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Evaluation of the Economic Effects of the USMCA on China by Reducing Technical Barriers

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Abstract:

First of all, the trade structure and tariff structure analysis of the United States, Mexico and Canada shows that the degree of inter-import and export dependence between the three North American countries is much higher than that of China, and the tariff level of most industrial sectors between the United States, Mexico and Canada is significantly lower than that of China. Further verifying technical trade barriers have become the preferred tool for trade protection in the United States, Mexico and Canada. Then the GTAP simulation is used to quantitatively examine the China’s economic effect changes brought by the reduction of technical trade barriers under the framework of the USMCA agreement. The study results showed that the reduction of technical barriers in the three North American countries would make China's GDP, resident income, resident consumption, social welfare, net return on capital, export and import volume, total output decline, which may also lead to an increase in the foreign trade surplus and international trade frictions; Moreover, with the deepening of the technical barriers in the three North American countries, the negative impact on China's macroeconomic and industrial output will also expand. In addition, China's reducing trade barriers and promoting technological progress can greatly reduce the negative impact of the United States, Mexico and Canada lowering technical barriers to each other on China's macroeconomy, so that China's social welfare, net return on capital, exports, imports, and sectoral output will show positive growth, and can also balance China's trade balance and ease China's foreign trade relations.The simultaneous implementation of these two measures can completely eliminate the negative impact of the technical barriers of the three North American countries on China's macro-economy and industrial economy.

Keywords: *USMCA agreement; Technical barriers; Competitive and complementary analysis; Computable general equilibrium; GTAP model.*

I. INTRODUCTION

On September 30, 2019, after 13 months of negotiations, the 25-year-old North American Free Trade Agreement (NAFTA), which is related to $1.2 trillion trade volumn for the North American continent's, was upgraded to the United States-Mexico-Canada Agreement (USMCA).Such G7 members see the possibility of strongers’ cooperation among the United States, Europe and Japan . Following the Eu-Japan FTA on July 17, 2020 and the US-Rok FTA on September 24, 2020, it will provide ready-made template references for the US-EU and US-Japan FTAs (Zhu Qirong et al., 2019[1]).In the name of trade freedom or trade security, the USMCA, led by the United States, seeks the interaction of rules and exceptions between general

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consensus and national exceptions to regulate technical trade rules and restrictions at multiple levels.The United States has been committed to creating a binding rule system of technical barriers.In USMCA agreement,technical barriers represented by digital trade have become important non-tariff barriers, and intellectual property protection with high standards and levels , free flow of data across borders and personal information protection have become key topics,which are reflected in the chapters on technical barriers, e-commerce, investment, intellectual property, information technology and cross-border service trade(Sun Yiwu,2019;Zhang Monan,2019[2,3]).

Their consensus is that the traditional agreement with tariff reduction as the main content has declined.With the strong promotion of multilateral mechanisms such as GATT and WTO, especially after the Uruguay Round negotiations, the global tariff level has been greatly reduced, and the problem of non-tariff trade barriers, especially technical trade barriers, has become increasingly prominent.TBT will be a key factor in determining the dividends of RTAs and the quality of agreements (Bronson,2020;Igor Bačkalov, 2020; James Garwood, 2020; Xiaohua Bao, 2015[4-7])

The Office of the U.S. Trade Representative (U.S. Trade Representative) submitted an annual assessment of China's compliance with World Trade Organization (WTO) rules to Congress on Feb. 16, accusing China of not fulfilling its commitments when it joined the WTO and saying it would use and improve domestic trade tools and use more non-tariff barriers to pressure China by working with the WTO and allies . The "tariff war" between China and the United States is increasingly evolving into a "technology war", and technical trade barriers are important non-tariff barriers. Based on the reality and trend of increasing the attention to technical trade barriers in the current regional trade agreement negotiations, this paper will quantitatively examine how the reduction of technical trade barriers under the framework of the USMCA agreement will bring about changes in the economic effects of China. Therefore, this study will expand the marginal research on technical trade barriers related to the Sino-US trade war, and provide useful policy reference for the trade decisions of relevant departments.

II.LITERATURE REVIEW

Some scholars have interpreted the USMCA agreement. Wang Jun (2019)believes that the signing of the USMCA will encounter major obstacles to China's "going out" strategy, have a major impact on the realization of China's regional economic integration strategy, and most likely make China face the challenge of "re-accession"[8].Wang Cuiwen (2020) pointed out that the US-centered bilateral cooperation directly leads to the fragmentation of regional institutional cooperation, and the establishment of new regulations under the regional and bilateral frameworks through the adjustment of technical trade norms has posed a serious challenge to the global multilateral free trade system[9]. Nancy Guo (2020)pointed out that the USMCA as a high-standard free trade agreement poses potential risks to China's exports to the United States, and China needs to actively negotiate bilateral or multilateral free trade agreements, change the export structure and model, and take advantage of the uncertainty of USMCA provisions to enhance export competitiveness[10].

Zhou Nianli and Wu Xixian (2021) argue that the Sino-U.S. digital technology power competition has seriously affected international industrial labor division and international order, distorting the existing international industrial layout and technology development system, and the Sino-U.S. technology competition will intensify in the future [11]. Ma Tianyue and Ding Xuechen (2020), Cai Zhonghua et al. (2022) found that the intensification of Sino-US technological competition directly leads to many

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uncertainties in the future trade development between two countries, and also has a great impact on the industrial development and competitive dynamics between China and the US. China is facing the serious challenge of "disconnecting" key technologies and decoupling industries in the high-tech field [12,13].

Other scholars have explored the sustainable development of the economy and international trade by analyzing technological spillovers in international trade (Li Xiao et al.,2018,Huang Xinfei,2018, Li Xiaoping,2004[14-16]).Luan Shenzhou(2018) uses provincial panel data from 2000 to 2016 as a study sample, then analyzes the impact of foreign trade and foreign direct investment on China's industrial structure optimization based on SGMM method. The results show that continuous progress has a significant role in promoting industrial structure optimization[17]. Liu Meiling and Huang Wenjun (2015) based on Chinese inter-provincial panel data from 1999 to 2012, showing significant differences in the international technology spillover effects of imports and exports, FDI and R&D investment have promoted the improvement of technical efficiency, but the effects on TFP and scale effects are not significant, while the domestic technology absorption capacity can slightly improve the efficiency of international technology spillover[18].Xu Peiyuan and Gao Weisheng (2009)use Chinese 1994-2007 year panel data of the three regions of eastern, central and western area, combined with the trade structure and human capital level of each region to construct trade spillover variables, empirically study the spillover effect of international trade on China's technological innovation capabilities, and point out that the eastern and central and western regions should implement different trade development strategies: The eastern region is based on independent innovation, and the central and western regions are based on comparative advantages.In addition, it is often used in academia CGE Models to analyze the economic effects of technical barriers[19].Tu Taotao(2011) finds that the technical trade barriers of agricultural products in developed countries have a significant negative impact on China's economy, using GTAP and China-CGE model, which not only increases the export price of China's agricultural products, reduces the export competitiveness and export volume of agricultural products, but also adversely affects China's employment, wages and terms of trade[20]. Liu Bing and Chen Shumei (2014) found RCEP achieving zero tariffs in the region has significantly positive effects changes among economic aggregates, welfare levels, and trade scales of member countries, and this positive effect change will gradually expand as technical barriers to trade in the region are gradually lowered[21]. Zhou Lingling and Zhang Keyu (2020)exploring the path mechanism of trade liberalization on the upgrading of China's food consumption structure, it is found that trade liberalization promotes the optimization and upgrading of residents' food consumption structure and improves residents' economic welfare.The substitution effect of trade liberalization on the upgrading of the structure of residents' food consumption is much higher than that of income, while the competitive effect needs to be effective through long-term industrial restructuring[22]. Zhu Qirong and Ren Fei(2019) find that China promotes technological progress using GTAP Model simulation analysis.It can alleviate or even eliminate the impact of United States and Japan-EU FTA on China's macro economy and industry[23].

Combined with previous research, it can be found that the current panel data for the analysis of trade structure and tariff structure in the three North American countries and China is relatively old, and due to the USMCA The agreement has just been signed, so the dividend research on its free trade agreement is mostly qualitative analysis, and lacks quantitative and comprehensive analysis of China's GDP, residents' revenue and expenditure, social welfare, import and export trade, and industries. Therefore, the marginal contribution of this paper mainly includes the following points: This study analyzes the current situation of the trade data of the United States, Mexico and Canada in the decade from 2010 to 2019, and compares the

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trade scale, industry comparative advantages and international competitiveness of the three countries and China through comparative analysis. In addition, because the USMCA agreement has just been signed, so the dividend research of its free trade agreement is mostly qualitative analysis, lack of quantitative and comprehensive analysis of China's GDP, resident revenue and expenditure, social welfare, import and export trade and industry, in this regard, this paper is based on the current regional trade agreement negotiations to increase the reality and trend of technical trade barriers, quantitative examination of the reduction of technical trade barriers under the framework of the USMCA agreement will bring about changes in the economic effects of China. The specific idea is as follows:

1) The current state of trade between the United States, Mexico, Canada and China → reveal the trade relationship.
2) The current state of tariffs between the United States, Mexico, Canada and China → reveal tariff barriers.
3) The assessment of the economic effects of the reduction of technical trade barriers in the United States, Mexico and Canada on China → reveal the effect of non-tariff barriers (technical barriers).
4) China has evaluated the response effect of improving its independent innovation capabilities and strengthening international technical cooperation→ exploring China's response plan.

III.CURRENT TRADE STATUS

3.1 The current export status between the United States, Mexico, Canada and China

3.1.1 The current mutual export status between the United States, Mexico and Canada. Judging from the proportion of mutual exports between the United States, Mexico and Canada in each country’s total exports, the proportion of Mexico and Canada's exports to the United States in total exports is more than 70%, indicating that both countries have serious dependence on the US market. U.S. exports are second to the Canadian and Mexican markets, with exports accounting for between 12 and 20 percent of total exports, a share that has stabilized in recent years. However, the level of export trade flows between Canada and Mexico is low, between 1%-4%, with little change.

3.1.2 The current mutual export status between the United States, Mexico, Canada and China. From the proportion of mutual exports between the United States, Mexico, Canada and China in each country’s total exports, it can be seen that China's exports to the United States account for the largest proportion of total exports, between 16.75% and 20%, which shows that the US market has an important significance for China's exports, due to the outbreak of the Sino-US trade war, the proportion of China's exports to the United States in 2019 has declined by 2.48%. The U.S. exports to China are second only, fluctuating between 6.48% and 8.39%, meaning that the United States and China are important trading partners. Canada's exports to China account for a larger share, at around 4 per cent, while mutual exports between China and Mexico account for a smaller share of total exports.

Through comparison, it can be seen that the degree of interdependence between the three North American countries is much higher than that of China.

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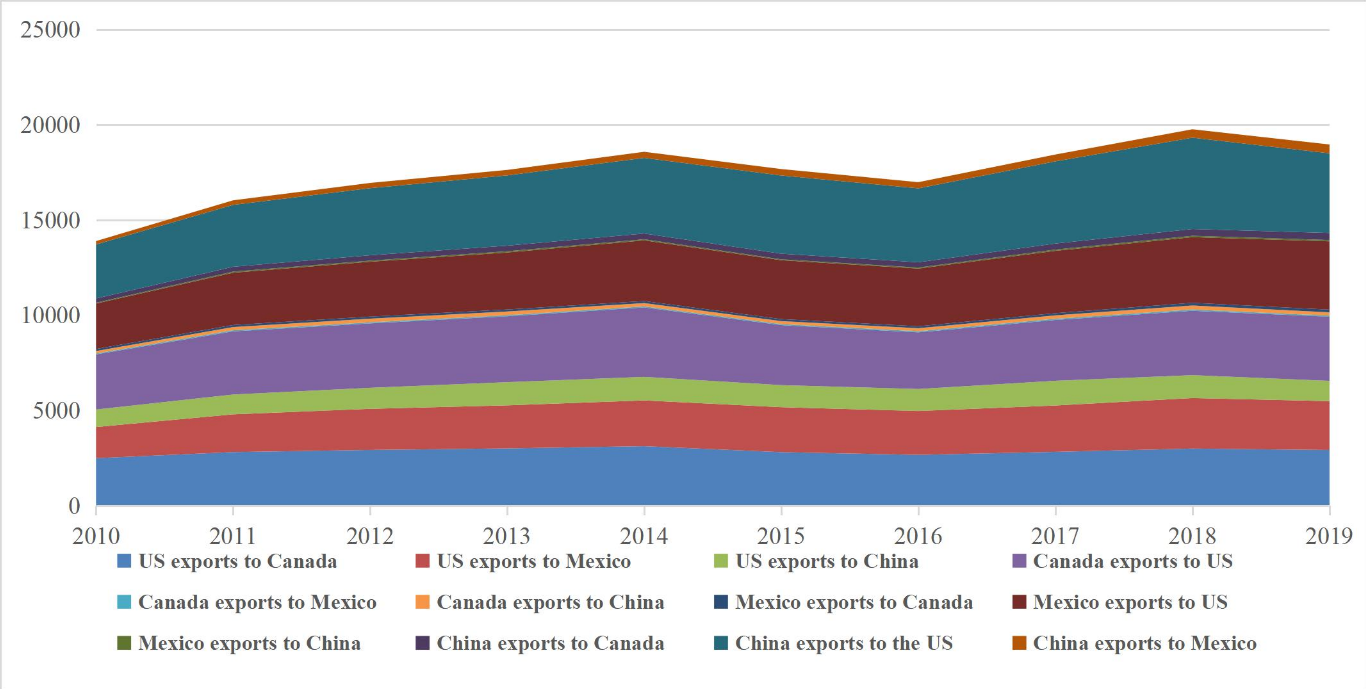

Fig 1 Mutual export status between the United States, Mexico and Canada from 2010 to 2019(Hundred million dollars)

Source: Calculated from the UN Comtrade database

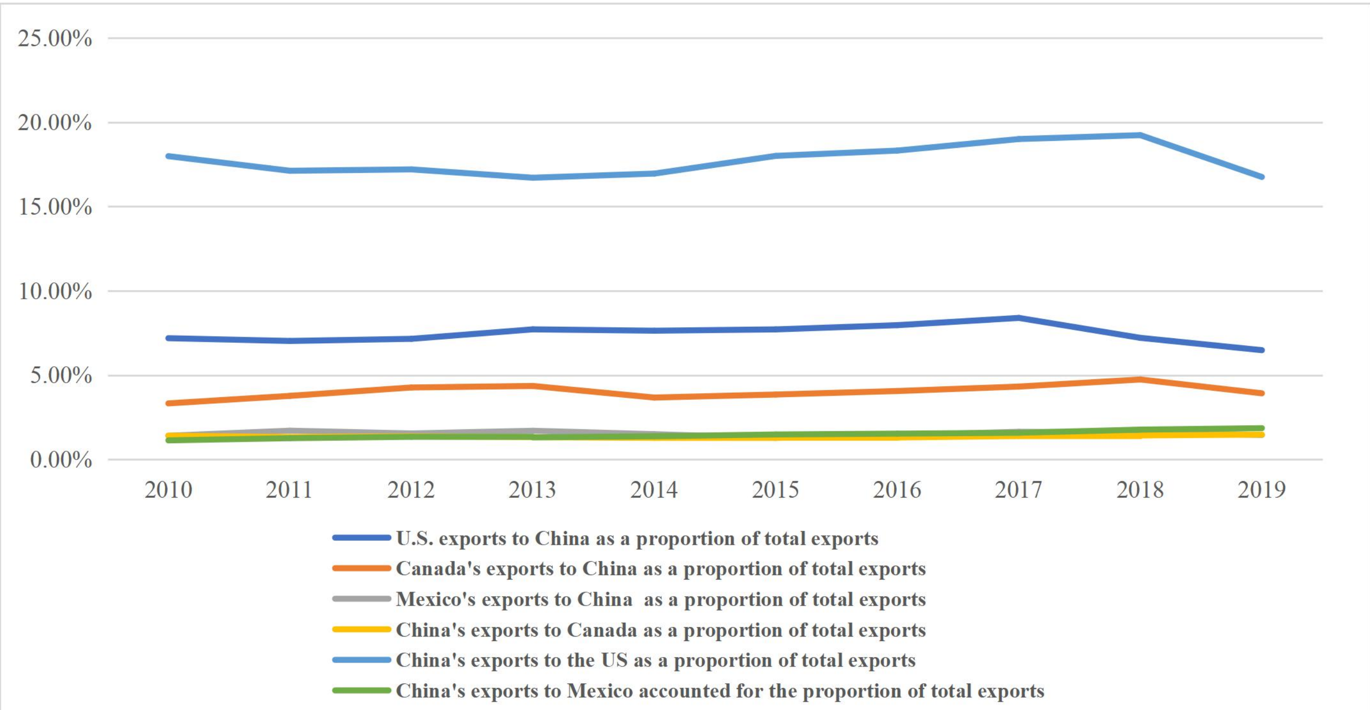

Fig 2 Mutual export status between the United States, Mexico,Canada and China from 2010 to 2019

Source: Calculated from the UN Comtrade database

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3.2 The current import status between the United States, Mexico, Canada and China

3.2.1 The overall mutual import status between the United States, Mexico and Canada. From the perspective of the proportion of mutual imports between the United States, Mexico and Canada in each country's total imports,Canada's imports from the United States account for the largest proportion of total imports, more than 60%, and Mexico's imports from the United States account for the proportion of total imports, at more than 54%, which shows that the United States is an important source of imports from Canada and Mexico. The U.S. imports from Canada and Mexico account for a similar share of total imports, ranging from 12 to 16 percent, and have converged in recent years. Imports between Canada and Mexico accounted for the smallest share of total imports, both below 3.12 per cent, but have seen gradual growth in recent years.

3.2.2 The overall mutual export status between the United States, Mexico, Canada and China. The largest proportion of U.S. imports from China in total imports was between 14% and 18.5%, and the overall trend in 2010-2018 was an upward trend, followed by Mexico's imports from China as a proportion of total imports, and it became a gradual upward trend.

Through comparison, it can be seen that the degree of mutual import dependence between the three North American countries is much higher than that of China.

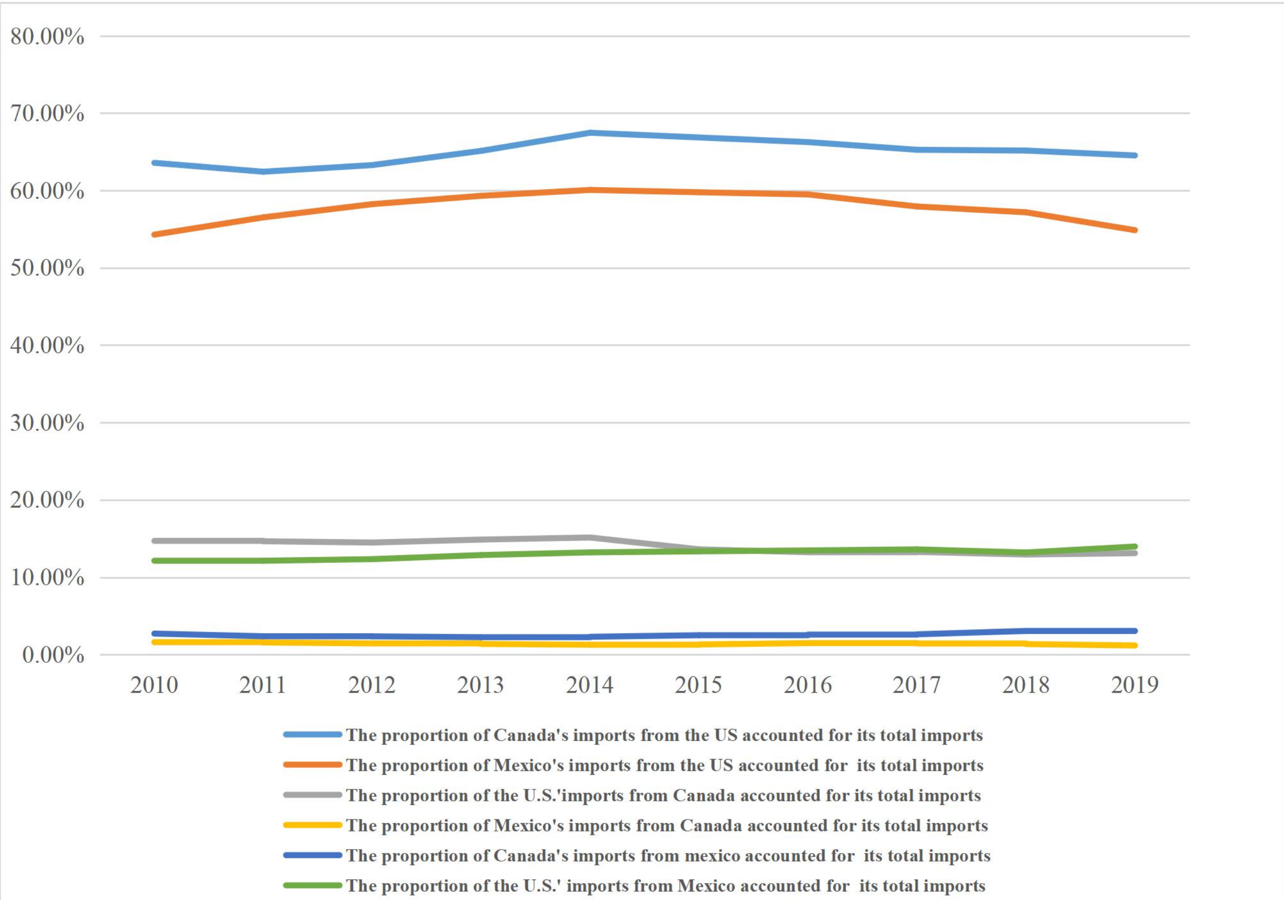

Fig 3 Mutual import status between the United States, Mexico and Canada

Source: Calculated and collated from the UN Comtrade database

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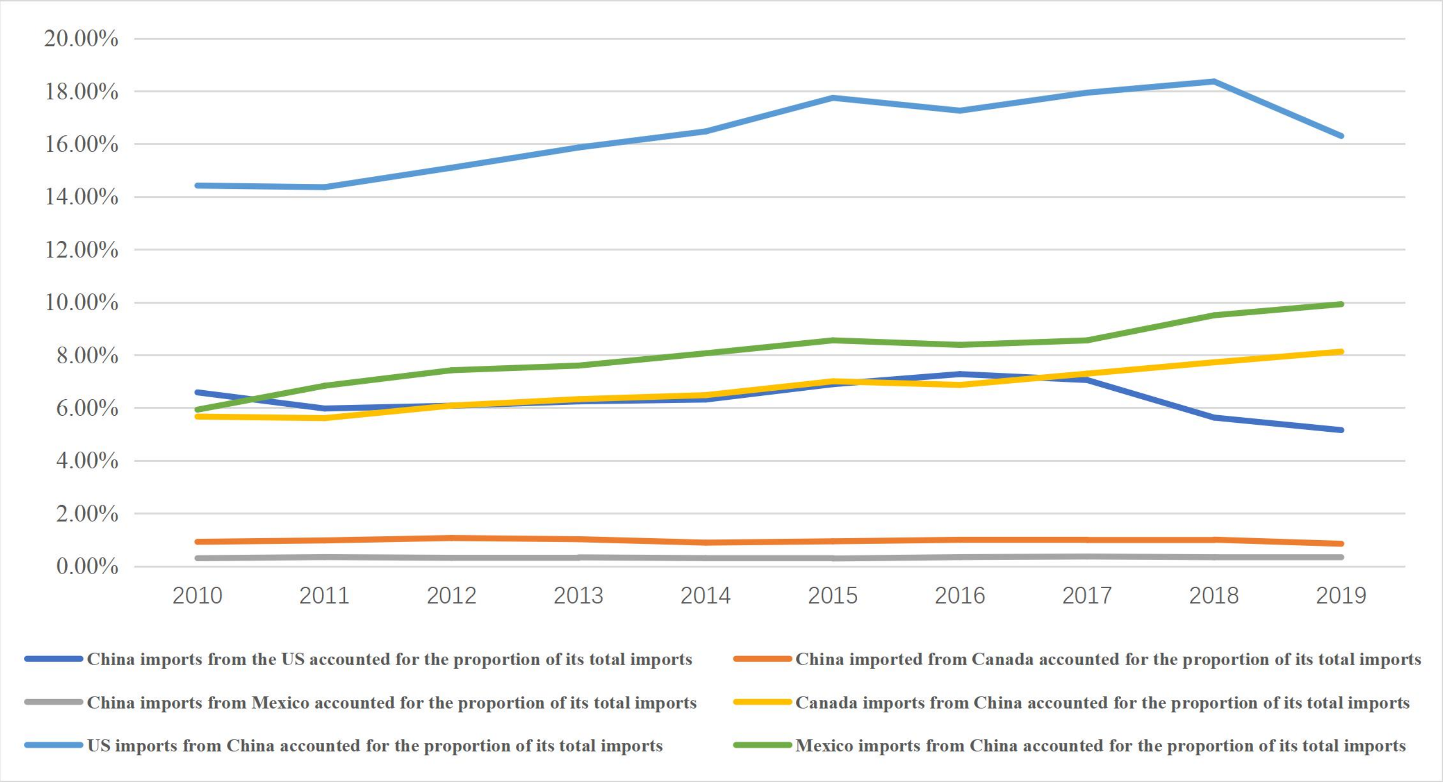

Fig 4 Mutual import trade status between the United States, Mexico, Canada and China

Source: Calculated and collated from the UN Comtrade database

3.3 Import tariff structure between the United States, Mexico, Canada and China

3.3.1 Tariff status between the United States, Mexico and Canada. Table 1 shows that in 2019, the import tariff level of mineral products, plastics and rubber, leather products, wood products, paper products,jewelry,metal products, machinery and electrical appliances, transportation equipment, precision instruments, arms products and art collections between the United States, Mexico and Canada has been as low as zero tariffs, and the import tariff level of fruits,vegetables and crops, chemical products and miscellaneous products is low, less than 1%, and the tariff level of most industrial sectors between the United States, Mexico and Canada is very low. This means that even if there is basically zero tariffs between the United States, Mexico and Canada, the tariff reduction space for these products is very limited, and the impact of further tax cuts on the exports of China's products or above will not be great.

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Table I Mutual tariffs between the United States, Mexico and Canada in 2019 (%)

Industrial sector (B) \ A	the United States		Canada		Mexico	
	Canada	Mexico	United States	Mexico	United States	Canada
Animal products	24.81	0.00	0.39	11.02	0.00	38.67
Fruits, vegetables and crops	0.00	0.00	0.12	0.00	0.00	0.00
Animal and vegetable oils	5.00	0.00	0.00	0.00	0.00	0.00
Tobacco,alcohol and non-staple food	14.28	0.13	2.69	0.59	0.11	12.61
minerals	0.00	0.00	0.00	0.00	0.00	0.00
Chemical products	0.50	0.00	0.00	0.00	0.00	0.03
Plastic and rubber	0.00	0.00	0.00	0.00	0.00	0.00
Leather products	0.00	0.00	0.00	0.00	0.00	0.00
woodwork	0.00	0.00	0.00	0.00	0.00	0.00
Paper products	0.00	0.00	0.00	0.00	0.00	0.00
Textile products	0.00	3.37	0.02	0.77	0.00	0.00
Shoes and hat products	0.00	9.02	0.00	0.77	0.00	0.00
Building supplies	0.00	0.77	0.00	1.59	0.00	0.00
Jewelry	0.00	0.00	0.00	0.00	0.00	0.00
Metal products	0.00	0.00	0.00	0.00	0.00	0.00
Mechanical and electrical	0.00	0.00	0.00	0.00	0.00	0.00
Transport equipment	0.00	0.00	0.00	0.00	0.00	0.00
Precision instruments	0.00	0.00	0.00	0.00	0.00	0.00
Arms products	0.00	0.00	0.00	0.00	0.00	0.00
Miscellaneous articles	0.00	0.62	0.00	0.73	0.00	0.00
Art collections	0.00	0.00	0.00	0.00	0.00	0.00

*Note: A is the exporting country and B is the importing country
Source: Calculated from the UN Comtrade database

3.3.2.Tariff Status between the United States, Mexico, Canada and China.

Table 2 shows that the tariff level faced by China in the export of US-Mexico-Canada products is generally higher, of which the tariff level of Canadian fruit,vegetable and crop sector is as high as 21.92 percent; moreover, the animal products, animal and vegetable oil, tobacco and alcohol by-products, transportation equipment, and arms products sectors in the United States, the animal and vegetable oil, chemical products, construction supplies and arms products sector in Canada and fruit,vegetable and crops, animal and vegetable oil, textile products, transportation equipment, and arms products sector in Mexico are also above 10%. China's exports to the United States, Mexico and Canada face a higher tariff level, China's exports to the United States in leather products, textile products, shoes and hat products and other industrial sectors face a higher tariff level, above 8%, most of other sectors are below 3% tariff level; China's exports to Canada in tobacco, alcohol and non-staple food, textile products, shoes and hat products, animal and vegetable oil and other industrial sectors face tariff levels of 8% or more, most of other sectors are below the 4% tariff level. Compared with the United States and Canada, the tariff level faced by China's exports to Mexico is relatively high, and the tariff level of animal products, fruits, vegetables and crops, tobacco, alcohol and non-staple food, leather products, textile products, shoes and hat products, transportation equipment and other departments is above 12.99%.

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Table II Mutual tariffs between the United States, Mexico, Canada and China in 2019 (%)

A / Industrial sector / B	the United States		Canada		Mexico	
	Canada	**Mexico**	**United States**	**Mexico**	**United States**	**Canada**
Animal products	24.81	0.00	0.39	11.02	0.00	38.67
Fruits, vegetables and crops	0.00	0.00	0.12	0.00	0.00	0.00
Animal and vegetable oils	5.00	0.00	0.00	0.00	0.00	0.00
Tobacco,alcohol and non-staple food	14.28	0.13	2.69	0.59	0.11	12.61
minerals	0.00	0.00	0.00	0.00	0.00	0.00
Chemical products	0.50	0.00	0.00	0.00	0.00	0.03
Plastic and rubber	0.00	0.00	0.00	0.00	0.00	0.00
Leather products	0.00	0.00	0.00	0.00	0.00	0.00
woodwork	0.00	0.00	0.00	0.00	0.00	0.00
Paper products	0.00	0.00	0.00	0.00	0.00	0.00
Textile products	0.00	3.37	0.02	0.77	0.00	0.00
Shoes and hat products	0.00	9.02	0.00	0.77	0.00	0.00
Building supplies	0.00	0.77	0.00	1.59	0.00	0.00
Jewelry	0.00	0.00	0.00	0.00	0.00	0.00
Metal products	0.00	0.00	0.00	0.00	0.00	0.00
Mechanical and electrical	0.00	0.00	0.00	0.00	0.00	0.00
Transport equipment	0.00	0.00	0.00	0.00	0.00	0.00
Precision instruments	0.00	0.00	0.00	0.00	0.00	0.00
Arms products	0.00	0.00	0.00	0.00	0.00	0.00
Miscellaneous articles	0.00	0.62	0.00	0.73	0.00	0.00
Art collections	0.00	0.00	0.00	0.00	0.00	0.00

*Note: A is the exporting country and B is the importing country
Source: Calculated from the UN Comtrade database

Through comparison, it can be seen that the tariff level between three countries in North America is far lower than that between the three countries and China, and most of the departments in the three North American countries have achieved zero tariffs, which are still high between China and them.

3.4 Trade competitiveness analysis between the United States, Mexico, Canada and China

Industrial competitiveness refers to the international competitiveness of a specific industry in a certain country or region relative to the production efficiency, meeting market demand, and continuous profitability of the same industry in other countries or regions. To reflect the competitive advantages of industries in the United States, Canada, Mexico and China, this paper uses 2019 data to measure and compare the differences in industrial competitiveness of 97 types of industries (HS two-digit code) in the United States, Canada, Mexico and China.The indicators are as follows.

3.4.1Revealed comparative advantage index (RCA)

RCA refers to the proportion of a national certain commodity exports accounted for this country's total export value in that of the world. In general, if RCA>2.5, indicates that the product sector in the country is extremely competitive; If 1.25≤RCA≤2.5,indicate that the product sector of the country has a strong international competitiveness; If 0.8≤RCA≤1.25, indicates that the product sector of the country has

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moderate international competitiveness; If RCA<0.8, indicating that the competitiveness of the product sector in the country is weak.The calculation formula of RCA is as follows:

$$RCA = (X_{ij} / X_j) / (X_{iw} / X_w) \qquad (1)$$

In formula (1), X_{ij} is the export value of product i in country j, X_j is the total export value of country j, X_{iw} is the total export value of product i in the world, Xw is the total export value in the world.

3.4.2 Revealed comparative advantage index of competition(CA)

CA refers to subtracting the comparative advantage of imports from the export comparative advantage of the industry, thereby obtaining the real competitive advantage of the industry in the country. Compared with the RCA index, the CA index considers import-export factors and the domestic market, which can more truly reflect the actual competitiveness of a country's industry in the world. If the CA index is greater than 0, it indicates that the country has a comparative advantage in the product sector; If the CA index is less than 0, it means that the product sector in the country does not have a comparative advantage. Moreover, the higher the index, the stronger the international competitiveness of the country's product sector,conversely, the weaker the international competitiveness of the country's product sector. The calculation formula of CA is as follows:

$$CA = RCA - (M_{ij} / M_j) / (M_{iw} / M_w) \qquad (2)$$

In formula (2), M_{ij} is the import value of product i in the country j, M_j is the total import value in the country j in a certain period, M_{iw} is the import value of product i in the world market in the same period, M_w is the total import value in the world during the same period.

3.4.3 Trade Competitiveness Index (TC)

The TC index is a competitive advantage index, also known as the trade competitiveness index, which refers to the proportion of the difference between a country's import and export trade and its total import and export trade value. The value range of the TC index is (-1, 1), if the TC index is greater than zero, it indicates that the type of commodity has strong international competitiveness, the closer to 1, the stronger the competitiveness; The TC index is less than zero, it indicates that the type of commodity is not internationally competitive, the closer to -1, the weaker the competitiveness; The index is zero, indicating that such commodities are intra-industry trade, and the competitiveness is comparable to the international level. The TC is calculated as follows:

$$TC = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij}) \qquad (3)$$

In formula (3), X_{ij} is the export value of product i in country j , M_{ij} is the import value of i product i in country j.

According to the calculation results of the three competitive indices (see Table 3), the industrial sectors of fruits, vegetables and crops, paper products, jewelry, transportation equipment, precision instruments, arms products and art collectibles in the United States have strong international competitiveness, while the animal products, fruits, vegetables and crops, animal and vegetable oils, mineral products, wood products, paper products, jewelry and other products industry sectors in Canada have strong international competitiveness.The fruits, vegetables and crops, tobacco, alcohol and non-staple food,jewelry in Mexico

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have strong international competitiveness. Industrial sectors such as transportation equipment and miscellaneous products have strong international competitiveness, and China's industrial sectors such as leather products, textile products, shoes and hat products, building supplies, metal products, machinery and electrical and miscellaneous products have strong international competitiveness. Technology-intensive products in the United States and China are the most competitive, and primary factor-intensive products in Canada and the United States provide a realistic and economic basis for technical barriers and further reduction.

Table III U.S.-Mexico-Canada and China sector product competitiveness index

Industrial sector	United States			Canada			Mexico			China		
	RCA	CA	TSC	RCA	CA	TSC	RCA	CA	TSC	RCA	CA	TSC
Animal products	0.89	0.23	-0.07	1.43	0.83	0.41	0.51	-0.29	-0.21	0.33	-0.68	-0.43
Fruits, vegetables and crops	1.46	0.74	0.12	1.65	0.61	0.21	1.41	0.42	0.17	0.41	-0.69	-0.39
Animal and vegetable oils	0.42	-0.15	-0.35	1.6	1.15	0.56	0.21	-0.33	-0.44	0.11	-0.97	-0.79
Tobacco,alcohol and non-staple food	0.85	-0.06	-0.25	1.06	-0.28	-0.12	1.04	0.48	0.31	0.4	-0.01	0.08
minerals	1.02	0.41	-0.02	1.94	1.35	0.49	0.55	-0.12	-0.14	0.17	-1.62	-0.82
Chemical products	1.11	0.14	-0.17	0.66	-0.26	-0.19	0.27	-0.4	-0.44	0.55	-0.22	-0.09
Plastic and rubber	1.1	0.29	-0.07	0.83	-0.32	-0.17	0.7	-0.84	-0.37	0.98	0.02	0.1
Leather products	0.34	-0.63	-0.6	0.23	-0.58	-0.53	0.26	-0.4	-0.39	2.23	1.5	0.61
woodwork	0.67	-0.36	-0.42	3.5	2.64	0.59	0.18	-0.29	-0.45	0.8	-0.59	-0.19
Paper products	1.24	0.51	0.04	2.32	1.02	0.27	0.38	-0.79	-0.51	0.77	-0.18	-0.01
Textile products	0.36	-0.81	-0.64	0.17	-0.65	-0.64	0.35	-0.22	-0.18	2.35	1.97	0.78
Shoes and hat products	0.13	-1.37	-0.88	0.08	-0.68	-0.8	0.18	-0.19	-0.3	2.62	2.29	0.83
Building supplies	0.7	-0.27	-0.34	0.43	-0.78	-0.46	0.84	0.08	0.09	2.16	1.62	0.68
Jewelry	1.08	0.39	0.01	1.42	0.73	0.35	0.45	0.35	0.64	0.25	-0.64	-0.49
Metal products	0.64	-0.15	-0.32	1.04	0.08	0.03	0.66	-0.54	-0.29	1.13	0.42	0.31
Mechanical and electrical	0.87	-0.17	-0.32	0.41	-0.5	-0.4	1.29	-0.05	-0.03	1.64	0.43	0.23
Transport equipment	1.58	0.22	-0.12	1.55	-0.35	-0.08	2.53	1.42	0.42	0.42	-0.04	0.07
Precision instruments	1.58	0.45	-0.05	0.46	-0.36	-0.29	1.18	0.18	0.09	0.89	-0.5	-0.13
Arms products	3.81	2.38	0.36	0.58	-0.42	-0.16	0.09	-0.03	-0.01	0.06	0.05	0.87
Miscellaneous articles	0.49	-1.39	-0.7	0.72	-0.74	-0.32	1.19	0.44	0.26	3.05	2.87	0.91
Art collections	3.97	0.93	0.05	0.39	-0.01	0.11	0.01	-0.05	-0.63	0.15	-0.12	-0.06
Other products	1.07	-1.84	-0.4	1.78	0.38	0.39	0.68	-1.86	-0.34	0.17	-0.17	0.05

Source: Calculated from the UN Comtrade database

IV.THEORY, MODEL AND SCENARIO SETTING

4.1 Theoretical basis

The French economist Walras(1874) established the theory of general equilibrium[24]. Walras believes that in the economic system, the quantity and price of supply and demand of various commodities are interrelated, and changes in the prices and quantities of one commodity can cause changes in the quantities and prices of other commodities until the commodity market achieves a balance between supply and demand (equilibrium), that is, the market is cleared. Based on general equilibrium theory, Johansen (1960) created a computable general equilibrium (CGE) model for evaluating the economic impact of tax policy changes[25]. After 60 years of development and refinement, the CGE model has become a commonly used policy

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analysis tool, widely used by academics and research institutions to evaluate the impact of domestic and international factors on the economy of one or more countries.

The principle of CGE model economics is: under open conditions, when the supply and demand relationship of commodities and production factors in an economy is impacted by external factors, it will cause changes in domestic import and export trade through international trade, which will not only cause a chain reaction of various economic activities in the economy, but also cause changes in the prices and supply and demand of various commodities and production factors in other countries (regions), and then cause changes in the equilibrium prices and quantities of various commodities and production factors in the world market. Until the market clears and a new equilibrium emerges between supply and demand, it will have an impact on its own production, income, consumption, welfare, investment and import and export trade with other economies.

4.2 Model selection

The GTAP (Global Trade Analysis Project) model, which is widely used by academics, was developed by Professor Thomas.W. Hertel of Purdue University and other scholars (1997)[26]. A multi-country, multi-sectoral global CGE model based on neoclassical economic theory. On July 31, 2019, Purdue University released the latest version of the GTAP 10 database, which connects the economic sectors of each country, including producers, consumers, and government economic activities in 65 industries, through data from import and export trade and input-output tables of 141 countries and regions around the world. The GTAP model can analyze the impact of political and economic factors on the macro-economy (GDP, resident income and consumption, social welfare level, capital returns, trade balance, etc.) and industry (output and product prices, etc.) (Li et al., 2018; Guo Qing et al., 2019; Zhu Qirong et al., et al., 2019[27-29]).This paper uses GTAP10 data to assess the impact of the USMCA on China in reducing technical barriers, and to discuss the effect of China's response measures.

In order to match the product data in the UN Comtrade database with the product groups in the GTAP10 database, we correspond the HS code in the WTO tariff database to the compilation of 65 industries in the GTAP database (McDougall,1996;Hutcheson,2006;Villoria, 2014; Zhou Shudong et al., 2016[30-33]), and taking into account the closing conditions required to meet the GTAP model operations, in order to meet the short-term closure conditions required for GTAP model operations, the GTAPagg software was used to merge the original 65 industrial sectors of GTAP 10 into 30 industrial sectors (see Table 6 for details).

GTAP10 database of is based on 2014. To accurately analyze the impact of the USMCA agreement lowering technical barriers on Chinese economy, this paper draws on the dynamic recursive approach of Walmsley et al. (2000), Walmsley (2002), and yang (2011) to update the model database with exogenous macroeconomic data of each country (region) (such as economic (GDP), capital stock, population, and labor force).Then the model database are updated to 2022.

4.3 BOTE analysis

Before GTAP simulation, the BOTE analysis method was used to predict the influence trend of USMCA on China, and the general equilibrium theory was explained.BOTE is Back-of-the-Envelope Estimations, referring to the use of economic transmission mechanism, rough verification of the impact of USMCA related policy variables under the standard closure of the GTAP model(GTAP model standard closure satisfies employment, fixed amount of capital, and free adjustment of wages and returns on capital.),

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the trend of changes in various economic indicators such as GDP, investment, consumption, import and export volume in China, and theoretical explanation of the model solution under the macroeconomic framework(Jin Bei,1996;Jin Bei etal.,1997;Chen Weiping etal.,2002;Zhu Qirong etal,2020;Sun Mingsong,2021[34-38]).

Specifically, suppose that the total social industries of the economies in the model conform to the Cobb-Douglas production function distribution:

$$Y = A_t L^{\varepsilon} K^{1-\varepsilon} \quad (4)$$

At the same time, in the national balance of payments equation calculated by the expenditure method, under equilibrium conditions, total output is equal to total income:

$$Y = C + I + G + X - M \quad (5)$$

Under the constraint of standard closure, assuming that various endogenous factors such as capital and labor remain unchanged, it can be known that the marginal return is equal to the marginal cost, and the marginal output of capital and labor is also certain, that is:

$$\frac{\partial Y}{\partial K} = A_t \varepsilon \left(\frac{L}{K}\right)^{1-\varepsilon} = \frac{Q}{P_{VA}} = \frac{Q}{P_1} \cdot \frac{P_1}{P_{gdp}} \cdot \frac{P_{gdp}}{P_{VA}} \quad (6)$$

$$\frac{\partial Y}{\partial L} = A_t \varepsilon \left(\frac{K}{L}\right)^{1-\varepsilon} = \frac{W}{P_{VA}} = \frac{W}{P_{gne}} \cdot \frac{P_{gne}}{P_{gdp}} \cdot \frac{P_{gdp}}{P_{VA}} \quad (7)$$

Among them, $A_t \varepsilon (\frac{L}{K})^{1-\varepsilon}$ remains unchanged, due to trade barriers $\frac{P_{gdp}}{P_{VA}}$ rise, then the capital return $\frac{Q}{P_1}$ declined , and investment I increased. By the same token, due to trade barriers $\frac{P_{gdp}}{P_{VA}}$ rise, terms of trade $\frac{P_{gdp}}{P_{VA}}$ deteriorate,real wages $\frac{w}{P_{gne}}$ fall, and social welfare declines.

As mentioned above, the USMCA effectiveness actually raises the trade barriers for China's products to enter the North American market, reduces the level of China's exports, and at the same time, the terms of trade deteriorate, and under the condition of a balance between marginal costs and marginal benefits, China's GDP and social welfare level decline and increase, which is consistent with the results of BOTE analysis. This analysis is further quantified below.

4.4 Scenario settings

Compared to NAFTA, the USMCA has had little traditional tariff liberalization, with only minor changes to market access and limited improvements in trade facilitation. But some technical barriers have been eased, including expanding U.S. access to Canada's dairy and poultry markets. The following will

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mainly explore and set the scenarios for the reduction of technical barriers in the United States, Mexico and Canada and the effectiveness of China's response measures (see Table IV).Note that service market access is not constrained in addition to some specific sectors , but leads to increased uncertainty about market access,which will lead to trade transfer from third parties. Given the high regionalization of the North American market, it is assumed that this amounts to third-party imports from Canada and Mexico to be replaced by imports from the United States.The reduction of technical barriers has promoted the liberalization of North American trade, but this has not been achieved overnight, because the "three zeros" goal is a gradual process.Therefore, set up three North American countries difference scenarios for lowering technical barriers and proposing our country's response to the scenario of the largest impact.

Table IV Scenario settings of the United States, Mexico and Canada lowering technical barriers and China taking countermeasures

Basic background	Scenario	Scenario description
North America three countries lower technical barriers	Scenario 1	Technical barriers between the United States, Mexico and Canada have dropped by 3%
	Scenario 2	Technical barriers between the United States, Mexico and Canada have dropped by 7%
	Scenario 3	Technical barriers between the United States, Mexico and Canada have dropped by 10%
China's response	Scenario 4	On the basis of Scenario 3, China lowered its technical barriers by 5%
	Scenario 5	On the basis of Scenario 3, China's technological progress is 1%
	Scenario 6	On the basis of Scenario 3, China lowers technical barriers by 5%, while technological progress by 1%

According to the above analysis, it is assumed that the three countries of the United States, Mexico and Canada combine their own technical level and protection level to reduce inspection and quarantine standards and relax market access in the short term, so that the technical barriers between each other will be reduced by 3%, 7% and 10%, thus forming scenarios 1-3. In order to cope with the spillover effect of the United States, Mexico and Canada to reduce technical barriers (scenario 3), China continues to strengthen international technical cooperation, due to the completeness of China's industrial sector, a large number of technological spillover effects, and finally China lowered 5% of the technical barriers, thus forming scenario 4; in order to cope with the impact of scenario 3, China continues to enhance its independent innovation capabilities, optimize the industrial structure, continuously liberate and develop productive forces, so that China's various industrial sectors produce technological progress, thus assuming that China's technological progress is 1%. In addition, in order to comprehensively assess the effectiveness of China's response to Scenario 3, the effectiveness of China's reduction of technical barriers and technological progress, Scenario 5 is set to consider the impact of both measures.

V.SIMULATION RESULTS ANALYSIS

5.1 Macroeconomic impact

According to the GTAP simulation results, the macroeconomic impact of China under various scenarios is sorted out (see Table 5).

Scenario 1 (the United States, Mexico and Canada lowering technical barriers with each other by 3%) is likely to reduce China's GDP, resident income, resident consumption expenditure,net return on capital,

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exports and imports by 0.38%, 0.39%, 64.06%, 0.08%, 0.07% and 0.54% respectively. Social welfare reduces by $6.406 billion,and trade balance increase by $9.593 billion.

Scenario 2(the United States, Mexico and Canada lowering each other's technical barriers by 7%) is likely to reduce China's GDP, resident income, resident consumption expenditure, net return on capital, exports and imports by 0.92%, 0.94%, 0.93%, 0.18%, 0.17% and 1.29% respectively.Social welfare reduces by $15.505 million, and China's foreign trade surplus increases by $22.642 billion.

Scenario 3 (the United States, Mexico and Canada lowering technical barriers with each other by 10%) may reduce China's GDP, resident income, resident consumption, net return on capital, exports and imports may fall by 1.35%, 1.37%, 1.35%, 0.26%, 0.25% and 1.87% respectively.Social welfare reduces by $22.734 billion, and China's foreign trade surplus increases by $32.558 billion.

This shows that the reduction of technical barriers in the three North American countries will reduce China's GDP, resident income, resident consumption, social welfare, net return on capital, exports and imports, and may also lead to an increase in the foreign trade surplus and increase international trade frictions; Moreover, as the technical barriers of the three North American countries are reduced, the above-mentioned macroeconomic negative impact on China will also expand. The following will analyze China's response from the external (China strengthens international cooperation and lowers trade barriers) and internal (China enhances its independent innovation capabilities and promotes technological progress).

Scenario 4 (China lowers the technical barriers by 5% on the basis of the United States, Mexico and Canada reducing technical barriers with each other by 10%) may reduce China's GDP changes, residents' income changes, and residents' consumption expenditure by 0.51%, 0.24%, and 0.35%, respectively, but social welfare increases by $111.788 million,net return on capital, exports and imports increase by 2.74%, 2.95%, and 4.51% respectively, and the foreign trade surplus reduce by $19.222 billion.

Scenario 5 (China improves technological progress by 1% on the basis of the United States, Mexico and Canada reducing technical barriers with each other by 10%) may reduce China's GDP, residents' income, and residents' consumption expenditure by 0.35%, 0.19%, and 0.26% respectively, but social welfare increases by $85.771 billion, and net return on capital, exports, and imports increase by 2.74%, 2.95%, and 4.51% respectively, and the foreign trade surplus reduces by $4.55 billion.

Scenario 6 (China lowers technical barrier by 5% and improves technological progress by 1% at the same time on the basis of the United States, Mexico and Canada reducing technical barriers with each other by 10%) may lead to an increase in China's GDP changes, changes in residents' incomes, residents' consumption expenditures, net return on capital, changes in exports and changes in imports: 0.47%, 0.93%, 0.72%, 4.79%, 2.4%, 5.53%, respectively.Social welfare increases by$ 220.44 billion.Foreign trade generates a deficit of $54.474 billion.

This shows that China's lowering of trade barriers and promoting technological progress can greatly reduce the negative impact of the technical barriers lowering between the United States, Mexico and Canada on China's macro economy, and even reverse the decline in social welfare, net return on capital, exports and imports, so that they can grow, and can also balance China's trade balance and ease China's foreign trade relations. These two measures, taken at the same time, can completely eliminate the technical barriers of the three North American countries and reduce the negative impact on China's macro economy.

Table V Impact of scenarios on China's macro-economy

Macroeconomic indicators	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
GDP change (%)	-0.38	-0.92	-1.35	-0.51	-0.35	0.47
Change in residents' income (%)	-0.39	-0.94	-1.37	-0.24	-0.19	0.93
Residents' consumption expenditure (%)	-0.39	-0.93	-1.35	-0.35	-0.26	0.72
Changes in social welfare (hundred million dollars)	-64.06	-155.05	-227.34	1117.88	851.71	2204.40
Net Return on Capital (%)	-0.08	-0.18	-0.26	2.74	1.77	4.79
Change in export value (%)	-0.07	-0.17	-0.25	2.95	-0.89	2.4
Change in import value (%)	-0.54	-1.29	-1.87	4.51	-0.86	5.53
Trade Balance (hundred million dollars)	95.93	226.42	325.58	-192.22	-45.50	-544.74

Data source: Compiled from GTAP simulation data

5.2 Output impact of the industrial sector

The GTAP model was used to calculate the change in output of various sectors in China from scenarios 1 to 6 (see Table 6).

Scenario 1-scenario 3(U.S.-Mexico-Canada lower technical barriers with each other by 3%, 7%, 10%) reduces China's total output level (the weighted average of the rate of change in export scale by sector) by 0.29%, 0.68%, and 0.99%, respectively. Obviously, the overall impact of technical barriers between the United States and Mexico on China's export trade is not large, but if it is in the long run, it may have a greater impact on China's exports; in terms of export changes in various sectors, the above scenario may lead to China's plant fibers, furs and textiles and clothing, precision instruments, paper products, oil and sugar crops, insurance services, forestry, other grains and crops, basic drugs, wood products, petrochemical products, rubber and plastic products, animal husbandry, fruit and vegetable products, rice and wheat, tobacco, alcohol and non-staple food, trade and business activities, entertainment and leisure and other sectors of exports increased slightly, but led to different degrees of decline in exports of metals and metal products, utility services, mineral deposits and energy products, real estate leasing and property, education and health, transportation and machinery and equipment, electrical appliances, construction and other sectors, of which the negative impact on China's construction industry was the largest (the three scenarios decreased by 0.27%, 0.65% and 0.94% respectively), and china metals and metal products, utility services, mineral deposits and energy products, exports such as real estate leasing and property also have a greater negative impact, and with the expansion of technical barriers in the United States and Mexico, the impact on china's exports in the above sectors has also increased. This shows that the reduction of technical barriers in the three North American countries will cause a decline in the output level of various departments in China, which will lead to a decline in the overall level of output, and the decline in output and the decline in technical barriers are positively correlated.

Under Scenario 4 (the United States, Mexico and Canada lower their technical barriers by 10%, and China's response by 5%) china, China has achieved a total output level of 1.57%. In terms of the changes in the exports of various departments, the above scenarios may lead to a significant increase in the exports of China's construction, education and health, precision instruments, fur and textiles and clothing, real estate leasing and property departments, of which the construction industry, education and health, and precision instruments sectors have the greatest impact, up 1.47%, 0.82% and 0.73% respectively, in addition, entertainment and leisure, public utility services, hotel and catering, fisheries, financial services,

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transportation and communications, tobacco, alcohol and non-staple food, electrical appliances, fruit and vegetable products and other departments increased slightly. However, as a result, the output of rice and wheat, wood products, trade and commercial activities, other cereals and crops, basic medicines, metals and metal products, petrochemical products, rubber and plastic products, paper products, transport and machinery and equipment, insurance services, plant fibers, forestry, oil and sugar crops, mineral deposits and energy products has decreased to varying degrees, of which the negative impact of plant fibers, forestry, oil and sugar crops, mineral deposits and energy products in China has been relatively large, with a decrease of 1.31%-2.76%.

Table VI Impact of all scenarios on China's sector outputs

Industrial sector	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Rice and wheat	0.03	0.07	0.1	-0.02	0.83	0.7
Other grains and crops	0.1	0.24	0.34	-0.26	1.11	0.51
Fruit and vegetable products	0.04	0.09	0.13	0.01	0.8	0.68
Oil and sugar crops	0.18	0.43	0.63	-1.68	1.43	-0.88
Plant	0.32	0.78	1.12	-1.31	1.41	-0.98
Animal husbandry	0.05	0.12	0.17	0	1.03	0.87
Forestry	0.11	0.26	0.37	-1.61	1.36	-0.64
Fishery	0	0.01	0.01	0.2	0.91	1.1
Mineral deposits and energy products	-0.02	-0.05	-0.07	-2.76	0.97	-1.74
Tobacco and alcohol side dishes	0.03	0.07	0.1	0.04	0.9	0.84
Fur and textile clothing	0.26	0.62	0.9	0.59	1.11	0.85
Woodwork	0.09	0.22	0.32	-0.12	1.33	0.88
Paper products	0.19	0.45	0.64	-0.52	1.43	0.27
Transport and machinery and equipment	-0.04	-0.09	-0.12	-0.62	0.85	0.34
Metals and metal products	-0.01	-0.02	-0.04	-0.44	0.83	0.42
Electrical appliances	-0.08	-0.18	-0.25	0.04	0.28	0.58
Precision instruments	0.23	0.51	0.72	0.73	0.64	0.7
Essential medicines	0.1	0.24	0.34	-0.27	1.43	0.82
Petrochemicals	0.08	0.2	0.29	-0.46	0.99	0.25
Rubber and plastic products	0.06	0.15	0.22	-0.46	0.91	0.22
Hotel and catering industry	0	0	0	0.44	1.26	1.7
Construction	-0.27	-0.65	-0.94	1.47	0.81	3.19
Real estate leasing and property	-0.02	-0.05	-0.07	0.55	1.19	1.82
Transportation communication	0	0	0	0.07	1.02	1.08
Utility services	-0.01	-0.03	-0.04	0.46	1.07	1.58
Trade and business activities	0.01	0.03	0.04	-0.21	1.05	0.8
Financial services	0	0	-0.01	0.09	1.07	1.16
Insurance services	0.16	0.36	0.51	-0.83	1.56	0.22
Education and health	-0.03	-0.07	-0.1	0.82	1.19	2.12
Entertainment and leisure	0.01	0.02	0.03	0.47	1.23	1.67
Total level	-0.29	-0.68	-0.99	1.57	0.8	3.33

Data source: Compiled from GTAP simulation data

Scenario 5 (the United States, Mexico and Canada lower their technical barriers by 10%, and China's response by 1% of technological innovation) has increased the overall level of output by 0.8%. In terms of changes in exports by sectors, the above scenario has led to a significant increase in China's exports in all

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sectors, of which the impact on insurance services, essential medicines, paper products, oil and sugar crops, plant fibers, forestry, wood products, hotel and catering, entertainment and leisure, education and health, real estate leasing and property, furs and textiles and garments, other cereals and crops, public utility services, financial services, trade and business activities, animal husbandry, transportation and communications sectors is relatively large, with an increase of between 1.02% and 1.56%. Petrochemicals, mineral and energy products, fisheries, rubber and plastic products, tobacco, alcohol and non-staples, transport and machinery and equipment, rice and wheat, metals and metal products, construction, fruit and vegetable products, precision instruments, electrical appliances and other sectors increased slightly.

Scenario 6 (the United States, Mexico and Canada lower their technical barriers by 10%,China took timely measures to reduce technical barriers by 5%, while carrying out technological innovation by 1%), resulting in a total output level of 3.33%. Judging from the changes in the exports of various departments, the above scenarios may increase significantly in the exports of construction, education and health, real estate leasing and property, hotel and catering, entertainment and leisure, public utility services, financial services, fisheries, transportation and communications, etc., of which the construction industry, education and health have the greatest impact, up 3.19% and 2.12%. Real estate leasing and property, hotel and catering, entertainment and leisure, utility services, financial services, fisheries, transportation and communications and other sectors increased slightly. However, it has led to different degrees of reduction in exports from sectors such as forestry, oil-seed and sugar crops, plant fibres, mineral deposits and energy products (the decline rates are 0.64%, 0.88%, 0.98% and 1.74%, respectively).

In summary, the reduction of technical barriers in the three North American countries will cause a decline in the output level of various departments in China, which will lead to a decline in the total level of output, and with the expansion of technical barriers in the United States and Mexico, the impact on the output of the above sectors in China will also increase. However, it should be noted that the overall impact of lowering technical barriers between the United States, Canada and Mexico on the output of various sectors in China is not large, but if it is in the long run, it may have a greater impact on China's exports. In addition, China's two measures to reduce technical barriers and technological progress can achieve improvement results, and the influence of technological innovation is greater than the influence of lowering technical barriers abroad, if two measures are taken at the same time, better results will be achieved.

VI.CONCLUSIONS AND RECOMMENDATIONS

First, we analyze trade structure and tariff structure between the U.S., Mexico, Canada and China. Then, we analyze the macroeconomic and industrial impacts of lowering technical barriers in the three North American countries in detail using the GTAP model. And we test the effectiveness of China's three countermeasures of lowering technical barriers, technological progress and two measures respectively. The conclusions and recommendations are as follows.

6.1Research Conclusions

Firstly, the degree of mutual import and export dependence among the three North American countries is much higher than that of China, while the tariff levels of most industrial sectors between the U.S., Mexico and Canada are significantly lower than those with China, indicating that there is an obvious "border effect" and geopolitical characteristics of trade between these countries. At the same time, this means that even if the tariff reduction space between the U.S., Mexico and Canada is very limited, the impact of further tariff

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reductions on China's exports of the above products will not be significant, which further proves that non-tariff barriers, especially technical barriers, have become an important constraint to trade liberalization in the three countries. And compared with the United States and Canada, China still has high tariff barriers to trade with the three North American countries, which seriously restricts the sustainable development of China's foreign trade.

Secondly, through the simulation results of GTAP model, the reduction of technical barriers in the three North American countries will cause China's GDP, residents' income and consumption, social welfare, net capital return, export and import volume and total output to decline, and may also lead to an increase in foreign trade surplus and increase international trade frictions. Moreover, as the reduction of technical barriers in the three North American countries deepens, the negative impact on China’s macroeconomic and industrial output will also expand. China needs to actively carry out services for SMEs, especially in construction, metals and metal products, utility services, mineral and energy products, real estate leasing and property, and other highly affected sectors to deal with technical barriers to trade, from industry to macro, to hedge against the above negative impacts. Through providing testing and certification training to small and medium-sized foreign trade enterprises, testing and certification agents and international market consulting services, and in-depth testing and certification, customs clearance and inspection-based general foreign trade comprehensive services to achieve Chinese enterprises to connect to foreign advanced product standards, and improve product quality and competitiveness.

Thirdly, China to reduce trade barriers and promote technological progress, can significantly reduce the U.S. Mexico and Canada to reduce each other's technical barriers to China's negative macroeconomic impact, and can even reverse the decline in social welfare, the net rate of return on capital, exports and imports, and sectoral output to growth, but also to balance China's trade balance and ease China's foreign trade relations. These two measures together can completely eliminate the negative impact of the reduction of technical barriers in the three North American countries on China's macro-economy and industrial economy.

6.2 Recommendations

U.S. technology blockade control measures against China inhibit China's trade scale, learning effect and national competitiveness.Specifically, Firstly, tariffs reduce the profits of Chinese exporters to the U.S. and inhibit the scale effect. U.S. tariffs on imports from China have risen significantly over the past three years, and two-thirds of China's exports to the United States face additional tariffs. Secondly, the cost of cooperation and communication between Chinese and overseas companies has risen, inhibiting learning effects. Research by the U.S. Chamber of Commerce in China shows that while most multinational companies see their future remaining anchored in China, a number of them say that the U.S.-China trade friction has forced them to delay or cancel investments in China or even replace suppliers from China. In the long run, this could affect U.S.-China business cooperation, hinder global knowledge and technology diffusion, and be detrimental to Chinese business innovation. Thirdly, and most importantly, the threshold for Chinese companies to enter the European and American markets will be raised, which will hinder Chinese companies from participating in international competition and weaken the role of the competitive effect. before 2018, the share of China's exports of high-tech products to the United States was stable at about 20%, and the ratio slipped to 17.5% in 2019. In this regard, there is a view that Chinese companies can abandon the U.S. market and turn to other countries' markets. In the short term, this can indeed reduce the

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loss of profits, but in the long run, companies may thus miss a good opportunity for development. This is because the United States still has a large number of advanced enterprises, there are also many high-quality customers, the market competition mechanism is also more perfect. If companies can enter the U.S. market, it is conducive to stimulate the "escape from competition effect" and promote innovation, on the contrary, companies will lose the opportunity to learn from the best and compete with the strongest, which is not conducive to innovation in the long run.

At the same time, China's economic development goal, which is based on a large domestic cycle, also needs to improve its R&D and technological progress capabilities.During the period of strict restrictions of the U.S. technology blockade control measures against China, mostly sanctions against the list of Chinese entities, TFP (total factor productivity) can be increased by about 0.6% for every 1% increase in R&D investment intensity in China in that case. Therefore, China can enhance its independent innovation capability by the following points.

Firstly, China should reduce technical barriers to promote international technological cooperation.On the one hand,it is urgent for China to internationalize the allocation of innovation resources, actively "bring in", and take the lead in exploring the shortcomings of the two-way transfer of international technology, then increase the introduction of foreign advanced technology, and use innovation resources to improve China's technological innovation disadvantages and shortcomings; On the other hand, China should strengthen its technological and innovation capacity to promote the technological industrial progress.China ought to strengthen enterprises with strong international competitiveness in leather products, textile products, footwear and hat products, building supplies, metal products, machinery and electrical and miscellaneous products, and make up for the shortcomings of the metal and metal products, utility services, mineral and energy products, real estate leasing and property sectors, then solve the financing problems that are crucial to the survival of small and medium-sized enterprises through flexible fiscal and financial measures. To enhance their ability to cope with the negative technological spillover effects of USMCA.

Secondly,China must improve R&D investment, the improvement of independent innovation capability is a cumulative process from quantitative change to qualitative change, which must solidify the foundation of development. In recent years, China's R&D investment has grown faster, and the total investment in research and experimental development (R&D) in China exceeded 2.4 trillion yuan in 2020[40], but it is still inferior to developed countries. Therefore, China should continue to increase the financial investment in science and technology, and guide the whole society to increase the investment in R&D through various effective incentive policies.

Furthermore, China is supposed to improve the education and training mechanism of innovative talents. Innovation drive needs the support of talent team. In recent years, the total number of human resources and R&D personnel in China has ranked first in the world, but the structure of talents still needs to be optimized, and there are not enough high-level talents, especially innovative talents. This is related to the way we have been educated for many years, with a mature system of education and a lack of innovative talents. Therefore, while based on cultivating local talents, China should introduce overseas and returnee talents and optimize the environment for the growth of talents. Deepening the integration of science and technology with education, integrating innovation throughout the education process, and building a high level of innovative talents is the direction of future efforts.

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Finally, China should promote international cooperation, absorb international experience, and strengthen cooperation in international trade technology. Strengthening international cooperation in science and technology is an important way to make full use of global scientific and technological resources, promote the leapfrog development of China's science and technology, and enhance China's ability to innovate independently in science and technology, to increase the opening of science and technology to the outside world, mobilize and attract global high-quality scientific and technological resources, and promote the two-way flow of scientific and technological innovation factors.

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