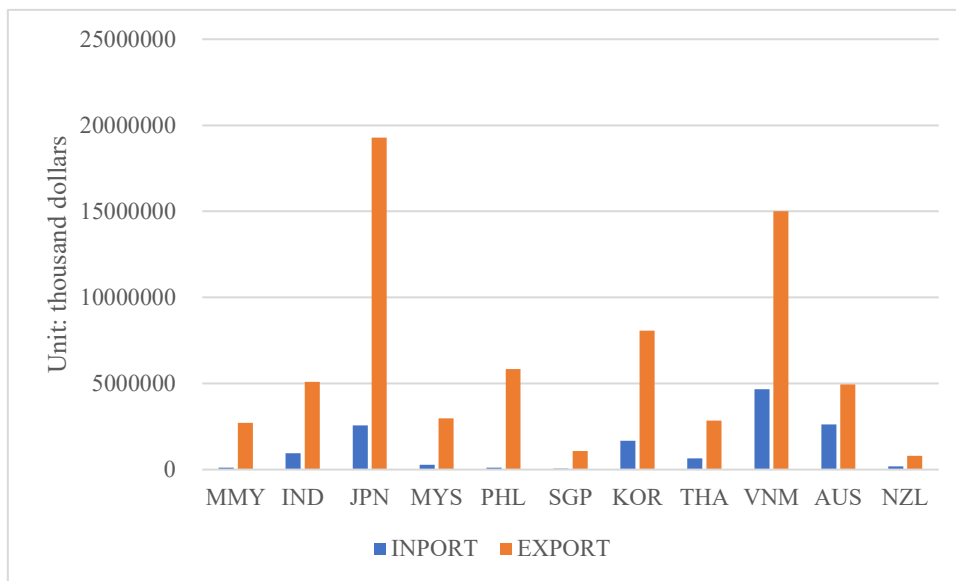


Chart 5-20 Trade status of China and other RCEP woolen raw materials and products in 2020¹
 (Data source: General Administration of Customs of China)

5.3.1.2 Conclusion

1.RCEP is conducive to the promotion of Chinese wool spinning raw materials and R & D design in the Vietnamese market position.

The most prominent bright spot in RCEP that will bring benefits to Vietnam’s export industry is its rules of origin, said Chung Tai Choon Hyun, director of the Origin Department of the Import and Export Bureau of Vietnam’s Ministry of Industry and trade, that is, products produced in one of the countries using raw materials from other member countries are still regarded as originating in that country. For example, Vietnam currently does not enjoy preferential tariff rates for many products made with raw materials from China when they are exported to Japan, South Korea, and India, whereas under the RCEP, products produced by Vietnam using raw materials from other member countries are still regarded as originating from Vietnam and enjoy preferential tariff rates for export. In 2018, Vietnam’s textile industry exported US \$36.2 billion, but imported raw materials (such as cotton, fiber, and accessories) amounted to US \$23 billion, mainly from China and South Korea.^[28] If RCEP is signed, it will address Vietnam’s textile industry’s concerns about raw materials. The global textile supply chain is expected to be dominated by China + neighboring countries. As China’s technological level of textile and apparel production involving R & D, design and RAW and auxiliary materials continues to improve, some low-end manufacturing links are moving to Southeast Asia, china’s trade-in finished textile and apparel products to Southeast Asia is declining, while the export of raw and auxiliary materials will increase significantly. Vietnam textile or will replace China

¹ JPN: Japan, KOR: South Korea, AUS: Australia, NZL: New Zealand, ASEAN: the Association of Southeast Asian Nations.

textile. Although taking Vietnam as the Representative Southeast Asia country textile industry is rising, the Chinese textile enterprise is not entirely in the substitution status. The joint promotion of RCEP by China and Southeast Asia is also aimed at achieving this win-win cooperation. Through regional economic cooperation, China and Southeast Asian countries will achieve common development. In the future, the global textile supply chain is expected to form a leading pattern of China + neighboring countries.

2.RCEP helps to enhance the competitiveness of Chinese wool textile products in the Japanese market.

Japan imports more than \$2 billion worth of worsted products annually, with China accounting for about 45 percent of the total, making it the largest import market. Japan is also China's fourth export market for wool products, with China's exports to Japan accounting for 10 percent of China's total exports of wool products in 2020.¹ The current import tariff of China's main wool textile products in Japan ranges from 2% to 10%, and the tariff reduction policy mainly adopts the way of gradual reduction. Tariffs on products such as woolen knitwear, woolly garments, and woolen scarves will be reduced to 0 percent within 16 years. As Japan and ASEAN, India, and other countries have signed free trade agreements, the above countries' wool products imported into the Japanese market can enjoy duty-free treatment. Under the promotion of zero tariff, Japan's imports of ASEAN wool textile products have been increasing year by year in recent years. At present, China and ASEAN export similar grade of wool products, with the implementation of RCEP tariff concessions, to improve the competitiveness of China's export wool products in Japan.

Tax code	Product	Exported to Japan (million dollars)	Percentage	Current tax rate	Tax reduction method ²
5106/5107	Wool yarn	0.212	6.58%	2.70%	the 11th year.
5111/5112	Wool fabric	0.2858	14.49%	5.30%	the 11th year.
61101101	Wool sweater	1.012	13.29%	10.90%	the 16th year.
61101200	Cashmere sweater	0.2236	5.11%	10.90%	the 16th year.
61171012	Wool knitted scarf	0.0103	1.89%	8.40%	the 16th year.
62	Wool woven clothing	2.6745	28.88%	9.10%	the 16th year.
62059100	Wool men's shirts	0.066	26.99%	7.40%	the 16th year.

¹ Data source: National Bureau of Statistics of China, General Administration of Customs of China

² It will be reduced proportionally within 11 years from the date of entry into force of the agreement, and tariffs will be exempt from the 11th years or the 16th years.

62142020	Wool woven scarf	0.3032	37.62%	6.60%	the 16th year.
43012000	Blanket	0.00372	10.59%	5.30%	the 16th year.
63014000	Chemical fiber blanket	1.44403	5.16%	5.30%	the 16th year.

*Chart 5-21 Japan's tariff reduction arrangements for woolen products imported from China
(Data source: China Wool Textile Industry Association)*

3.China-South Korea trade has taken advantage of previous free trade agreements

Korea is one of the important export markets of China's wool textile products. In 2020, China's exports to South Korea accounted for 5 percent of its total exports of wool products.¹ China is also South Korea's largest source of textile and apparel imports. China- Korea FTA agreement has entered into force in 2015, wool products in the past five years have been tariff concessions, based on the general tariff has been a certain degree of preference. Under the china-Korea agreement, the main wool textile products will be tariff-free in the next five or 10 years, which has been the best case.

RCEP is another important breakthrough since China has accelerated the implementation of the free trade zone strategy. China had signed free trade agreements with many member states of RCEP. In 2008, the China-New Zealand Free Trade Agreement came into effect. In 2010, the China-ASEAN Free Trade Area was fully established. In 2015, the China-Australia and China-Korea Free Trade Agreements took effect. In addition to the free trade agreements between ASEAN and Japan and other regions, through the construction of these free trade agreements and free trade zones, woolen products have achieved relatively free flow in the region from woolen raw material production, processing to consumption. With the signing of RCEP, China and Japan have also achieved a new free trade partnership. The expansion and deepening of free trade within the region will help further promote the export of my country's woolen products and increase trade and investment exchanges.

The woolen industry will further realize free trade and integration in the RCEP area. RCEP adopts regionally accumulated rules of origin, which lowers the threshold for identification of the source, making it easier for products from various regions in the region to enjoy tariff reductions. It helps strengthen the division of labor among members and promote the further development of regional integration of the wool textile industry.

5.3.2 Steel Industry in China

China's steel industry has grown rapidly in recent decades, with China now the

¹ Data source: National Bureau of Statistics of China, General Administration of Customs of China

world's largest producer and consumer of steel. Over the past 30 years, China's steel production has increased rapidly as the economy has industrialized and urbanized. The expansion of steel production, particularly over the past decade, has been a significant driver of China's demand for raw materials, especially iron ore and coking coal. This has resulted in a considerable increase in China's imports of these commodities.^[29]

5.3.2.1 China's steel industry overview

Taking the steel industry as an example, the new development pattern of steel in RCEP member countries, the signing of RCEP will promote the regional steel industry's integration. China imports 62.2 percent of its iron ore from Australia and 59.1 percent of its coking coal from Australia and Indonesia.^[30] The RCEP agreement will stabilize the supply of raw materials to the steel industry. In terms of steel trade, China exports 24.34 million tons of steel to RCEP member countries, accounting for 45.4 percent of China's total steel exports.¹ Among RCEP member countries, South Korea and Japan are still the primary sources of China's steel imports, accounting for 26 percent and 24 percent, respectively.⁴¹ The signing of RCEP will promote the import and export trade of steel products and the upgrading of products. It will also enhance the export competitiveness of China's steel industry's equipment and technology, facilitate the export of China's steel environmental protection experience, and promote the regional steel industry's participation in carbon trading. Import of raw materials accounts for nearly 62%, and the supply chain of raw materials has been stabilized. The production and consumption of steel in RCEP member countries is the world's largest steel production region.

¹ Data source: National Bureau of Statistics of China, General Administration of Customs of China

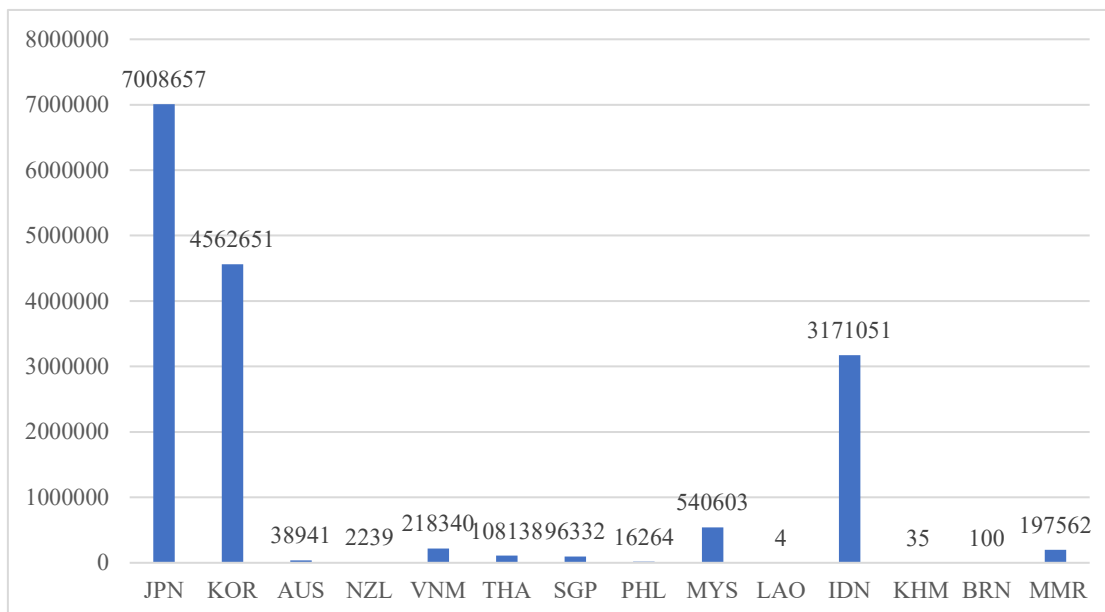


Chart 5-22 China's imports of steel products in 2019 (Unit: Thousand dollars¹)
(Data source: National Bureau of Statistics of China, General Administration of Customs of China)

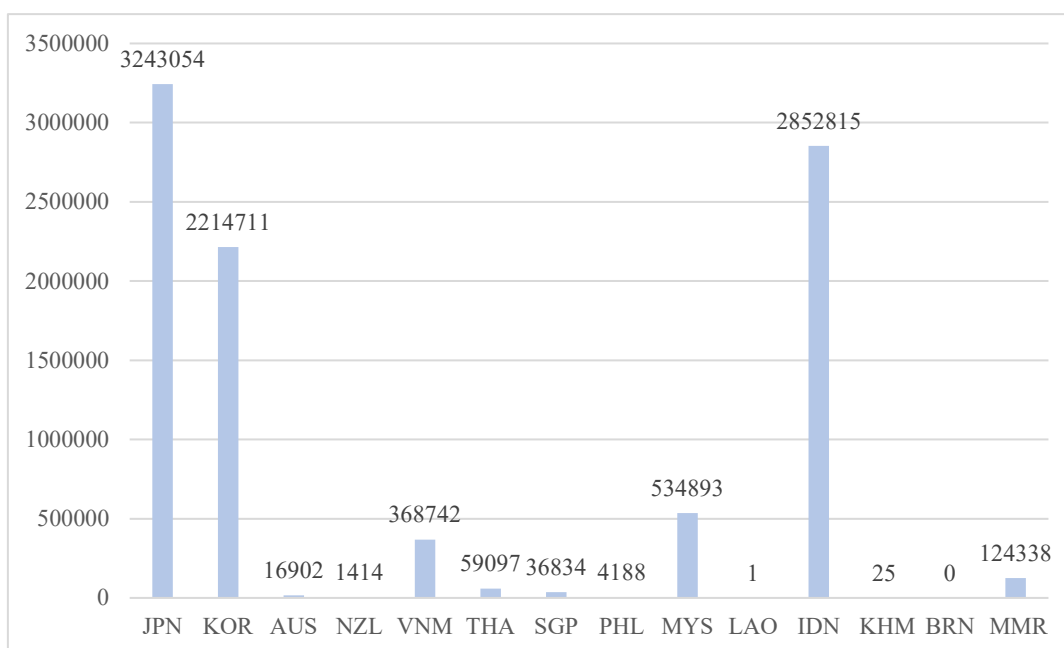


Chart 5-23 China's imports of steel products in the first half of 2020 (Unit: Thousand dollars)
(Data source: National Bureau of Statistics of China, General Administration of Customs of China)

¹ CHN: China, JPN: Japan, KOR: South Korea, AUS: Australia, NZL: New Zealand, VNM: Vietnam, THA: Thailand, SGP: Singapore, PHL: Philippines, MYS: Malaysia, LAO: Laos, IDN: Indonesia, KHM: Cambodia, BRN: Brunei.

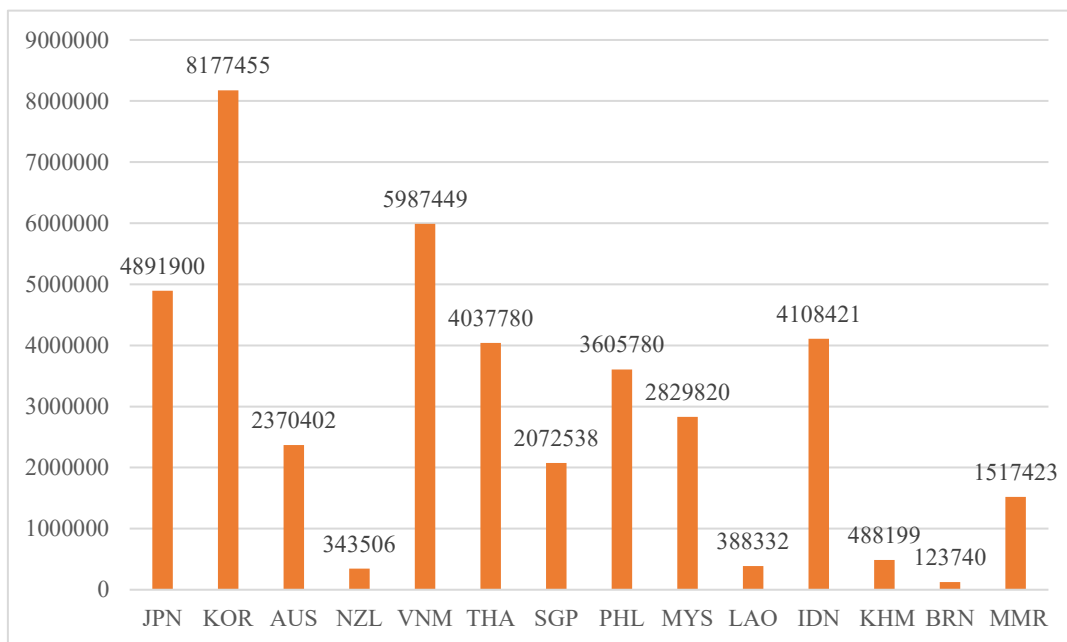


Chart 5-24 China's exports of steel products in 2019 (Unit: Thousand dollars)
 (Data source: National Bureau of Statistics of China, General Administration of Customs of China)

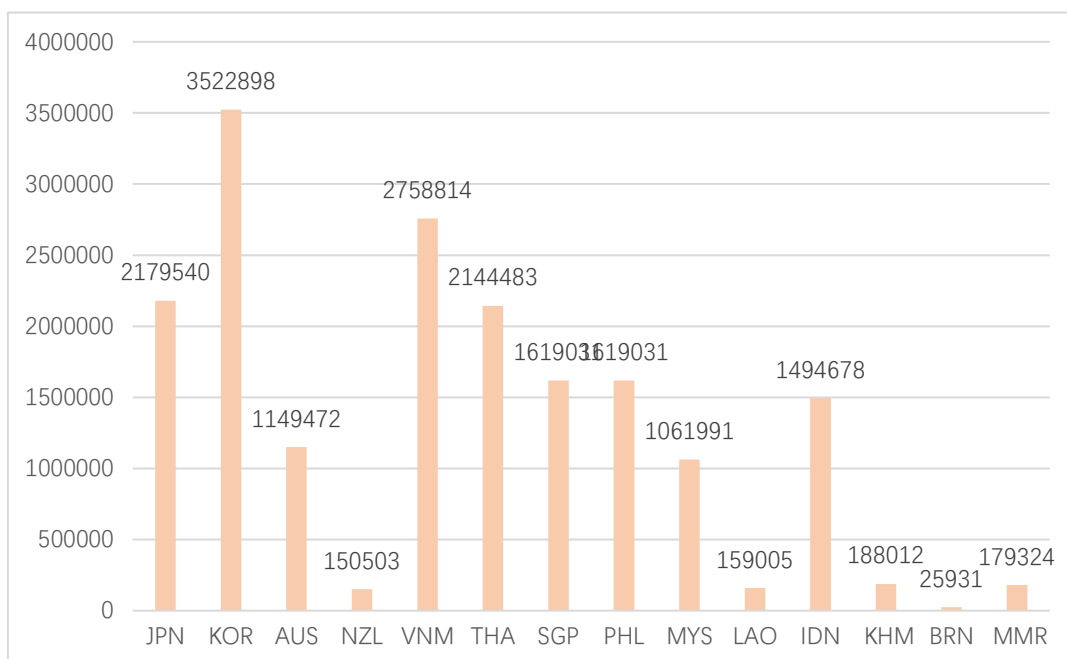


Chart 5-25 China's exports of steel products in the first half of 2020 (Unit: Thousand dollars)
 (Data source: National Bureau of Statistics of China, General Administration of Customs of China)

The signing of RCEP will further enhance the integrated development level of the regional steel industry and create a broader space for the optimization of the Division of Labor and cooperation of the regional steel industry.

First of all, to promote the stability of raw material supply chain, at present, China's main raw material supply of steel depends on the international cycle, of which many member countries of RCEP are China's important raw material supply sources, which is crucial to the safety of China's steel industry chain. In terms of iron ore, China has a large import volume of iron ore, and the degree of dependence on foreign trade has been over 80% since 2015. China imported 713.13 million tons of iron ore from Australia in 2020, rose 7%, accounting for 60.9 percent of the total.¹

As for coking coal, China's coking coal supply is dominated by the domestic market with an external dependence of about 10%. Australia and Indonesia are the central importing countries of China's coking coal. In 2020, 72.6 million tonnes of coking coal the year 2020 was imported by China, down by 2.5% from 74.5 million tonnes in 2019, 42.9 million tons of coking coal from the two countries.⁴³

5.3.2.2 Conclusions coming from the impact

1. RCEP effectively promote the growth of China's steel imports

China's policy on coal import restrictions to Australia is uncertain. With the entry into force of RCEP, China's trade relations with Australia, Indonesia, and New Zealand will be improved, the cost of imported coking coal may have additional room for reduction. In 2020, China imported 20.23 million tons of steel, up 64.4 percent year-on-year. By country and region, among the RCEP member countries, Korea and Japan are still the primary sources of China's steel imports, accounting for 26% and 24%, respectively.⁴³ At present, Australia has no tariff on iron ore exports, and China has no tariff on iron ore imports. However, there has been uncertainty in Sino Australian trade relations, and the entry into force of RCEP may improve Sino Australian trade relations, china's iron ore import trade smooth formation of good.

The signing of RCEP can effectively integrate and expand the free trade agreements between the ten ASEAN countries and China, Japan, the Republic of Korea, Australia, and New Zealand, cut tariffs and Non-tariff barriers to trade, and effectively promote the growth of China's steel imports. RCEP will effectively drive the increase of indirect steel imports. With the rapid development of China's automobile, high-end equipment manufacturing, and other fields, high-end products such as coated sheets, cold-rolled strips, hot-rolled strips, electrical steel, and seamless steel pipe are imported to maintain a particular scale. The signing of RCEP will reduce the cost of China's imports of medium and high-end steel products from Japan and South Korea and promote the importance of some medium and high-end steel products. At the same time, it will also bring certain competitive pressure to some medium and high-end

¹ Data source: General Administration of Customs of China

steel products in China, pushing domestic iron and steel enterprises to improve product grade, quality, and service level. China's iron and steel industry still relies on imports of some large-scale steel-making and rolling advanced equipment, incredibly revolutionary and critical process equipment.

2. RCEP enhance the export competitiveness of equipment technology in China's iron and steel industry

The signing of RCEP will vigorously promote the region's economic recovery, drive countries to increase steel investment and construction, and provide more opportunities and space for the export of China's steel equipment and technology. Simultaneously, the effective reduction of investment risk and trade cost helps enhance the export competitiveness of equipment technology in China's iron and steel industry. Besides, the implementation of RCEP will promote the technical exchanges between China and Japan, and South Korea and introduce advanced equipment technology from Japan and South Korea to help or force China's steel industry to speed up the upgrading of equipment technology. In addition, with the realization of zero tariffs for most products in the RCEP region, the manufacturing cost will be further reduced, which will benefit the import of mechanical and electrical products in China, thus increasing the indirect importance of steel. The entry into force of RCEP will also promote the growth of China's steel exports.

6. Conclusion and outlook

6.1 Summary

When reviewing all the contents above, the paper first provides a brevity description in the CHAPTER 1, including the relevant research background, research purpose, research methods, and the entire framework.

The details of the research background about the Regional Comprehensive Economic Partnership (RCEP) and China's economic and trade circumstances are described in CHAPTER 2. Facing the risks and competition brought about by the process of global economic integration, the Asia-Pacific region's pursuit of trade integration spawned this free trade agreement. After decades of coordination and negotiation, the agreement was finally signed after various historical transitions. The signing of RCEP is a victory for multilateralism and free trade, marking the smooth start of constructing the East Asia Free Trade Area with the largest population and the most diverse membership structure.

At the same time, this chapter details China's economic and trade circumstances in recent years, which is deeply affected by multiple factors, such as COVID 19, the Sino-US trade war, and the RCEP free trade agreement is highlighted here. At the end of the CHAPTER 2, an explanation of the key rules of RCEP is listed in the aspect of the principle of origin, tariff preferences, and non-tariff barriers.

Firstly, some rules are collectively referred to as the principle of origin in trade agreements, which plays an essential role in shaping the global supply chain. In the framework of principle of origin, the free trade agreement encourages manufacturers outside the boundaries of the agreement to locate production activities within the member states' borders to take advantage of the preferential treatment of goods produced in that country.

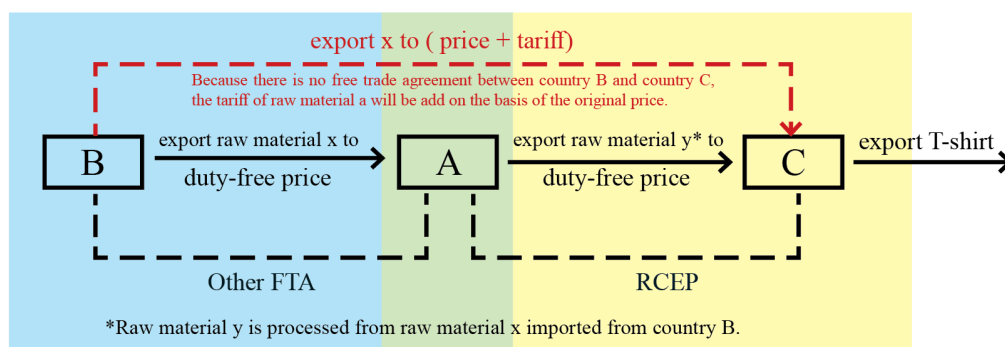


Chart 6-1 Graphical description of expanded accumulation

Secondly, in terms of tariff preferences, more than 90% of the products are RCEP zero-tariff products. And most tariffs will drop to zero immediately or within ten years. This ensures that RCEP's tariff reduction effect will be more significant, and at the same time, the liberalization of trade in goods can be achieved more quickly.

Thirdly, non-tariff measures refer to all import restriction measures other than the tariff, usually including quantitative restriction measures and non-tariff measures that create barriers to other trade. RCEP aims to substantially eliminate restrictions and discriminatory measures in trade between RCEP parties and gradually realize trade liberalization. The non-tariff measures of RCEP can be summarized as the following points:

- 1) Abolish and prevent any form of agricultural export subsidies and abolish quantitative restrictions
- 2) Reasonable sanitary and Phytosanitary Measures
- 3) Introduce technical consultation mechanism
- 4) Customs clearance procedures and trade facilitation

Because of the above research backgrounds and research purposes, this paper decides to use the GTAP model as the research tool to quantitatively research the influence of RCEP on the regional economy and even the Chinese economy in CHAPTER 3. The Global Trade Analysis Project (GTAP), as a research organization, established GTAP database (an extensive database with large organizations such as WTO to update data) and developed the standard GTAP model (a multi-region, multi-department, and computable general equilibrium model with the characteristics of perfect competition and constant returns to scale). They can simulate the impact of multi-country and multi-sectoral trade policy changes and thus are widely used to study issues surrounding various international economic policies.

CHAPTER 3 also mentioned that this simulation involved 15 regions, including RCEP member countries and 11 central departments(*Chart 3-2 The division of departments*).

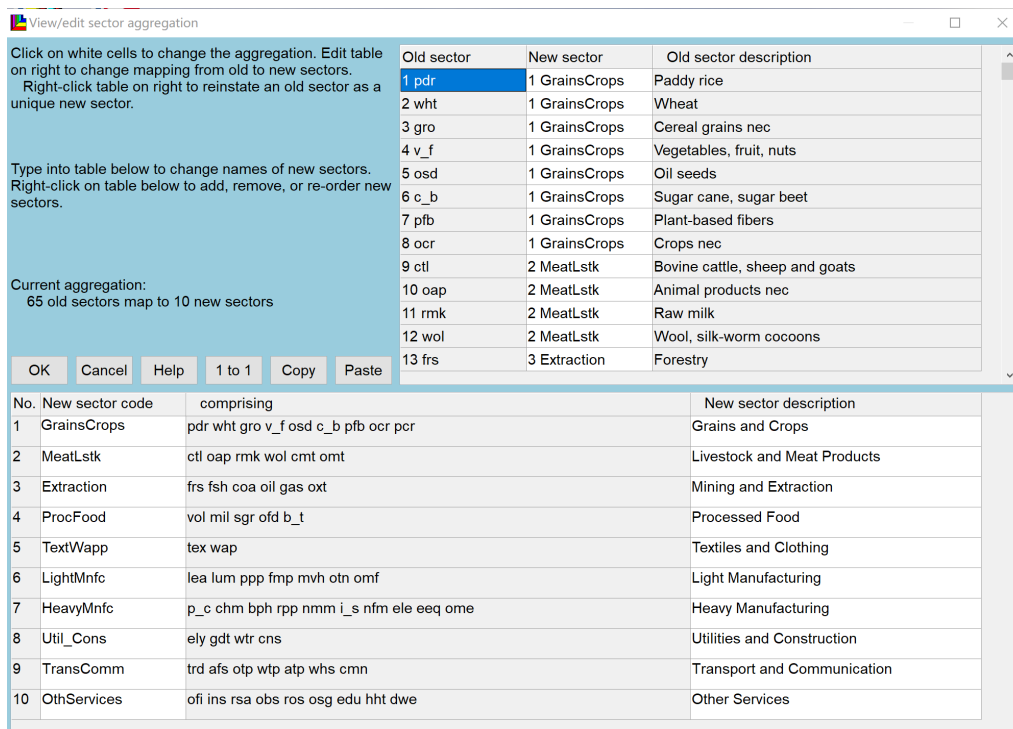


Chart 6-2 Gtap Agg software screenshot of departments division

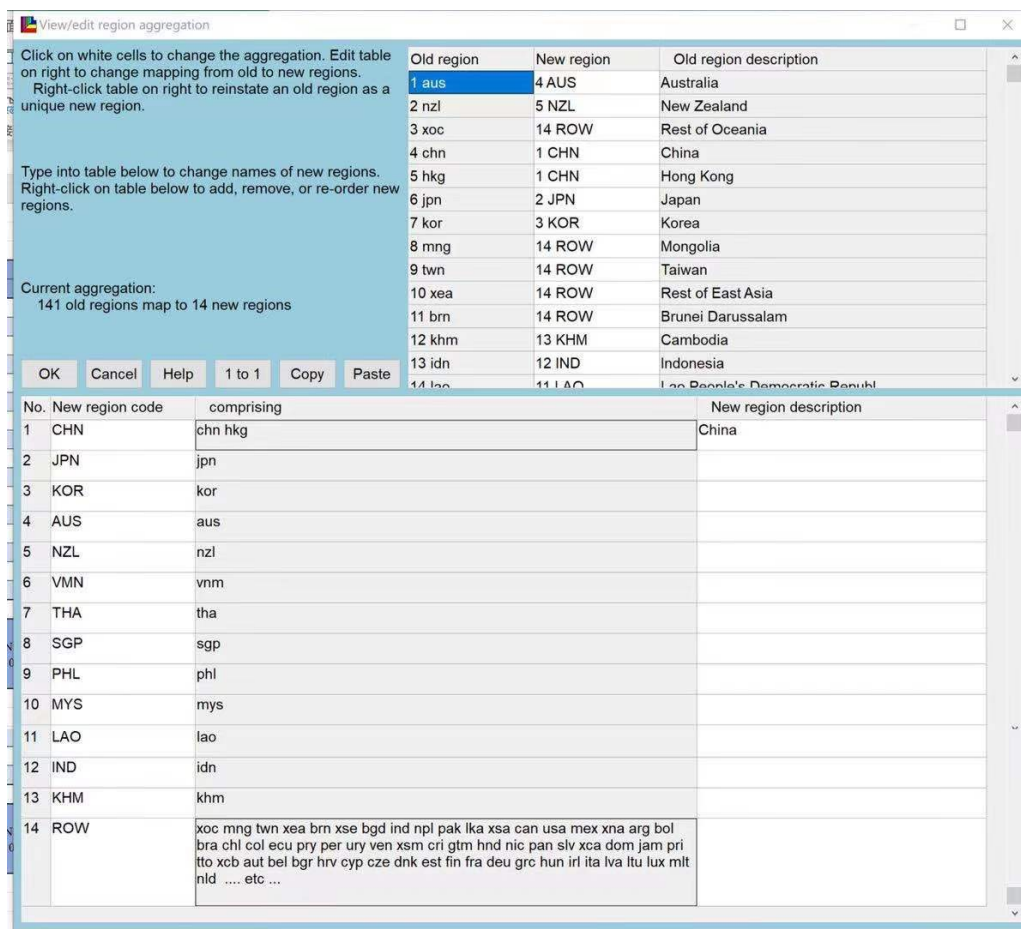


Chart 6-3 Gtap Agg software screenshot of country distribution

After collecting and reclassifying the original data, the first step is to separate the data based on assumed changes in trade policy. The next step is to set the specific shock of the exogenous variables and then use the Johansson method to enter the implementation of the general equilibrium simulation solution in RunGTAP software.

Considering that one of the goals of RCEP is to eliminate tariffs and technical barriers between member states, the basic simulation of this study will be set assuming that RCEP member partners have eliminated import tariffs on all commodities and technical barriers will be decreased of varying degrees (0%, 2%, 10%).(*Chart 3-3 Simulation scenario settings*)

- Simulation scenario 1: the tariffs between RCEP member states is 0 and the technical barriers to trade remains unchanged;
- Simulation scenario 2: the tariffs between RCEP member states is 0 and the technical barriers to trade reduced by 2%;
- Simulation scenario 3: the tariffs between RCEP member states is 0 and the technical barriers to trade reduced by 10%;

Based on the simulation results, CHAPTER 4 conducts an in-depth analysis, using graphs and data to compare and analyze changes in the welfare level and GDP, trade scale, terms of trade, and departmental output in the Asia-Pacific region, especially China. At the end of CHAPTER 4, the thesis draws general conclusions:

- a) The overall welfare of China and RCEP member states has been improved after the establishment of RCEP(*Chart 6-4 Changes in welfare of RCEP member states in three scenarios*). Technical barriers are the main obstacle to obtaining high welfare. The higher the degree of reduction, the better the overall welfare.

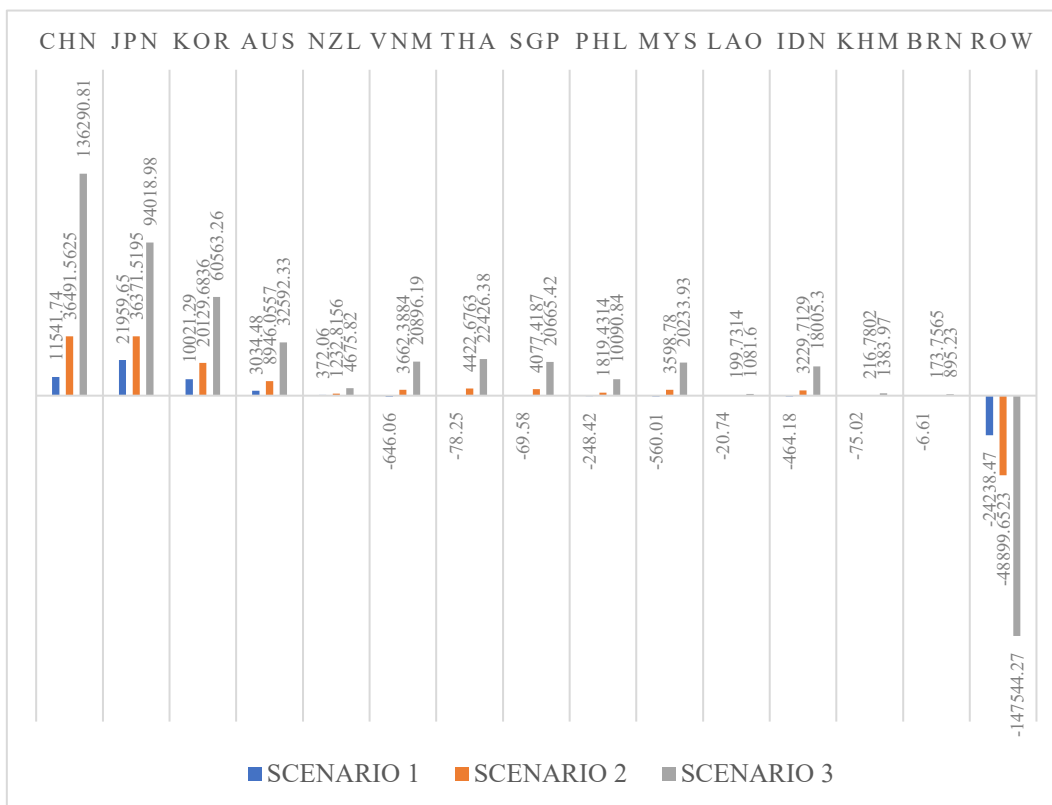


Chart 6-4 Changes in welfare of RCEP member states in three scenarios

- b) The implementation of various policies will positively increase the real GDP of all member countries in the region(QGDP represents the real GDP: *Chart 6-5 Changes in QGDP of RCEP member states in three scenarios*; PGDP represents the GDP deflator: *Chart 6-6 Changes in PGDP of RCEP member states in three scenarios*), and many countries in Southeast Asia will enter a stage of inflation. The absolute value of China's economic growth is relatively high, and the share of imports and exports will increase, but some terms of trade will be sacrificed. Therefore, the trade surplus will be further reduced.

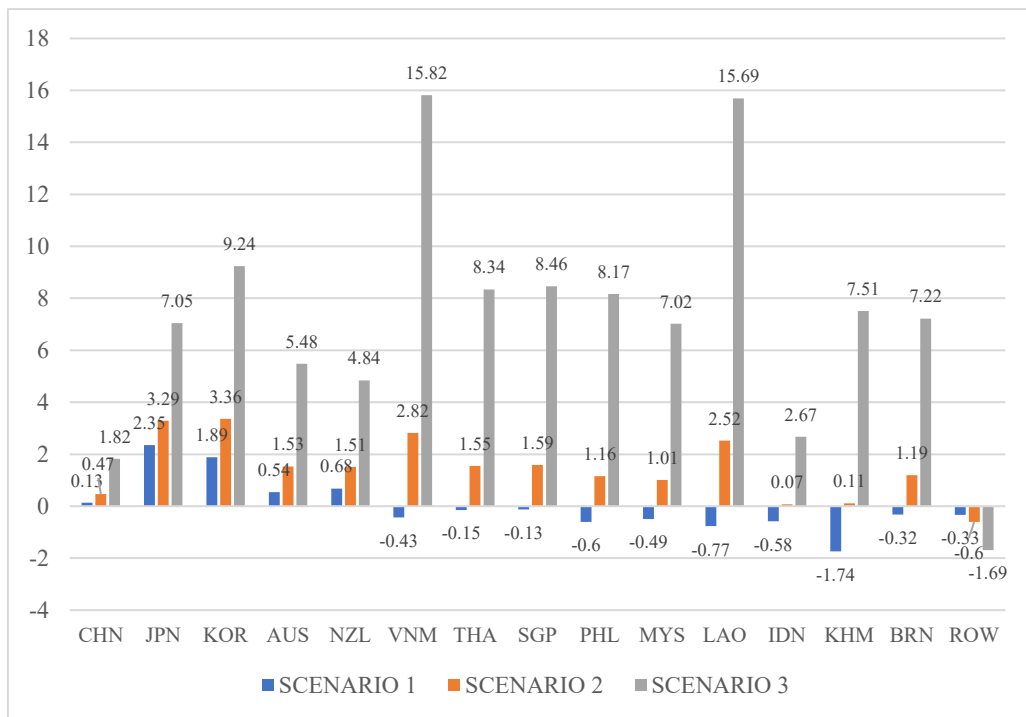


Chart 6-5 Changes in VGDP of RCEP member states in three scenarios (Data Resource: GTAP Calculation)

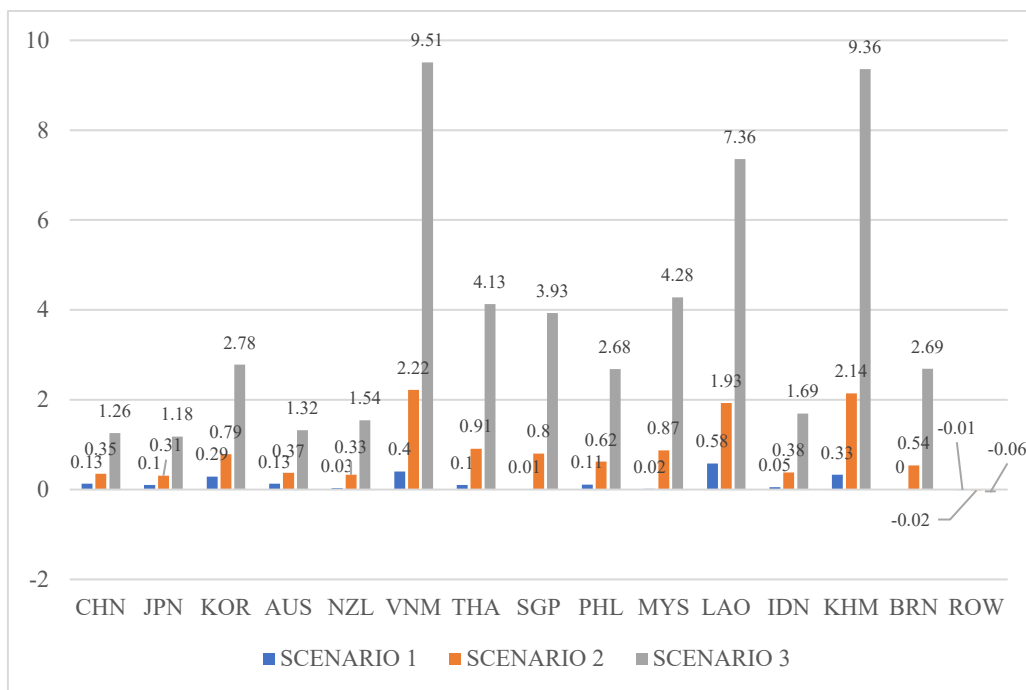


Chart 6-6 Changes in QGDP of RCEP member states in three scenarios (Data Resource: GTAP Calculation)

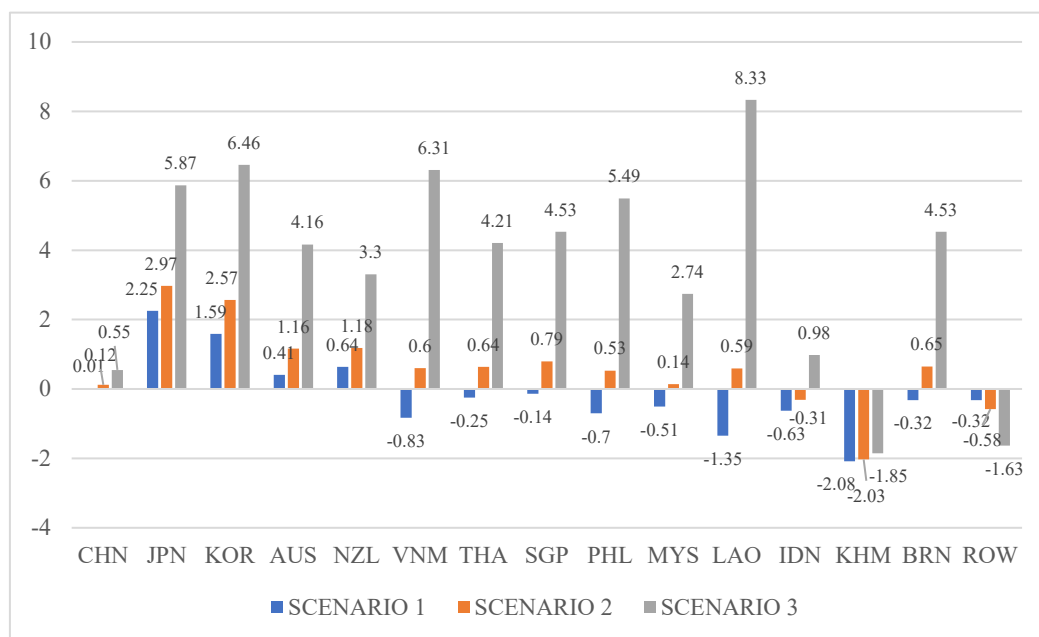


Chart 6-7 Changes in PGDP of RCEP member states in three scenarios (Data Resource: GTAP Calculation)

c) With the gradual decrease of TBT in the region, China's import and export trade's growth scale is also gradually expanding(import: *Chart 4-7 Changes in V_{iwreg} of China in three scenarios* export: *Chart 4-8 Changes in V_{xwreg} of China in three scenarios*). Increase, which to a certain extent shows that the division of labor is becoming more and more detailed. However, the product trade structure of RCEP member countries is slowly converging. How China transforms this competition into complementary competition is an inevitable requirement for China to expand cooperation with other countries in RCEP and promote economic development in the future.

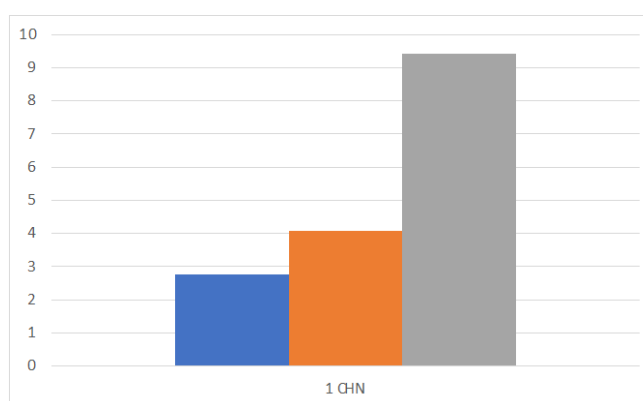


Chart 6-8 Changes in V_{iwreg} of China in three scenarios (unit:%) (Data Resource: GTAP Calculation)

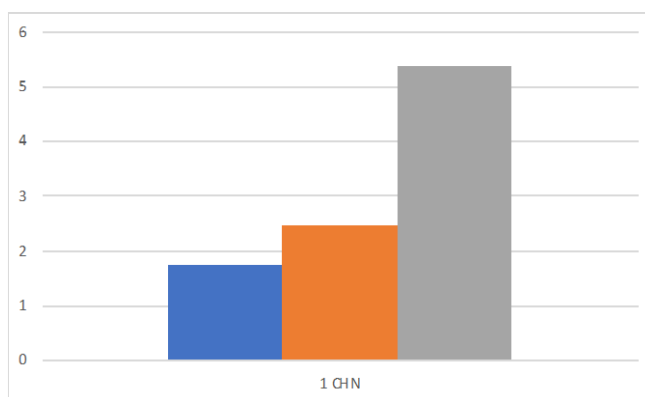


Chart 6-9 Changes in Vxwreg of China in three scenarios (unit:%)
 (Data Resource: GTAP Calculation)

- d) The implementation of policies such as tariffs and technical barriers will bring about positive changes in China's terms of trade. (Chart 4-10 Changes in Tots of China in three scenarios)

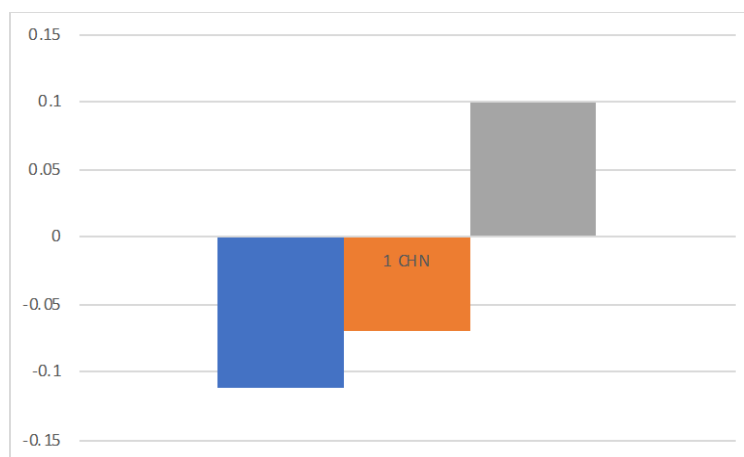
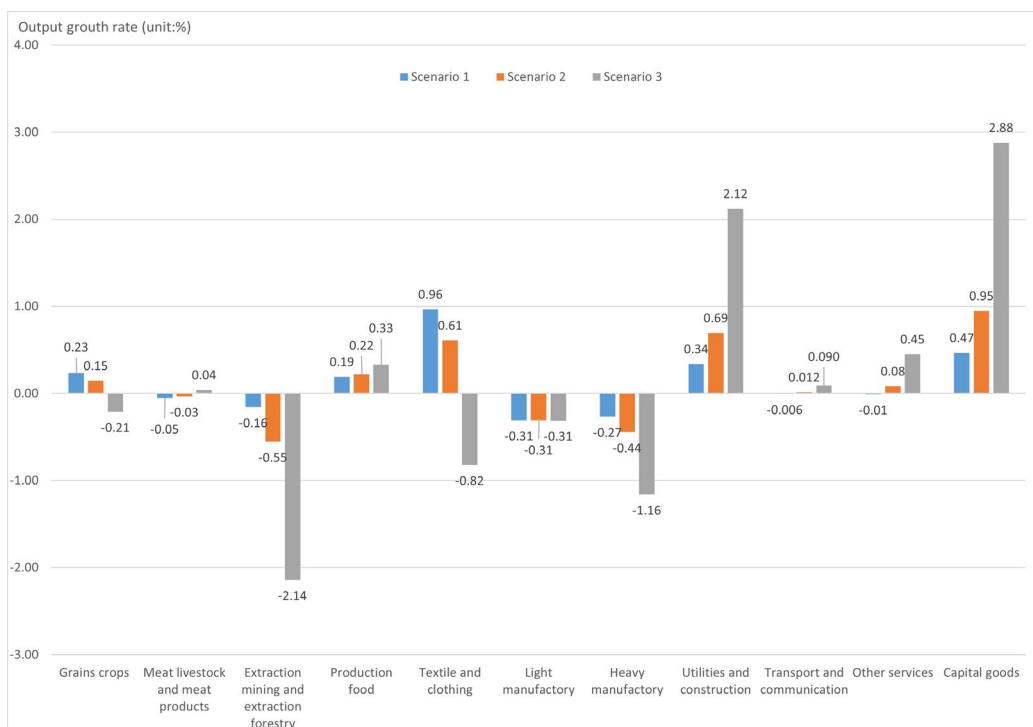


Chart 6-10 Changes in Tots of China in three scenarios (unit:%)
 (Data Resource: GTAP Calculation)

- e) From the perspective of specific industrial output, after China joined RCEP, Production food, Utilities and construction, Other services, Capital goods, Meat Livestock, and meat products and Transport and communication have all increased, and the others have been hit. (Chart 4-12 Output growth rate of various industries in China (unit:%))



*Chart 6-11 Output growth rate of various industries in China (unit:%)
(Data Resource: GTAP Calculation)*

- f) The adverse effects of Extraction mining and extraction forestry, Light manufactory, and Heavy manufactory show that China lacks competitive advantages in these manufacturing industries. Under the impact of trade liberalization, such manufacturing companies will face particular challenges.

CHAPTER 5 serves as a summary section, based on the changes analyzed in the previous data, combined with specific cases and China's supply chain, and further discusses the impact of the establishment of RCEP on China's supply chain and the possible future. CHAPTER 5 first introduces the supply chain's development process and how China's role in the global supply chain has changed during this process. This is closely related to the possible impact from the import and export perspective and departments perspective.

From an import perspective, the signing of RCEP will reduce the cost of tariffs between member states and provide countries that rely on downstream companies in the supply chain with low-cost materials and equipment, thereby creating complementary effects. However, it is still difficult for China's major exporting countries to form trade substitution, and the degree of supplier substitution is relatively weak, so the marginal impact of RCEP on China's supply chain is relatively small(*Chart 5-6 The transmission path of RCEP's impact on China's import chain*).

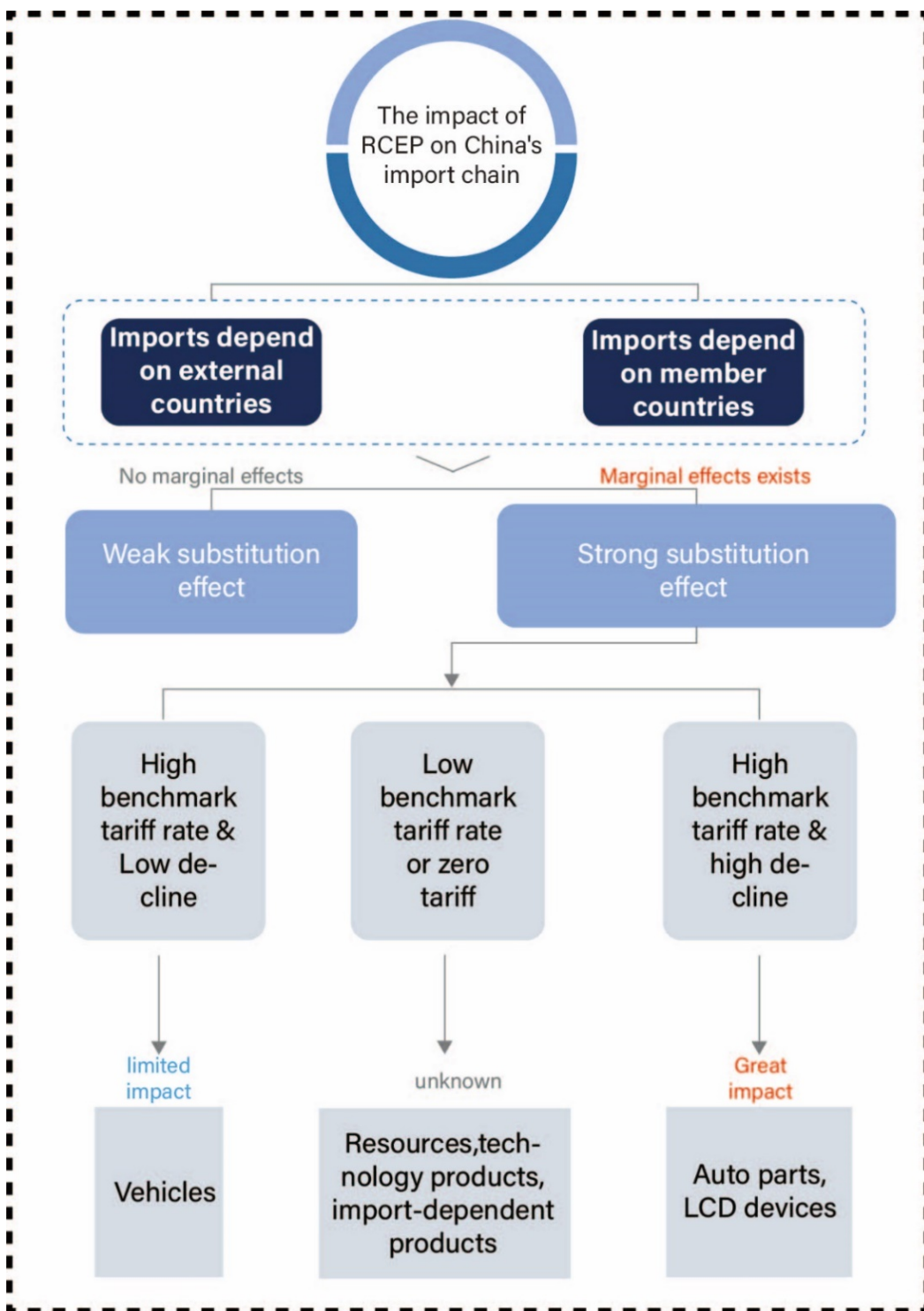


Chart 6-12 The transmission path of RCEP's impact on China's import chain

From an export perspective, the signing of RCEP will encourage the transfer of trade from non-member states to member states. This is an external substitution and will have a positive effect on the supply chain. Nevertheless, at the same time, it brings about competition among member states. This kind of competitive relationship may bring about the internal transfer of trade and have adverse impacts on the industrial chain of a specific country. (Chart 5-13 The transmission path of RCEP's impact on China's

export chain)

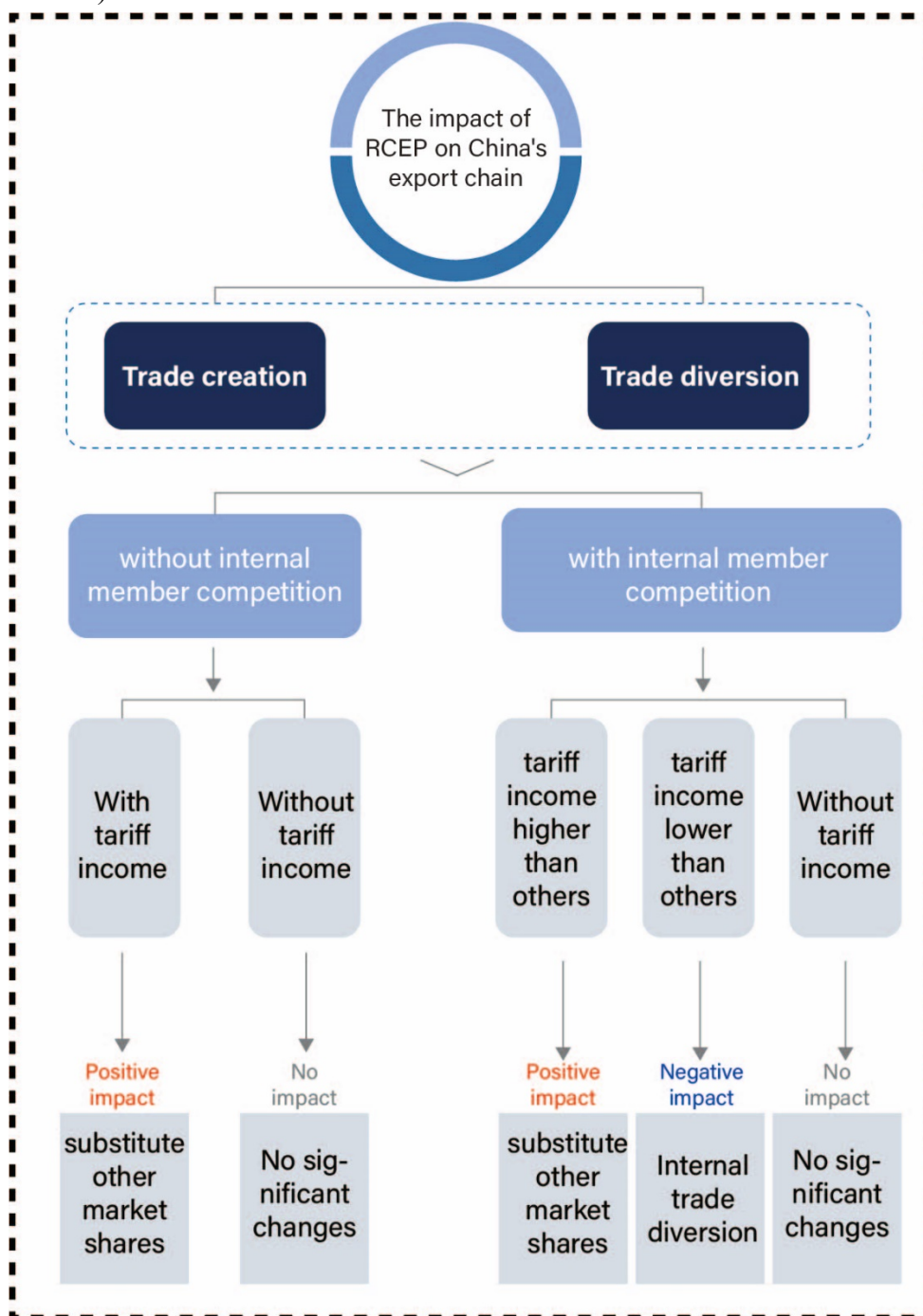


Chart 6-13 The transmission path of RCEP's impact on China's export chain

Integrating both aspects of import and export, the signing of RCEP will affect China's supply chain from two aspects: complementary effects and increasingly fierce competition. On the one hand, based on the fact that RCEP members account for a high proportion of China's imports, the impact of future tariff policies will be more obvious. Therefore, China's import costs can be further reduced, and China's exports can be expanded. This enables China to be more closely linked with other member states. On the other hand, resource allocation and industrial division of labor among

RCEP member states are not the same. Therefore, China's exports to RCEP member states will have Matthew effect of accumulated advantage.

Since both the textile and steel industries are China's pillar industries, the following will take the textile industry and the steel industry as examples to analyze the impact of RCEP on China's unfamiliar output supply chain. In the textile industry, the tariff policies promoted by RCEP will help China's textile industry accelerate industrial innovation and upgrading, such as importing raw materials and exporting finished products represented by Vietnam and Japan. Improve production efficiency, but countries represented by South Korea have implemented various preferential rules such as tariff reductions. The signing of RCEP has little impact on the existing textile and clothing trade tariffs between them. Also, the signing of RCEP will effectively promote China's steel imports while also enhancing China's steel industry's competitiveness in equipment and technology exports.

Taking these two industries as representatives, it shows that the establishment of RCEP will significantly promote the completion of the technological upgrading of related industries in order to deal with competition from other countries, thereby enhancing the development level of China's industrial chain.

In RCEP, in this region of East Asia and Southeast Asia, the similarity of geography and the difference in the degree of development determine the economic territory of the RCEP circle. The respective expertise of RCEP member states is complementary. In terms of commodity exports, the largest export categories of China, South Korea, Thailand, Malaysia, and the Philippines are electronic and mechanical products. Many countries have specializations in the industry, such as South Korea specializing in semiconductor chips and Thailand specializing in hard disk production, forming a critical mid-section of the global supply chain. The largest export categories of Vietnam and Cambodia are textiles and clothing. With the rapid rise of labor costs in China, Southeast Asian countries with lower wages have undertaken a large number of industries transferred from China. In addition to the two countries mentioned above, Myanmar and Laos also followed closely. Australia and New Zealand are atypical members, with many lands and superior mineral resources and suppliers of raw materials and agricultural products. In ensuring the diversity and continuity of the supply chain, RCEP helps China extend the supply chain and industrial chain length and enhance selectivity.

Before RCEP, China has signed bilateral trade agreements with all countries in the RCEP group except Japan, and only Japan is genuinely a new partner brought to China by RCEP. Japan's largest export category in the manufacturing of automobiles and high-tech industrial production equipment. Japan's industrial robot production occupies more than half of the world's share, leading the industry.

Advanced production equipment is essential to China. With economic development, labor costs in China will continue to rise. China's manufacturing industry and the overall supply chain have two development routes:

1. Labor-intensive industries move south to lower-cost Southeast Asian countries, close enough to China, and in the same free trade zone, which can still be closely integrated with the domestic industrial chain. Other regions cannot accept the transfer of China's low-tech industries, and moving to other regions will destroy the integrity of the regional supply chain and the clustering effect.
2. After joining RCEP, the open regional market will force China's mid-to-high-end related industries to complete technological upgrades to cope with competition from other countries, and this will also help improve the development level of China's industrial chain.

6.2 Limitation and Remarks

When analyzing and writing this thesis, there are still many limitations. First of all, this thesis mainly relies on the GTAP model, a tool that can reduce the time of data collection and facilitate data simulation. Nevertheless, it itself has intrinsic limitations, which can be explained from the following three points:

- 1) The compare base period limits. The latest GTAP database (the tenth edition) is now six years old and is based in 2014. If the analysis uses past data to simulate future situations from the present perspective, the simulation results may be imprecise.
- 2) The flexibility of replacement in the GTAP database varies only by product category, not by country. This setting is too simplistic and contrary to the actual situation.
- 3) The standard GTAP model is not used for dynamic effect analysis but static. Besides, all markets are set to be fully competitive, and the recovery of production scale is fixed, which is not practical.

Second, technical barriers appear in the form of national or regional technical regulations, agreements, standards, and certification systems. It covers a wide range of technical indicators, including science and technology, health, quarantine, safety, environmental protection, product quality and certification, and many other technical indicator systems. When applied to international trade, technical barriers present flexible and varied regulations with various names. So this is not quantifiable. The contextual assumptions in this thesis can only be based on the possible trends of

technical barriers, which may be inaccurate.

6.3 Advise on How To Gain A Competitive Edge With RCEP

Finally, in response to these effects, some corresponding suggestions to Chinese companies are listed at the end of the paper. This is a microscopic analysis of how RCEP will affect the supply chain of Chinese companies and how these companies should seize the Free Trade Agreement's opportunity to enhance their competitive advantages and reduce supply chain risks. By establishing a flexible supply chain model, the use of supply chain management software, and the use of big data to monitor supply chain risks, the above objective can all be implemented.

The anterior part of this article analyzes the impact of RCEP trade agreements and tariffs, especially on China's supply chain. This section intends to explore how to use trade agreements to reduce tariff costs and the impact on the structure of the supply chain from a company level, a more microscopic perspective. Due to COVID-19, ongoing trade wars between countries, climate change, and other unpredictable factors, companies of all dimensions are currently under unprecedented pressure. There is an urgent need to establish more transparent and amplify procedures to monitor and respond proactively to potential disturbances in such an environment. Especially the tariff-oriented supply chain design may have potential risks and problems.

To reduce risk, an essential tool (usually underutilized) that the companies have is the effective use of free trade agreements (such as RCEP). These agreements can restrict the scope of sudden changes in government regulations, policies, tariff levels and services, and investment restrictions within the acceptable range. The correct use of RCEP rules can save thousands of dollars each year, thereby consistently lowering costs. Furthermore, partner countries' rules can bring greater certainty and lower risks to the regional supply chain.

There are typically two reasons why companies cannot use free trade agreement (like RCEP) correctly:

First, some of the existing free trade agreements (such as the China-Korea Free Trade Area) provide limited coverage and scope. Nevertheless, now there are steadily increasing new transactions, especially if RCEP is a regional agreement signed by more participating countries, bringing considerable advantages to the companies.

Second, dealing with increasingly complex trading arrangements may be a challenge for some companies. Because not all products or services traded between countries participating in these free trade agreements are automatically eligible for preferential

benefits: only those products or services that meet specific rules can automatically receive preferential benefits. This requires evaluating how RECP maps various parts of the company's supply chain to determine the tremendous benefits and formulating trade compliance strategies to ensure product and document compliance. For companies that lack end-to-end supply chain and product visibility, implementing such assessments and strategies can be costly. However, the development of new trade management software tools and customs solutions has made these tasks automated and streamlined, making it easier to take advantage of the benefits of RCEP.

Taking advantage of the opportunities provided by the vast RCEP network, companies can optimize their supply chains. At the same time, they can prevent regional fragmentation, improve the flexibility and flexibility of the supply chain, and reduce compliance costs and tariffs. Moreover, take advantage of the vast and growing market to purchase and export their products.

Based on this, the following measures and suggestions can enable the company to obtain a favorable competitive position and be launched one by one with examples below.

- 1) Develop models to evaluate the opportunities and risks of alternatives across the supply chain.
- 2) Reduce supply chain risks and costs by purchasing and supplying within the RCEP specifications in the region.
- 3) Use trade management software to implement trade compliance optimization strategies to optimize production, tariffs, and trade networks
- 4) Monitor and actively respond to the impact of trade protectionist measures and opportunities to enhance competitive advantage.

6.3.1 Development of a flexible supply chain model

In recent years, companies hope that the supply chain can not only help improve efficiency but also promote continuous business growth. The latest global survey shows that before the outbreak of COVID 19, only 12% of the Chinese companies surveyed had established a flexible supply chain that focused on customers and promoted business growth. This proportion is slightly higher than the global average (10%).^[34]

The research titled "Accelerating Growth: Customer-centric Supply Chain" ^[34] covers ten countries and regions worldwide. The report pointed out that to build a customer-centric supply chain, Chinese companies still face many challenges, including the insufficient flexibility of the supply chain infrastructure and resources and the lack of co-creation capabilities with ecological partners.

Research also shows that between 2017 and 2019, Chinese companies surveyed invested around US\$180 million on average to transform their supply chains. However, only a few leading companies can obtain a satisfactory return on investment. The revenue of leading companies has increased by an average of 11%, while other companies' revenue has fallen by an average of 4%. In addition, the contribution of flexible supply chains to the revenue of leading companies is 4.3 times that of other companies (51% and 12% of revenue, respectively).^[34]

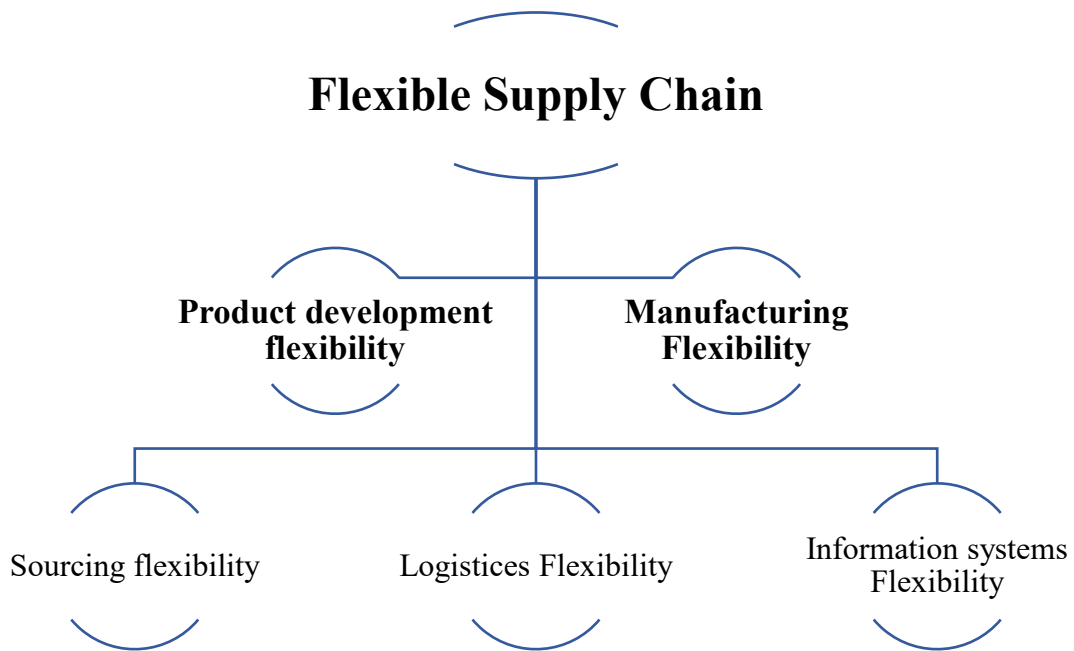


Chart 6-14 Five elements of flexible supply chain

Under the epidemic, as the engine of corporate recovery, it is urgent to establish a flexible supply chain that can ensure that companies provide products or services quickly, safely, and steadily.

Using econometric models and considering the impact of an analytical, asset-light collaborative structure on corporate revenue growth, companies can formulate a roadmap for supply chain response to emergencies (*Chart 5-8 List of supply markets for vehicle imported by China*). Through the five steps of mobilizing the command center, sensing risks, analyzing risks, configuring risk response plans, and agile operations, companies can effectively respond to emergencies in the supply chain, strengthen operations, and prepare for possible risks.

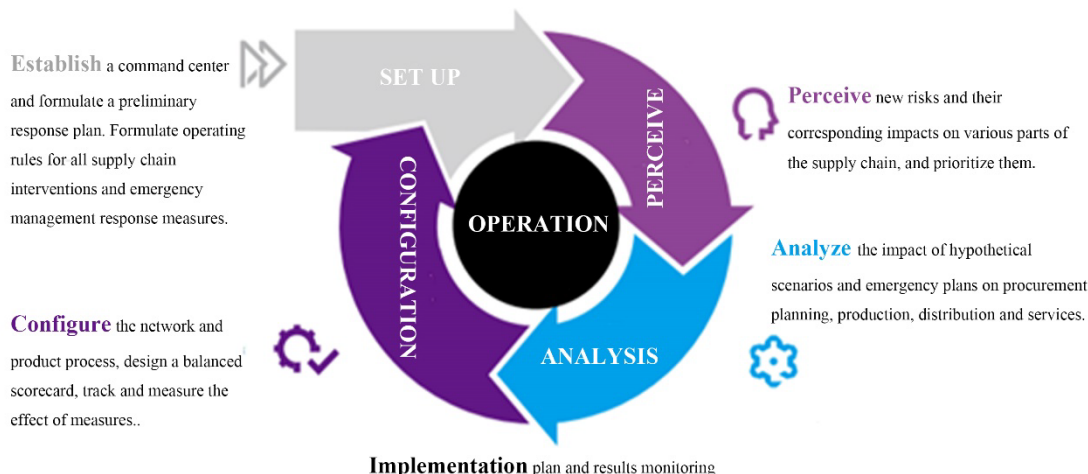


Chart 6-15 Supply chain emergency response roadmap

1) Establish a command center

The supply chain under the leadership of the emergency command center must be able to coordinate and respond to emergencies flexibly, quickly, and with certainty to minimize the impact of emergencies. Once the emergency command center is established, it should take up the responsibilities of rapid response and coordination of all parties. In the short term, companies first set up a command center to macro-organize the emergency mechanism of the entire supply chain. Secondly, formulate and adjust feasible emergency plans according to the enterprise's actual internal situation and deploy and empower cross-functional teams to implement customized emergency plans. The supply chain control center can help companies quickly understand the current operating conditions and visually predict the provision of products or services. The supply chain can quickly make decisions in terms of network, secondary suppliers, product process adjustments, and internal optimization. decision making.

2) Perceive and prevent risks

Although supply chain emergencies always come unexpectedly, with the support of big data, intelligent systems, and interconnected ecosystems, the supply chain can now predict emergencies based on early signs. Respond quickly and maintain the flexibility of the supply chain. Therefore, in the short term, companies not only need to grasp the characteristics of the company's supply chain (such as components, products, and services, customers), analyze the correlation between the supply chain and emergencies, and also need to define risks or emergencies. The scope of the incident, determine which elements are at risk, identify, match and prioritize the risks, and identify the affected communities and ecosystems. In the long run, companies need to build intelligent capabilities to identify and assess risks and emergencies automatically and proactively provide recommended measures for risk mitigation.

3) Quantify risk impact

Regardless of whether the occurrence of emergencies is predictable. Supply chains need to quickly assess end-to-end operational capabilities and quantify financial and operational impacts to accelerate decision-making. In the short term, companies need to identify, measure and quantify risks and evaluate key risk indicators to prioritize critical strategic decisions. It also needs to understand the actual needs of employees, build practical scenario models for scenario rehearsals, and quickly evaluate the value chain and alternative solutions. The long-term solution is to identify scenarios, construct and deduct scenarios for different possible emergencies, and clarify their impact on the value chain to identify and explore business and operational opportunities through simulation and optimization engines and build early solid warning management.

4) Configure a risk response plan

After evaluating and quantifying the emergency and its impact, and the company must decide what response measures to take in the supply chain, whom to arrange for, and what trade-offs and considerations to make. A practical value decision framework, such as creating decision trees, uses the delivered value to guide the decision-making process, customizes end-to-end emergency plans for risks or emergencies, and identifies and monitors priority strategies and operational KPIs affected by emergency plans and reports. In the long run, companies need to improve their existing operating models' flexibility, use intelligent capabilities to improve the customization of emergency plans, redefine risk key performance indicators (KPIs) and performance indicators, and clarify how to respond to the subsequent impact of emergencies effectively.

5) Intelligent and agile operation

With the continuous advancement of rapid response, companies need to adjust emergency plans constantly and their operations based on time, events, and results to achieve efficient delivery to customers anytime, anywhere. A cross-functional operation team is currently established to ensure that decisions are made accurately and quickly, and it is continuously adjusted and adapted during the implementation process to ensure business continuity and understand employee concerns. Grasp and evaluate the results and notify the command center at a time when other emergency plans are needed. In the future, companies need to use innovative technology to implement proven and effective emergency plans, extend the experience summaries and capabilities of the command center to the entire enterprise, and fully ensure that the emergency plans and analysis capabilities built by the command center are coordinated with the enterprise resource plan (ERP) Unanimous.

6.3.2 Utilize supply chain management software

With the improvement of supply chain management standards, acceptable errors become smaller and smaller. Nevertheless, due to the emergence of supply chain management software, companies will avoid these losses. Supply chain management tools and technologies enable users to reduce errors and costs while optimizing the entire supply chain. To meet the complex supply chain and inventory management requirements, most companies now have to deploy multiple supply chain management software and inventory management system software. They can provide professional manufacturing, distribution, and supply chain management functions(*Chart 6-15 Eight elements of supply chain management softerware*) so that companies do not need to overthink about product manufacturing and storage locations when making decisions. In this way, modern supply chains can be managed across regions and time zones, and delivery lead times can be shortened as much as possible.

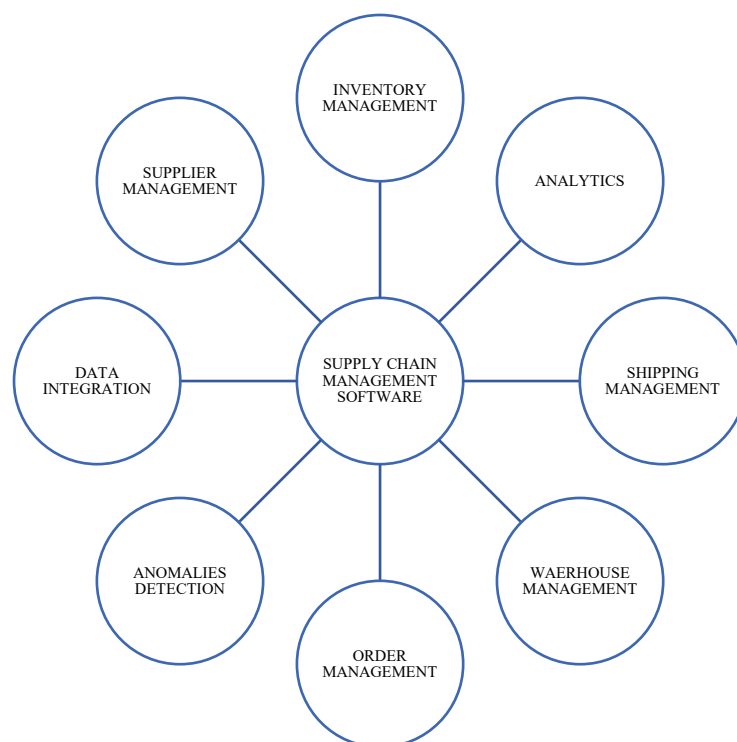


Chart 6-16 Eight elements of supply chain management softerware

The closest thing to RCEP is supplier management tools. In addition to the auxiliary functions of cost issues, supply chain management tools can also help companies better understand their relationship with suppliers. Supplier management tools show the history of business partnerships and how it affects the supply chain. Using supplier performance analysis, users can see how any given supplier contributes to the business model.

With the ability to continuously evaluate partners' contributions, decision makers can change or otherwise manage supplier relationships with greater confidence. For example, the selection of raw material suppliers is shifted from outside the RCEP region to within RCEP member states.

6.3.3 Using big data and data analysis to predict and monitor the supply chain

The three significant benefits of using big data in the supply chain are traceability, relationship management (e.g. better customer service), and forecasting/predictability. The benefits of traceability are obvious: understanding where the goods are located in the supply chain any position. Based on this, companies can predict or notify supply chain disruptions and develop contingency plans to solve emergencies. This will have a immense influence on profitability, resource planning, and customer satisfaction.

Data analysis can improve supply chain efficiency in various ways: verify data; detect anomalies; benchmark operations; visibility into global logistics; provide real-time route optimization; improved demand forecasting and inventory management; stipulate responses to government audits. (*Chart 6-16 Big data supply chain*) At the same time, data analysis can reduce ordinary manual tasks, allowing the global trading team to focus on strategic planning, and bring tangible benefits to the company.

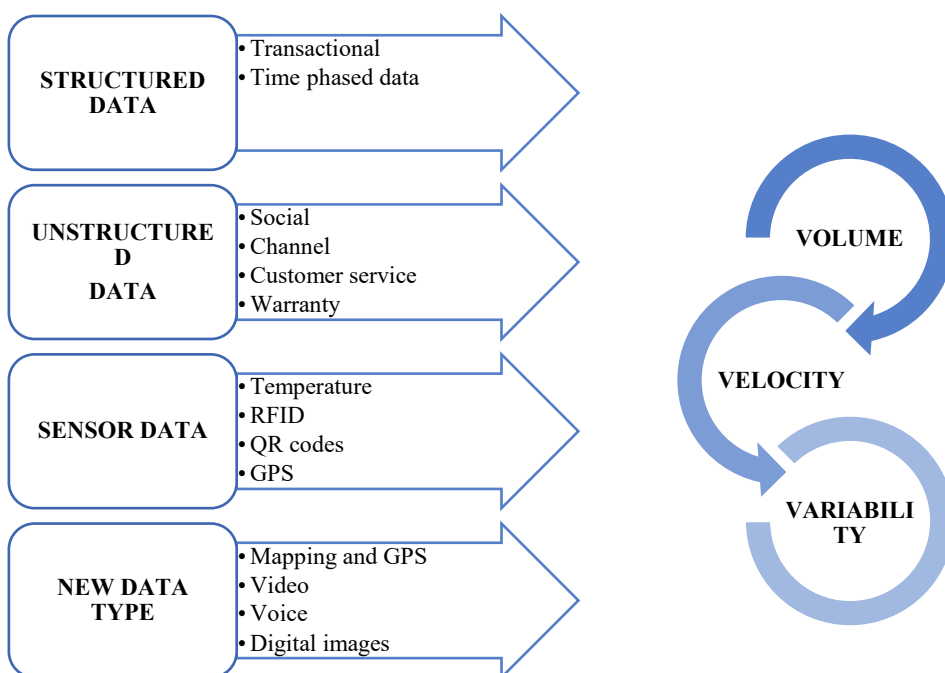


Chart 6-17 Big data supply chain

The use of these technologies by multinational companies increases because they are under pressure to increase profit margins and shorten order lead times. During the COVID-19 pandemic, the power of artificial intelligence (AI) to assist supply chain planning became clear. Artificial intelligence can quickly modify shipping plans to minimize delays and service failures. To ensure the speed of healthcare and the timely delivery of critical medical supplies by aerospace companies. (*Chart 6-17 The timely delivery of critical medical supplies*)



Chart 6-18 The timely delivery of critical medical supplies by drone

(Source: <https://knowledge.insead.edu/blog/insead-blog/africas-drone-medical-delivery-service-saves-lives-in-lockdown-14371>)

Normative analysis can solve the problems found through predictive analysis. The Thomson Reuters report stated that "analysis of the current data set model"^[33]. The normative analysis assesses the possible outcomes of a variety of action processes. This not only provides decision-makers with multiple options on how to solve problems but also the hypothetical impact of each option provides multiple options.

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APPENDIX

A.1 In Scenario 1, The Change Rate of The Variable qo Sim(%)

qo	CHN	JPN	KOR	AUS	NZL	VNM	THA	SGP	PHL	MYS	LAO	IDN	KHM	BRN	ROW
1 Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 UnSkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 SkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 NatRes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 GrainsCrops	0.23	-2.96	-3.23	2.33	2.65	0.00	0.56	0.67	-0.18	0.21	0.01	0.09	0.44	0.41	-0.07
7 MeatLstk	-0.05	-5.88	-1.58	11.31	2.32	-1.38	1.47	0.11	-0.07	0.07	-1.32	-0.24	-1.79	0.40	-0.15
8 Extraction	-0.16	-1.32	-0.91	-0.60	-0.73	-1.08	0.00	-0.04	0.10	0.05	-1.07	0.15	-0.65	0.04	0.08
9 ProcFood	0.19	-1.02	1.05	2.46	2.74	-3.06	1.23	16.29	0.44	1.31	-0.97	0.22	-3.55	-0.89	-0.14
10 TextWapp	0.96	-4.53	1.69	-9.40	-7.13	14.42	-4.06	-4.74	-0.69	-4.33	-6.99	-1.49	-1.30	-0.44	-0.59
11 LightMnfc	-0.31	0.89	-0.82	-3.71	-2.90	1.18	-1.18	-2.81	-1.46	0.27	-8.55	-0.38	6.83	0.16	0.06
12 HeavyMnfc	-0.27	-0.54	0.23	-1.26	-1.34	-0.68	0.69	-0.65	0.36	-0.10	10.66	0.26	8.29	-0.52	0.15
13 Util_Cons	0.34	1.00	1.74	0.65	0.32	3.41	0.59	-0.06	0.12	-0.09	5.80	0.07	3.94	-0.17	-0.22
14 TransComm	-0.01	0.01	-0.09	-0.02	-0.18	-0.32	-0.08	0.30	0.02	0.03	1.01	0.03	1.26	-0.03	0.03
15 OthServices	-0.01	0.02	-0.15	-0.04	-0.06	-2.12	-0.24	0.02	-0.08	-0.09	1.06	-0.07	-0.78	-0.04	0.01
16 CGDS	0.47	2.16	3.27	1.04	0.64	4.99	1.13	-0.19	0.18	-0.15	4.55	0.06	4.53	-0.16	-0.43

A.2 In Scenario 1, The Change Amount Of The Variable qo Ch(Million Dollars)

qo	CHN	JPN	KOR	AUS	NZL	VNM	THA	SGP	PHL	MYS	LAO	IDN	KHM	BRN	ROW
Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UnSkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NatRes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GrainsCrops	2529.75	-2007.09	-1181.16	623.36	89.66	-0.93	303.24	5.06	-61.55	44.88	0.57	98.51	18.81	0.04	-1430.75
MeatLstk	-316.25	-2783.30	-586.86	5068.39	546.69	-202.09	340.96	1.53	-17.48	4.75	-29.71	-61.68	-38.69	0.10	-2988.38
Extraction	-1371.00	-363.11	-134.71	-1305.41	-61.53	-321.52	-0.24	-0.29	19.01	25.25	-34.66	202.33	-14.49	4.50	3330.25
ProcFood	1970.38	-2960.81	839.47	1954.23	782.46	-980.60	575.90	1312.61	196.28	724.36	-31.56	273.73	-86.89	-0.39	-5360.00
TextWapp	11482.50	-1710.66	806.39	-787.15	-128.58	4944.84	-1023.03	-46.09	-65.76	-279.57	-35.37	-712.27	-120.69	-0.22	-8029.50
LightMnfc	-8518.25	7500.88	-3199.59	-4293.74	-510.83	646.02	-1309.13	-915.81	-282.90	201.21	-83.28	-610.81	289.90	0.48	5318.00
HeavyMnfc	-24657.00	-10617.38	2624.88	-2447.84	-399.52	-777.74	1943.50	-1366.63	325.39	-287.66	153.89	642.89	150.26	-5.89	23363.00
Util_Cons	10888.50	8639.44	5042.44	2615.59	163.17	1447.81	366.95	-47.73	53.29	-67.95	106.14	177.91	88.74	-4.92	-24175.00
TransComm	-183.50	137.38	-499.25	-129.56	-148.90	-147.72	-149.89	656.25	20.90	64.23	22.57	84.56	75.18	-0.95	6604.00
OthServices	-488.50	474.50	-1248.69	-459.19	-93.84	-998.50	-350.34	48.47	-94.84	-139.86	27.86	-224.75	-42.64	-2.77	5280.00
CGDS	21237.00	21154.88	13592.31	4050.56	289.86	2662.81	1160.27	-197.13	111.55	-122.33	191.27	177.78	164.52	-10.08	-52863.00

A.3 The Variables VGDP of RCEP Member States and ROW In Scenarios 1, 2, 3 (%)

VGDP	SCENARIO 1	SCENARIO 2	SCENARIO 3
1 CHN	0.132	0.4691	1.82
2 JPN	2.3451	3.2861	7.05
3 KOR	1.8868	3.3582	9.24
4 AUS	0.5436	1.5305	5.48
5 NZL	0.6762	1.5094	4.84
6 VNM	-0.4277	2.8228	15.82
7 THA	-0.1501	1.5488	8.34
8 SGP	-0.1286	1.5889	8.46
9 PHL	-0.5958	1.1568	8.17
10 MYS	-0.4933	1.0103	7.02
11 LAO	-0.7704	2.5214	15.69
12 IDN	-0.5763	0.0736	2.67
13 KHM	-1.7423	0.1078	7.51
14 BRN	-0.3156	1.1912	7.22
15 RESTOFWORLD	-0.3308	-0.6028	-1.69

A.4 The variables PGDP of RCEP member states and ROW in Scenarios 1(%)

PGDP	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	0.0057	1	1.0001	0.0001
2 JPN	2.246	1	1.0225	0.0225
3 KOR	1.5926	1	1.0159	0.0159
4 AUS	0.4146	1	1.0041	0.0041
5 NZL	0.6443	1	1.0064	0.0064
6 VNM	-0.8263	1	0.9917	-0.0083
7 THA	-0.2485	1	0.9975	-0.0025
8 SGP	-0.1404	1	0.9986	-0.0014
9 PHL	-0.7049	1	0.993	-0.007
10 MYS	-0.5115	1	0.9949	-0.0051
11 LAO	-1.346	1	0.9865	-0.0135
12 IDN	-0.6303	1	0.9937	-0.0063
13 KHM	-2.0768	1	0.9792	-0.0208
14 BRN	-0.3192	1	0.9968	-0.0032
15 RESTOFWORLD	-0.3215	1	0.9968	-0.0032

A.5 The variables QGDP of RCEP member states and ROW in Scenarios 1(%)

QGDP	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	0.1262	10351099	10364164	13065
2 JPN	0.099	4596165.5	4600717.5	4552
3 KOR	0.2942	1411312.9	1415464.38	4151.5
4 AUS	0.1291	1454845.4	1456723.25	1877.875
5 NZL	0.0319	200142.28	200206.125	63.8438
6 VNM	0.3986	186205.05	186947.266	742.2188
7 THA	0.0984	404316.34	404714.281	397.9375
8 SGP	0.0117	306343.69	306379.563	35.875
9 PHL	0.1091	284777.03	285087.656	310.625
10 MYS	0.0183	338103.88	338165.594	61.7188
11 LAO	0.5756	11715.638	11783.0703	67.4326
12 IDN	0.054	890480.88	890961.438	480.5625
13 KHM	0.3345	16777.832	16833.9531	56.1211
14 BRN	0.0035	17104.695	17105.2969	0.6016
15 RESTOFWORLD	-0.0092	57756720	57751380	-5340

A.6 The Variables EV Of RCEP Member States and ROW In Scenarios 1, 2, 3

EV	SCENARIO 1	SCENARIO 2	SCENARIO 3
1 CHN	11541.74	36491.56	136290.8
2 JPN	21959.65	36371.52	94018.98
3 KOR	10021.29	20129.68	60563.26
4 AUS	3034.483	8946.056	32592.33
5 NZL	372.0633	1232.816	4675.82
6 VNM	-646.063	3662.388	20896.19
7 THA	-78.2491	4422.676	22426.38
8 SGP	-69.5828	4077.419	20665.42
9 PHL	-248.421	1819.431	10090.84
10 MYS	-560.007	3598.78	20233.93
11 LAO	-20.736	199.7314	1081.6
12 IDN	-464.184	3229.713	18005.3
13 KHM	-75.0173	216.7802	1383.97
14 BRN	-6.6126	173.7565	895.23
15 RESTOFWORLD	-24238.5	-48899.7	-147544

A.7 The variables VIWREG of RCEP member states and ROW in Scenarios 1, 2, 3

VIWREG	SCENARIO 1	SCENARIO 2	SCENARIO 3
1 CHN	2.7799	4.1017	9.39
2 JPN	4.5828	6.5008	14.17
3 KOR	4.9837	6.8865	14.5
4 AUS	2.9676	5.1336	13.8
5 NZL	1.5293	3.3148	10.46
6 VNM	3.8652	5.5067	12.07
7 THA	1.1589	3.3674	12.2
8 SGP	-0.2973	1.0485	6.43
9 PHL	0.6343	2.8288	11.61
10 MYS	0.1556	2.1776	10.27
11 LAO	2.6072	5.116	15.15
12 IDN	1.1323	3.1115	11.03
13 KHM	2.5945	3.4276	6.76
14 BRN	-0.1348	1.1021	6.05
15 RESTOFWORLD	-0.4396	-0.851	-2.5

A.8 The Variables vxwreg of RCEP Member States and ROW In Scenarios 1, 2, 3

VXWREG	SCENARIO 1	SCENARIO 2	SCENARIO 3
1 CHN	1.74	2.4674	5.38
2 JPN	2.5761	3.251	5.95
3 KOR	3.0363	4.0857	8.28
4 AUS	1.7014	2.8906	7.65
5 NZL	1.1396	2.303	6.96
6 VNM	2.9864	3.0073	3.09
7 THA	0.732	1.7792	5.97
8 SGP	-0.2411	1.1176	6.55
9 PHL	0.9503	1.818	5.29
10 MYS	0.0669	1.4864	7.16
11 LAO	1.6003	1.894	3.07
12 IDN	1.0236	2.6884	9.35
13 KHM	1.9761	2.3459	3.83
14 BRN	-0.0979	0.5567	3.17
15 RESTOFWORLD	-0.1302	-0.3145	-1.05

A.9 The Variables TOT of RCEP Member States and ROW In Scenarios 1

TOT	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	-0.1112	1	0.9989	-0.0011
2 JPN	1.8625	1	1.0186	0.0186
3 KOR	0.9646	1	1.0096	0.0096
4 AUS	0.3948	1	1.0039	0.0039
5 NZL	0.5926	1	1.0059	0.0059
6 VNM	-0.7627	1	0.9924	-0.0076
7 THA	-0.2032	1	0.998	-0.002
8 SGP	-0.0371	1	0.9996	-0.0004
9 PHL	-0.4418	1	0.9956	-0.0044
10 MYS	-0.2835	1	0.9972	-0.0028
11 LAO	-0.7566	1	0.9924	-0.0076
12 IDN	-0.4793	1	0.9952	-0.0048
13 KHM	-0.6634	1	0.9934	-0.0066
14 BRN	-0.1551	1	0.9984	-0.0016
15 RESTOFWORLD	-0.1237	1	0.9988	-0.0012

A.10 In Scenario 2, The Change Rate Of The Variable Qo Sim(%)

qo	CHN	JPN	KOR	AUS	NZL	VNM	THA	SGP	PHL	MYS	LAO	IDN	KHM	BRN	ROW
Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UnSkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NatRes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GrainsCrops	0.15	-3.63	-3.76	2.24	2.52	-1.22	0.23	0.32	-0.67	-0.26	0.26	-0.04	0.34	-0.95	0.00
MeatLstk	-0.03	-6.87	-1.78	11.42	2.18	-0.58	1.16	-0.59	0.41	0.01	-2.30	-0.35	-1.68	-0.81	-0.10
Extraction	-0.55	-2.15	-1.87	-0.32	-0.56	-1.94	-0.93	-0.54	-0.25	-0.25	-1.90	0.24	-0.80	-0.16	0.00
ProcFood	0.22	-1.16	1.07	2.29	3.07	-4.14	0.69	17.50	-0.23	1.03	-1.09	0.07	-4.95	-1.37	-0.09
TextWapp	0.61	-6.41	0.51	-13.07	-9.74	15.67	-6.97	-5.48	-4.75	-6.53	-18.45	-1.64	-2.57	-1.04	-0.30
LightMnfc	-0.31	-0.14	-2.69	-5.21	-3.63	-1.09	-0.12	-2.71	-3.27	-0.03	-8.96	-0.37	9.53	-4.82	0.23
HeavyMnfc	-0.44	-1.03	0.37	-3.62	-2.76	-1.56	0.96	1.80	0.24	-0.18	16.54	-1.09	12.26	-3.85	0.11
Util_Cons	0.69	1.68	2.80	1.25	0.91	7.67	2.82	0.77	1.96	0.79	8.31	0.62	6.82	0.67	-0.38
TransComm	0.01	0.11	-0.13	0.00	-0.15	0.47	-0.24	-0.08	-0.12	0.26	1.43	0.10	1.57	0.39	0.05
OthServices	0.08	0.11	0.04	0.08	0.00	-2.11	-0.42	-0.79	0.03	-0.19	2.95	0.12	-0.43	0.22	0.02
CGDS	0.95	3.51	5.16	2.02	1.70	11.03	5.18	1.25	2.79	2.76	8.30	0.71	8.00	1.85	-0.74

A.11 In Scenario 2, The Change Amount Of The Variable qo Ch(Million Dollars)

qo	CHN	JPN	KOR	AUS	NZL	VNM	THA	SGP	PHL	MYS	LAO	IDN	KHM	BRN	ROW
Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UnSkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SkLab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NatRes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GrainsCrops	1562.00	-2464.16	-1375.41	599.71	85.57	-469.99	124.72	2.46	-226.43	-55.84	12.81	-37.77	14.57	-0.10	94.25
MeatLstk	-205.00	-3248.92	-663.47	5117.94	513.75	-84.24	269.36	-7.87	107.04	0.33	-51.85	-91.10	-36.21	-0.20	-2019.88
Extraction	-4841.31	-590.16	-275.52	-691.83	-47.01	-575.29	-205.36	-3.69	-45.14	-123.69	-61.74	331.61	-17.77	-15.61	-52.75
ProcFood	2248.25	-3352.59	855.91	1825.13	875.89	-1326.88	326.28	1410.58	-105.72	570.47	-35.28	84.97	-121.09	-0.60	-3408.50
TextWapp	7237.25	-2422.57	241.49	-1094.60	-175.67	5371.66	-1758.39	-53.25	-455.10	-421.39	-93.28	-788.65	-239.08	-0.52	-4139.75
LightMnfc	-8532.25	-1226.06	-	-6021.16	-639.24	-596.12	-131.33	-883.64	-632.15	-18.98	-87.28	-591.67	404.75	-14.34	19450.00
			10469.59												
HeavyMnfc	-41165.00	-	4141.88	-7025.86	-819.12	-1775.42	2703.66	3779.09	215.32	-521.25	238.85	-	222.18	-43.25	17583.00
		20331.25										2725.23			
Util_Cons	22327.25	14430.75	8147.38	5022.50	461.21	3252.36	1750.25	669.92	854.88	597.84	152.05	1622.38	153.66	19.92	-42977.00
TransComm	355.75	2171.50	-737.38	13.38	-119.98	219.07	-437.66	-172.84	-145.60	537.13	32.02	275.06	93.39	12.73	11320.00
OthServices	3936.00	3389.25	361.06	801.50	-5.63	-993.14	-615.86	-	34.34	-295.41	77.49	393.00	-23.87	16.27	8188.00
								2054.95							
CGDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

A.12 The Variables PGDP Of RCEP Member States And ROW In Scenarios 2

PGDP	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	0.1154	1	1.0012	0.0012
2 JPN	2.9718	1	1.0297	0.0297
3 KOR	2.566	1	1.0257	0.0257
4 AUS	1.1632	1	1.0116	0.0116
5 NZL	1.1758	1	1.0118	0.0118
6 VNM	0.6012	1	1.006	0.006
7 THA	0.6438	1	1.0064	0.0064
8 SGP	0.7937	1	1.0079	0.0079
9 PHL	0.5337	1	1.0053	0.0053
10 MYS	0.1391	1	1.0014	0.0014
11 LAO	0.5898	1	1.0059	0.0059
12 IDN	-0.3073	1	0.9969	-0.0031
13 KHM	-2.0315	1	0.9797	-0.0203
14 BRN	0.6502	1	1.0065	0.0065
15 RESTOFWORLD	-0.5827	1	0.9942	-0.0058

A.13 The variables QGDP of RCEP member states and ROW in Scenario 2

QGDP	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	0.3537	10351099	10387712	36613
2 JPN	0.3143	4596165.5	4610611	14445.5
3 KOR	0.7922	1411312.9	1422492.88	11180
4 AUS	0.3673	1454845.4	1460189.63	5344.25
5 NZL	0.3336	200142.28	200809.906	667.625
6 VNM	2.2216	186205.05	190341.875	4136.8281
7 THA	0.905	404316.34	407975.281	3658.9375
8 SGP	0.7952	306343.69	308779.719	2436.0313
9 PHL	0.6231	284777.03	286551.406	1774.375
10 MYS	0.8712	338103.88	341049.344	2945.4688
11 LAO	1.9317	11715.638	11941.9443	226.3066
12 IDN	0.3809	890480.88	893872.5	3391.625
13 KHM	2.1393	16777.832	17136.7637	358.9316
14 BRN	0.541	17104.695	17197.2383	92.543
15 RESTOFWORLD	-0.0201	57756720	57745120	-11600

A.14 The variables TOT of RCEP member states and ROW in Scenario 2

TOT	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	-0.0693	1	0.9993	-0.0007
2 JPN	2.3435	1	1.0234	0.0234
3 KOR	1.4687	1	1.0147	0.0147
4 AUS	1.2575	1	1.0126	0.0126
5 NZL	1.0868	1	1.0109	0.0109
6 VNM	-0.275	1	0.9972	-0.0028
7 THA	0.236	1	1.0024	0.0024
8 SGP	0.4663	1	1.0047	0.0047
9 PHL	0.1876	1	1.0019	0.0019
10 MYS	0.1501	1	1.0015	0.0015
11 LAO	0.1576	1	1.0016	0.0016
12 IDN	-0.1182	1	0.9988	-0.0012
13 KHM	-0.6611	1	0.9934	-0.0066
14 BRN	0.8037	1	1.008	0.008
15 RESTOFWORLD	-0.2443	1	0.9976	-0.0024

A.15 In Scenario 3, the change amount of the variable q_0 sim (%)

q_0	CHN	JPN	KOR	AUS	NZL	VNM	THA	SGP	PHL	MYS	LAO	IDN	KHM	BRN	ROW
Land	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UnSkLab	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SkLab	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NatRes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GrainsCrops	-0.21	-6.33	-5.88	1.89	2.04	-6.09	-1.09	-1.05	-2.62	-2.1	1.25	-0.54	-0.06	-6.39	0.3
MeatLstk	0.04	-10.81	-2.61	11.87	1.62	2.64	-0.07	-3.4	2.32	-0.27	-6.24	-0.8	-1.22	-5.66	0.09
Extraction	-2.14	-5.46	-5.7	0.81	0.13	-5.36	-4.67	-2.52	-1.66	-1.48	-5.23	0.61	-1.39	-0.96	-0.34
ProcFood	0.33	-1.7	1.15	1.65	4.38	-8.47	-1.43	22.37	-2.91	-0.08	-1.54	-0.55	-10.55	-3.31	0.11
TextWapp	-0.82	-13.95	-4.23	-27.75	-20.18	20.65	-18.64	-8.43	-21	-15.31	-64.26	-2.28	-7.66	-3.42	0.84
LightMnfc	-0.31	-4.26	-10.15	-11.18	-6.55	-10.16	4.15	-2.32	-10.5	-1.23	-10.6	-0.32	20.35	-24.76	0.91
HeavyMnfc	-1.16	-2.99	0.91	-13.04	-8.41	-5.05	2.03	11.61	-0.25	-0.5	40.07	-6.48	28.14	-17.16	-0.04
Util_Cons	2.12	4.37	7.08	3.64	3.28	24.69	11.74	4.09	9.33	4.3	18.34	2.82	18.36	4.01	-1.05
TransComm	0.09	0.52	-0.31	0.1	-0.01	3.6	-0.85	-1.62	-0.67	1.19	3.12	0.37	2.8	2.05	0.14
OthServices	0.45	0.48	0.83	0.57	0.23	-2.07	-1.13	-4.04	0.46	-0.59	10.53	0.9	0.93	1.25	0.06
CGDS	2.88	8.95	12.72	5.93	5.94	35.2	21.38	6.99	13.26	14.4	23.29	3.32	21.87	9.92	-2

A.16 In Scenario 3, the change amount of the variable qo *Ch*(million dollars)

qo	CHN	JPN	KOR	AUS	NZL	VNM	THA	SGP	PHL	MYS	LAO	IDN	KHM	BRN	ROW
Land	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UnSkLab	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SkLab	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NatRes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GrainsCrops	-2308.75	-4292.46	-2152.41	505.09	69.23	-2346.22	-589.37	-7.96	-885.97	-458.71	61.78	-582.92	-2.41	-0.68	6194.13
MeatLstk	240	-5111.36	-969.92	5316.14	381.97	387.21	-17.05	-45.48	605.13	-17.36	-140.39	-208.78	-26.31	-1.39	1854
Extraction	-18722.8	-1498.35	-838.78	1762.5	11.08	-1590.35	-1025.82	-17.27	-301.74	-719.46	-170.04	848.78	-30.89	-96.06	-13584.8
ProcFood	3359.81	-4919.78	921.68	1308.72	1249.63	-2711.96	-672.21	1802.44	-1313.75	-45.07	-50.13	-670.09	-257.87	-1.45	4396.5
TextWapp	-9743.75	-5270.22	-2018.09	-2324.4	-364	7078.96	-4699.84	-81.9	-2012.47	-988.67	-324.94	-1094.18	-712.63	-1.73	11419.13
LightMnfc	-8588.25	-36133.8	-39549.7	-12930.8	-1152.89	-5564.68	4579.9	-754.98	-2029.18	-899.76	-103.26	-515.17	864.13	-73.61	75976
HeavyMnfc	-107199	-59186.3	10210.13	-25338	-2497.53	-5766.16	5744.28	24362.02	-224.95	-1455.63	578.69	-16197.8	509.87	-192.7	-5541
Util_Cons	68082.5	37596	20567.16	14650	1653.39	10470.57	7283.47	3540.54	4061.2	3261.02	335.67	7400.28	413.34	119.29	-118184
TransComm	2512.25	10308.13	-1689.81	585.19	-4.3	1686.21	-1588.73	-3489.19	-811.6	2428.64	69.81	1037.06	166.24	67.44	30188
OthServices	21635.5	15047.5	6800	5844.13	347.23	-971.69	-1677.88	-10468.6	551.05	-917.56	276.02	2863.91	51.19	92.46	19824
CGDS	131248.5	87866.56	52917.63	23062.03	2709.22	18787.37	21878.09	7260.92	8422.27	12146.2	979.42	9684.03	793.87	611.63	-247215

A.17 The variables PGDP of RCEP member states and ROW in Scenarios 3

PGDP	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	0.55	1	1.01	0.01
2 JPN	5.87	1	1.06	0.06
3 KOR	6.46	1	1.06	0.06
4 AUS	4.16	1	1.04	0.04
5 NZL	3.3	1	1.03	0.03
6 VNM	6.31	1	1.06	0.06
7 THA	4.21	1	1.04	0.04
8 SGP	4.53	1	1.05	0.05
9 PHL	5.49	1	1.05	0.05
10 MYS	2.74	1	1.03	0.03
11 LAO	8.33	1	1.08	0.08
12 IDN	0.98	1	1.01	0.01
13 KHM	-1.85	1	0.98	-0.02
14 BRN	4.53	1	1.05	0.05
15 RESTOFWORLD	-1.63	1	0.98	-0.02

A.18 The variables QGDP of RCEP member states and ROW in Scenario 3

QGDP	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	1.26	10351099	10481905	130806
2 JPN	1.18	4596165.5	4650185.5	54020
3 KOR	2.78	1411312.9	1450606.63	39293.75
4 AUS	1.32	1454845.4	1474055.38	19210
5 NZL	1.54	200142.28	203225.05	3082.77
6 VNM	9.51	186205.05	203920.25	17715.2
7 THA	4.13	404316.34	421019.19	16702.84
8 SGP	3.93	306343.69	318380.38	12036.69
9 PHL	2.68	284777.03	292406.5	7629.47
10 MYS	4.28	338103.88	352584.38	14480.5
11 LAO	7.36	11715.64	12577.44	861.8
12 IDN	1.69	890480.88	905516.81	15035.94
13 KHM	9.36	16777.83	18348	1570.17
14 BRN	2.69	17104.7	17565.01	460.31
15 RESTOFWORLD	-0.06	57756720	57720092	-36628

A.19 The variables TOT of RCEP member states and ROW in Scenario 3

TOT	GTAP	PRE GTAP	POST GTAP	CH/%CH GTAP
1 CHN	0.1	1	1	0
2 JPN	4.27	1	1.04	0.04
3 KOR	3.48	1	1.03	0.03
4 AUS	4.71	1	1.05	0.05
5 NZL	3.06	1	1.03	0.03
6 VNM	1.68	1	1.02	0.02
7 THA	1.99	1	1.02	0.02
8 SGP	2.48	1	1.02	0.02
9 PHL	2.71	1	1.03	0.03
10 MYS	1.88	1	1.02	0.02
11 LAO	3.81	1	1.04	0.04
12 IDN	1.33	1	1.01	0.01
13 KHM	-0.65	1	0.99	-0.01
14 BRN	4.64	1	1.05	0.05
15 RESTOFWORLD	-0.73	1	0.99	-0.01