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The Impact of RCEP on Chinese Regional Economy

From Global Value Chains Perspective

(tentative results)

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Abstract

The Regional Comprehensive Economic Partnership (RCEP) is a free trade agreement (FTA) that has been established in 2020. RCEP will bring great benefits for China. However, China is a country with a vast territory and there are great differences of natural resource endowment and geographic location between the regions, as well as the economic. Therefore, first of all we investigate the potential effect of RCEP with a focus on China's regional economy using GTAP model. Furthermore, we apply soft

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connection between the global computable general equilibrium model and Chinese regional input-output model to assess the potential impacts on China's regional economy. Finally, we analyze the impact of RCEP on China's regional industry with different global value chain participation. In general, RCEP would have a significant economic creation effect for members. Our simulation results suggest that RCEP would encourage significant increases for its members. RCEP would promote the economy of most provinces. RCEP has a greater promotion effect on the economy of coastal areas. In addition, the indirect impact of RCEP on different industries is relatively strong.

Key Words: RCEP; CGE Model; China's Regional Economy; GVC

I. Introduction

In November 15th 2020, RCEP members officially have established the Regional Comprehensive Economic Partnership (RCEP). RCEP will connect about 30% of the world's people and output and will generate significant gains. RCEP is expected to eliminate a range of tariffs on imports within 20 years, which will greatly reduce trade costs. Moreover, it incentivizes supply chains across the regions. Nowadays, RCEP has become the largest free trade agreement negotiation in the world. It is also the free trade agreement with the largest number of members, the largest economic scale and the widest influence scope that China participates in. It is another mega FTA in the Asia-Pacific region after the Trans-Pacific Partnership (TPP). Providing rationalization and intensification of a substantial part of the "noodle bowl" of overlapping and intersecting FTAs that have expanded among countries of the Asia-Pacific, the RCEP would not only liberalize trade barriers on goods and services and free up investment flows, but would also enhance trade facilitation, encourage the development of global value chains.

Notably, China is a country with a vast territory and there are great differences of natural resource endowment and geographic location between the regions, as well as the economy. Therefore, each province plays a different role in the global division of labor; their positions in global value chains (GVC) are different, and the forms of participation in GVCs are different. In view of this, RCEP not only promotes the economic growth

of member countries, but also affects the flow of production factors among different regions within a country, and even affects the spatial pattern of Chinese economic activities.

From global value chains perspective, what impact will RCEP have on the Chinese regional economy? And what is the effect of RCEP on Chinese regional industries? These answers to a number of quantitative questions will help us to understand the impact of trade liberalization on Chinese regional economy.

The objectives of this paper are twofold. First, we apply the soft linkage between the GTAP model and Chinese regional input-output model, in order to explore the impact of RCEP on Chinese regional economy. Second, we use input-output analysis methods to separate the impact of RCEP on China's economy into direct and indirect impacts. In this paper, we take Chinese mainland 31 provinces as the research object, and explore the economic impact of RCEP on Chinese provinces through GVCs. It includes the direct impact caused by its own export of each province, as well as the indirect impact caused by the export of other provinces through the value chain. Our simulation results show that RCEP will significantly improve China's economic welfare, however, it will differ at provincial level.

The remainder of this paper is organized as follows. The next section is literature review. In the Section III introduces GTAP model, scenarios, data aggregation and model connection. In Section IV the results presented are preliminary. Concluding remarks are provided in the final section.

II. Literature Review

Generally speaking, free trade agreements have a "Domino Effect". The openness of trade within members of the free trade area has continued to increase, which has further caused trade transfer effect and trade creation effect (Baldwin, 2013). This is because reduced trade costs can incentivize firms to switch to exports to supply foreign markets. Recently, there are many studies on RCEP. Previous studies show that RCEP will greatly promote Chinese economic development and promote my country's foreign

trade growth. There is no doubt that free trade agreements promote economic growth. In particular, the members of RCEP are China's important trading partners, and regional trade agreements play a vital role in the economic growth of the members (Gilbert et al., 2018).

Athukorala (2016) studied the global production network trade patterns of RCEP countries, and this study showed that the labor division pattern of RCEP is more significant than that of Europe and North America. Li et al. (2016) used the 13-country CGE model framework covering trade costs to explore the potential impact of China's construction of large-scale free trade zones. Li (2017) extended Zhai (2008) corporate heterogeneous global CGE model to a global CGE model with heterogeneous FDI, and analyzed the potential impact of RCEP on FDI. Itakura (2018) used a dynamic GTAP model to simulate the economic effects of ASEAN and RCEP under different productivity growth scenarios. This study found that the wage growth rate of unskilled labor in the high productivity scenario will exceed that of skilled labor. Balistreri and Tarr (2018) estimated the impacts on The Philippines of deep integration in a modern mega-preferential trade agreement RCEP, comparison in the Melitz, Krugman and Armington models.

In addition, RCEP would have a strong reshaping effect on the division of labor in the global value chains (Baldwin and Lopez-Gonzalez, 2015). Baldwin and Lopez-Gonzalez (2015) pointed out that the global value chain reshaping effect has led to the North-South trade pattern of parts and assembly. Itakura and Lee (2019) utilize the GTAP database and inter-country input-output tables to construct a global computable general equilibrium model that disaggregates imports of intermediate products by country of origin, and estimate the welfare and sectoral output effects of RCEP and CPTPP. RCEP will also promote the flow of FDI among trading partners (Li, 2014; Du and Guo, 2021). Generally speaking, previous literatures have explained the economic effects of RCEP from different perspectives, but few literatures discuss the impact of RCEP on China's regional economy. As such, this paper focuses on impact of RCEP on China's regional economy.

III. Models, Scenarios and Model Connection

In this section, CGE model, scenarios, data aggregation and model connection are explained. In this paper, Chinese mainland's 31 provinces and municipalities (hereinafter referred to as "provinces") are the object of this paper, and the economic impacts of RCEP on China's provinces are explored from the perspective of global value chains. In view of different industrial structures and industries with cutting tariffs, the national macroeconomy, provincial levels and industrial exports will be impacted in different degrees across provinces.

1. CGE Model

We simulate the impacts of RECP on China's exports based on GTAP model. This model is a global computable general equilibrium model which is a multi-sector, multi-region computable general equilibrium (CGE) model of global trade. CGE models are among the most popular tools used to assess the effects of trade liberalization arrangements. A good thing is that the model dimensions are flexibly adjusted. The equilibrium of this model is achieved in both endowment market and product market.

This model details the economic ties among producers, consumers and governments in different countries and economies around the world, as well as the economic and trade relations and industrial ties among them, making it a good tool for simulating the effects of RCEP on different countries and regions. The model setting in this paper follows a short-term closure assumption, with labor supply as an exogenous variable, and the wage level is adjusted according to labor supply and demand. The return on capital (ROC) is fixed and capital supply is used as an endogenous variable.

2. Scenarios

Two scenarios of RCEP are designed, under which impacts on the economy, welfare and trade of China and major trading partners are simulated. Specifically,

Scenario 1 (RCEP15): RECP members, excluding India;

Scenario 2 (RCEP16): RECP members, including India.

In Scenario 1, we assume that 10 ASEAN countries, China, Japan, Korea, Australia, and New Zealand will realize trade liberalization.

In Scenario 2, we assume that 10 ASEAN countries, China, Japan, Korea, India, Australia and New Zealand will reach final agreement on the RCEP and realize trade liberalization.

3. Data Aggregation

According to the simulation results, the soft-connection between GTAP model and China's regional input-output model is applied to assess impacts of RCEP on China's regional economy.

To reduce the computational burden, we have aggregated the data to 15 countries/regions (as shown in Table 1) and 16 sectors (see tables 2). Based on the change range of tariffs in each sector under the setting scenarios, the GTAP results are applied to simulate China's exports of different sectors after being cutting tariffs to compare with exports without tariff cut to measure the change range, that is, the impacts on China's exports of different sectors under different scenarios.

Table 1 Countries/Regions aggregation

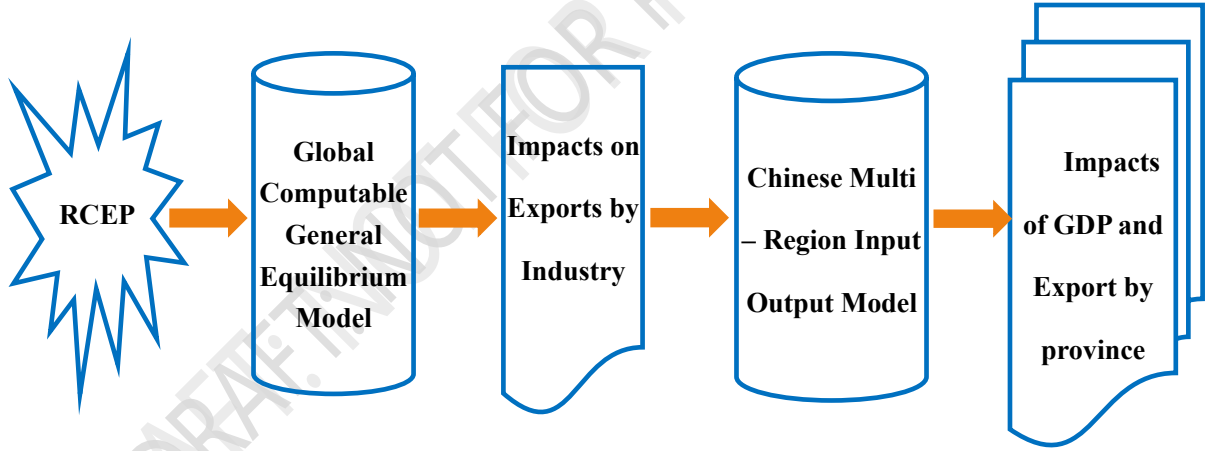
Country/Region	Description
CHN	China
JPN	Japan
KOR	Korea
IND	India
ASEAN	Association of Southeast Asian Nations
USA	United States
CAN	Canada
MEX	Mexico
EU	Europe Union
DEU	Germany
GBR	United Kingdom
AUS	Australia
NZL	New Zealand
RUS	Russia
ROW	Rest of World

Table 2 Sectors aggregation

No.	Sector	No.	Sector
1	Agriculture	9	Gas
2	Mining	10	Water
3	Food	11	Construction
4	Textile and Leather	12	Transportation
5	Minerals	13	Communication
6	Non-ferrous Metals	14	Finance
7	Manufacture	15	Insurance
8	Electricity	16	Service

4. Model Connection

In this paper, the simulation of soft connection between the global computable general equilibrium model and China regional input-output model is applied with a view to assess the impacts of RCEP on China's regional level. The basic logical framework is shown in Figure 1.

**Figure 1 Logical Framework**

Based on the logical framework and the national results by sector obtained from the global model simulations, China's provincial multi-regional input-output model is soft-connected to estimate the absolute and relative impacts of RCEP on the value added of each province. The method is as follows:

$$\Delta v = \widehat{f^v} \cdot L \cdot \Delta e \quad (1)$$

$$\Delta e = re \cdot e \quad (2)$$

$$\Delta v^{s,\cdot} = \theta \cdot \Delta v \quad (3)$$

Where, Δv means the changes of value-added; $\widehat{fv}$ means diagonal matrix of value-added rate; L means Leontief inverse (the total requirements matrix); re means relative impact of RCEP on Chinese exports; e means the volume of exports;

The formula is used to calculate the absolute impact of RCEP on the export value-added of each province. This paper adopts the value-added rate and Leontief inverse matrix in 2017. And the export vector uses the data from 2017. The relative impact on the total economic output of each province is obtained, according to the absolute impact of the RCEP on the value added of exports of each province:

$$rv^{s,\cdot} = \Delta v^{s,\cdot} / g^s \quad (4)$$

IV. Preliminary Results

1. National Level

The simulation results obtained using the standard GTAP model are provided in table 3. RCEP will have huge economic effects on member states, such as GDP, welfare, and trade. Comparing Scenario 1 and Scenario 2, India's accession will bring greater benefits to RCEP members. Based on our simulation results, RCEP would have a significant economy creation effect for members. In general, RCEP will bring a great welfare for all members in different scenarios. First of all, real GDP of China will increase 0.138% in S1, and 0.177% in S2. Chinese welfare will be improved greatly, increased by 23.5 and 34.2 billion dollars in S1 and S2 respectively. In addition, terms of trade will be good if RCEP realize trade liberalization.

Table 3 RCEP's Impact on Chinese Macroeconomic in Different Scenarios (%)

Variable	S1(RCEP15)	S2(RCEP16)
Real GDP	0.138	0.177

GDP Deflator	0.447	0.733
Welfare (\$Million)	23513	34191
Real Export	-1.249	-1.885
Real Import	0.070	0.032
Trade Balance (\$Million)	-97760	-122714
Terms of Trade	0.256	0.516
CPI	0.426	0.671
Investment	2.071	2.634
Capital	2.071	2.634

Source: Simulation Results

2. Provincial Level

At provincial level, GDP changes differ in different scenarios (see table 4). In Scenario 1, GDP will decrease in several provinces, such as Anhui, Gansu, Heilongjiang, Jiangsu, Jilin, Xinjiang. However, GDP in other provinces will increase. Comparing Scenario 1 and Scenario 2, India's accession will bring greater benefits to some provinces.

Table 4 RCEP 's Impact on Chinese Provincial GDP (%)

Region	S1(RCEP15)	S2(RCEP16)
Anhui	-0.447	-0.445
Beijing	0.910	0.903
Chongqing	-1.332	-1.322
Fujian	-0.040	-0.039
Gansu	-3.030	-3.005
Guangdong	1.090	1.077
Guangxi	-9.482	-9.423
Guizhou	-3.915	-3.880
Hainan	-5.457	-5.419
Hebei	-11.088	-11.005
Heilongjiang	1.820	1.802
Henan	0.398	0.395
Hubei	-0.004	-0.004
Hunan	0.130	0.129
Inner Mongolia	-0.705	-0.697
Jiangsu	0.825	0.819
Jiangxi	0.008	0.008
Jilin	2.555	2.536
Liaoning	-0.905	-0.898
Ningxia	-21.433	-21.266
Qinghai	19.020	18.855

Shaanxi	-0.801	-0.796
Shandong	0.006	0.006
Shanghai	-0.048	-0.047
Shanxi	0.171	0.170
Sichuan	-0.846	-0.840
Tianjin	-0.103	-0.102
Tibet	-0.135	-0.133
Xinjiang	1.975	1.963
Yunnan	-0.703	-0.698
Zhejiang	-0.262	-0.260

Source: Simulation Results

Furthermore, impacts of RCEP on Chinese provincial export will be divided into direct impact and indirect impact in Table 5. Indirect impact refers to the fact that RCEP affects the province's exports through exports from other provinces. In particular, exports of inland provinces will suffer a certain degree of negative impact, exports from coastal provinces will increase to a certain extent. Why is there such a big difference? The extent to which each province engages in the division of labor on global value chains actually varies significantly. More or less, the raw materials and parts from other countries or provinces are used as intermediate inputs in producing exporting commodities from different provinces of China, which is why the value added in export of each province is not entirely created by its own.

Table 5 Direct and Indirect Impact of RCEP on Chinese Provincial Export (\$million)

Region	S1 (RCEP15)		S2 (RCEP16)	
	Direct Impact	Indirect Impact	Direct Impact	Indirect Impact
Anhui	-4717	-8822903	-4715	-8795264
Beijing	-92696	17309996	-90920	17162567
Chongqing	-212355	-17263141	-208650	-17131204
Fujian	-19855	-842023	-19854	-840801
Gansu	-23274	-14982124	-23084	-14857837
Guangdong	740554	64490565	731365	63715505
Guangxi	348486	-118684937	348615	-117950273
Guizhou	-88073	-35706143	-87346	-35389767
Hainan	-46999	-16395509	-46354	-16282350
Hebei	-106977	-254546851	-106441	-252642356
Heilongjiang	-31051	19573835	-31017	19381811
Henan	-25249	11986062	-25121	11906494
Hubei	14552	-119610	14498	-118490

Hunan	144	2973180	149	2949456
Inner Mongolia	12360	-7071752	12300	-6990631
Jiangsu	49484	47780483	49053	47426383
Jiangxi	1095	104676	1070	106459
Jilin	-16490	25560673	-16389	25372848
Liaoning	83657	-14388273	83318	-14269051
Ningxia	-76804	-46856231	-76223	-46491230
Qinghai	64192	33644283	63703	33351656
Shaanxi	483351	-12119702	482597	-12046004
Shandong	-2351	289318	-2292	287758
Shanghai	-1787482	791459	-1769183	802602
Shanxi	386	1794075	393	1778655
Sichuan	47080	-21218343	46704	-21056587
Tianjin	75020	-1366225	74801	-1355204
Tibet	2273	-119630	2246	-118253
Xinjiang	34368	14885028	33097	14793115
Yunnan	-14855	-7757749	-14901	-7706857
Zhejiang	-101302	-9176534	-99643	-9104863

Source: Simulation Results

3. Industry Level

From the simulation results, we see the hardest-impacted sectors are wood products, computers and other electronic equipment, metal products, instrument, research and technical services. In summary, RCEP has a certain role in promoting the export of agriculture and labor-intensive manufacturing industries. It has a certain restraining effect on technology-intensive industries and service industries. Because tariff cuts in agricultural and food products are slightly higher and, more importantly, reductions in NTBs in services trade are assumed to be larger. Again, sectoral export changes become larger for most sectors in scenario 2, when the model with the soft linkage is employed.

Table 6 Direct and Indirect Impact of RCEP on China's Industrial Export (\$million)

Sector	RCEP15		RCEP16	
	Direct Impact	Indirect Impact	Direct Impact	Indirect Impact
S01	32.041	92.163	31.795	91.496
S02	248.682	-11590.824	250.554	-11499.084
S03	671.905	-4748.536	668.045	-4749.835
S04	21.538	-1504.073	21.352	-1497.483
S05	13.921	-421.683	13.748	-419.105
S06	-3.226	-57.821	-3.206	-57.364

S07	34.056	10859.543	33.773	10766.964
S08	7.763	297.190	7.704	295.356
S09	-12.441	-3292.343	-12.350	-3267.661
S10	-0.068	5237.002	-0.069	5195.989
S11	-2.258	6.607	-2.236	6.403
S12	0.117	-32.815	0.114	-32.507
S13	7.193	253.935	7.141	251.972
S14	6.723	-212.737	6.686	-210.776
S15	-14.554	-3816.659	-14.284	-3782.507
S16	1.502	700.376	1.489	694.134
S17	1.915	-944.137	1.899	-937.271
S18	2.495	489.956	2.474	485.896
S19	7.230	442.460	7.173	438.366
S20	6.126	-2252.588	6.132	-2234.501
S21	-374.994	6445.437	-372.166	6381.121
S22	54.519	-829.138	54.207	-828.682
S23	251.686	12166.540	249.950	12057.848
S24	-2.791	-38.815	-2.768	-38.477
S25	-7.771	314.221	-7.735	310.700
S26	-26.420	-6255.926	-26.342	-6213.009
S27	-0.070	-2.979	-0.070	-2.958
S28	0.189	-12.147	0.186	-12.038
S29	0.036	3.145	0.036	3.104
S30	1.726	-114.857	1.716	-114.034
S31	-0.015	-3.830	-0.015	-3.813
S32	0.563	9.045	0.562	8.947
S33	4.368	-113.356	4.325	-112.160
S34	0.925	-60.005	0.916	-59.231
S35	70.524	-403.320	69.987	-399.485
S36	-15.177	-2517.271	-15.063	-2497.018
S37	-21.123	-602.655	-20.940	-593.299
S38	-25.712	210.595	-25.532	208.549
S39	0.169	36.039	0.168	35.780
S40	-1.395	-16.621	-1.375	-16.481
S41	-5.884	-482.360	-5.840	-478.131
S42	-0.322	2.646	-0.319	2.611

Source: Simulation Results

V. Conclusion

In this paper, the soft connection between the global computable general equilibrium model and China's multi-region input output model is adopted to discuss impacts of

RCEP on China's regional economy. The preliminary results suggest that RCEP has great impacts on the magnitudes of welfare effects on China, while it might affect the magnitudes of China's regional economy substantially. The main findings are as follows:

Firstly, from a national perspective, RCEP will have huge economic effects on members, such as GDP, welfare, and trade. Comparing Scenario 1 and Scenario 2, India's accession will bring greater benefits to RCEP members.

Secondly, from a provincial perspective, RCEP would promote the economy of most provinces. RCEP has a greater promotion effect on the economy of coastal areas, while it has a certain inhibitory effect on inland areas. In addition, the impact is divided into direct impact and indirect impact. According to the simulation results, the indirect impact of RCEP on different industries is relatively strong. This also shows that RCEP affects the province's exports through exports from other provinces.

Thirdly, from an industrial perspective, impact of RCEP on exports of different industries is different. RCEP has a certain role in promoting the export of agriculture and labor-intensive manufacturing industries. It has a certain restraining effect on technology-intensive industries and service industries.

In general, China is still at the middle and low ends as to the division of labor on global value chain, with a low profitability and a lack of irreplaceability. China's current engagement in the global industrial division of labor is relatively limited, as its central and western provinces engage in the division of labor system by providing energy, raw materials and primary products, and have not yet been freed from their dependence on resources, while the eastern coastal provinces have to import a large number of intermediate products. Thus it needs to extend and deepen the domestic part of global value chain division of labor so the central and western provinces play a larger role in the global division of labor system.

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Appendix

Sectors in China's Regional Input-Output Model

Sector	Description
S01	Agriculture
S02	Mining
S03	Petroleum and natural gas
S04	Metal minerals
S05	Non-metal minerals
S06	Food and tobacco
S07	Textiles
S08	Textile and garment
S09	Wood products and furniture
S10	Paper printing and stationery and sporting goods
S11	Petroleum, coking products and processed nuclear fuel products
S12	Chemical products
S13	Non-metallic mineral products
S14	Metal smelting
S15	Metal products
S16	General equipment and special Equipment
S17	Transportation equipment
S18	Electrical equipment
S19	Communications equipment, computers and other electronic equipment
S20	Instrument
S21	Other Manufacture
S22	Waste
S23	Metal products, machinery and equipment repair services
S24	Electricity and Heat
S25	Gas
S26	Water
S27	Construction
S28	Wholesale and Retail
S29	Transportation, warehousing and postal services
S30	Accommodation, food and service activities
S31	Communication
S32	Finance
S33	Real estate
S34	Leasing and business services
S35	Research and experimental development
S36	Technical services
S37	Public facilities management
S38	Residents services, repairs and other services
S39	Education
S40	Human health and social work activities
S41	Recreational and other services
S42	Public administration and defense