An Empirical Analysis of the Trade Effect of the Construction of the Sino-Russian Free Trade Area Based on the Trade Gravity Model

Nan Yan

School of Economics, Harbin University of Commerce, Harbin, Heilongjiang, China

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Abstract: Based on the trade scale, trade structure, and investment cooperation development between China and Russia from 2010 to 2019, using the trade gravity model, empirical analysis of the trade effects of the establishment of a free trade area between China and Russia. The regression results show that the GDP growth of China and Russia has a significant boost to the bilateral trade volume; the changes in the exchange rate level between the two countries will have a certain impact on the bilateral trade volume; the reduction and exemption of tariffs between the two countries will have a positive effect on the growth of bilateral trade volume. Therefore, with the in-depth development of economic and trade cooperation between the two countries, the establishment of a free trade zone will have a more significant trade effect.

1   INTRODUCTION

The signing of the world's largest free trade agreement, RCEP, on November 15, 2020, indicates that China's strategy of "promoting the construction of a global-oriented high-standard free trade zone system" in 2019 is being implemented steadily. Against the background of rising global trade protectionism and the negative impact of the new crown pneumonia epidemic on trade and investment, China's active participation in bilateral or multilateral free trade areas not only helps reduce trade frictions and stabilizes the foreign trade situation, but also promotes the development of a dual cycle of domestic and foreign trade.

There have been some related academic studies on the construction of the Sino-Russian Free Trade Area. Hao Yubiao (2013) used the trade gravity model to measure the influencing factors between China and its main trading partners, and analyzed the restrictive factors of Sino-Russian trade development. (Hao, 2013) Liu Zhizhong (2017) used the revealed competitive advantage index and trade complementarity index to estimate the competitiveness and complementarity of various products in bilateral trade between China and Russia under the "One Belt and One Road" strategy. (Liu, 2017) Ling Chen (2020) comprehensively analyzed the constraints and complementary conditions for the

establishment of the Sino-Russian Free Trade Area under the opportunities of the new era, and further elaborated the specific promotion strategy. (Chen, 2020)

This article continues the above thoughts, on basis of expounding the status quo of Sino-Russian trade and investment, draws lessons from the Sino-Australian Free Trade Area, which is similar to the Sino-Russian trade structure, and uses the trade gravity model to analyze the trade effects established by the Sino-Russian Free Trade Area. Based on the above research, suggestions are given for accelerating the construction of a Sino-Russian free trade area under the new situation.

2   DEVELOPMENT STATUS OF SINO-RUSSIAN BILATERAL TRADE

2.1   The Scale of Bilateral Trade Continues to Expand, and the Growth Rate Is Relatively Slow

As shown in Figure 1, from 2010 to 2019, the bilateral trade volume rose from 55.53 billion U.S. dollars to 110.94 billion U.S. dollars, an overall increase of 99.78%. In 2019, the total bilateral trade between China and Russia increased by 3.58% year-on-year, of.
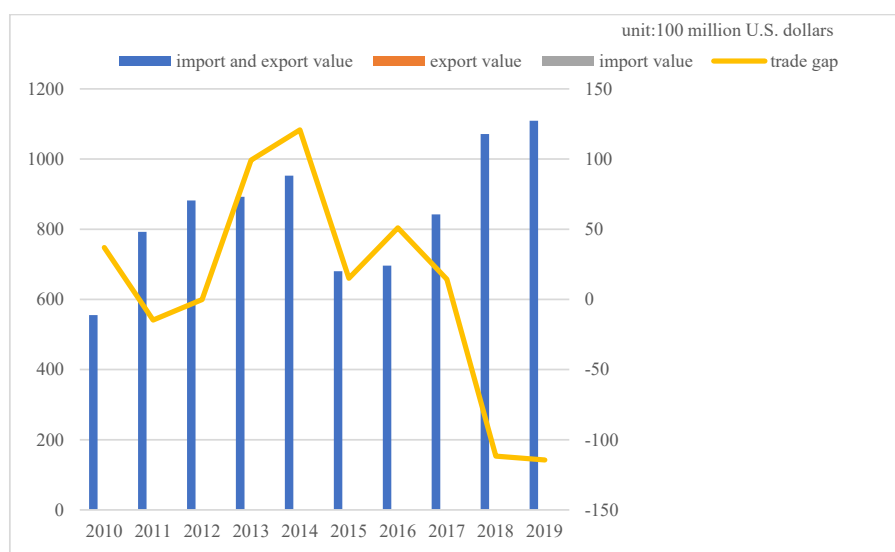
Figure 1: 2010-2019 China's trade value with Russia.

which China's exports to Russia were US$49.75 billion, a year-on-year increase of 3.71%, and imports from Russia were US$61.19 billion, a year-on-year increase of 3.47%. In terms of trade balance, the trade surplus and deficit have fluctuated. From 2013 to 2017, China was in a trade surplus position, but after 2014, the trade surplus position declined. In 2018 and 2019, China's trade deficit was 1.17 billion U.S. dollars and 11.44 billion U.S. dollars. The steady growth of trade volume in the past ten years has laid a solid economic foundation and stable cooperative relations for the construction of the China-Russia Free Trade Area. However, the scale of bilateral trade is still relatively small and the growth rate is relatively slow. It can be seen there is great room for bilateral trade to development.

2.2 The Level of Bilateral Trade Is Low and The Trade Structure Is Highly Complementary

Free trade zones are easier to establish between economies that dominate intra-industry trade. For example, the China-Korea Free Trade Zone focuses on intra-industry trade of mechanical and electrical products. According to the country-by-country trade report of the Ministry of Commerce of China, in 2019, mechanical and electrical products accounted for more than 50% of the total import and export volume of China and South Korea. The trade structure between China and Russia is similar to that of China and Australia, with inter-industry trade dominated. China mainly exports labor-intensive manufactured products such as machinery and electronics and textiles, and

imports primary energy products such as mineral products. In 2019, mechanical and electrical products, base metals and products, textiles and raw materials were the top three commodities in Russia's imports from China. These three categories of commodities together accounted for more than 60% of Russia's total imports from China. Mineral products, wood products, and mechanical and electrical products are the top three commodities in Russia's exports to China. These three types of commodities together accounted for 85.8% of Russia's total exports to China, of which mineral exports accounted for the highest proportion, reaching 75.2 %. It can be seen the low level of Sino-Russian trade and the single trade structure are not conducive to the increase of the added value of bilateral trade and the further expansion of trade scale.

Although the Sino-Russian trade structure dominated by inter-industry trade will restrict the construction of the free trade zone to a certain extent, the strong complementarity of the industrial structure and its import and export commodity structure is also the advantage of the construction of the Sino-Russian free trade zone. Russia's industrial structure is dominated by heavy industries, and it relies heavily on the export of crude oil and other energy sources to generate income. In the process of rapid economic development, China's external demand for energy resources has continued to grow. In addition, the development of Russia's agriculture and light industry is relatively lagging, and China, as a world manufacturing country, has advantages in scale, cost, and price, and can effectively meet Russia's domestic market demand. In 2019, Russia's first import from

China was mechanical and electrical products, which accounted for nearly half of Russia's total imports from China. It shows that China's mechanical and electrical products have market competitive advantages in Russia's import trade of such products. In addition, China's light industrial products such as base metals and products, textiles and raw materials, furniture, toys, miscellaneous products, plastics, rubber, shoes and umbrellas still occupy a major share of Russia's import trade. Among them, light industrial products such as furniture, toys, miscellaneous products, shoes and umbrellas account for more than half of the total imports of similar commodities in Russia's foreign trade.

2.3 The Scale of Investment Is Small, and the Areas of Cooperation Tend to Be Diversified

As shown in Figure 2, although China's direct investment in Russia fluctuated greatly from 2010 to 2019, it averaged US$987.2 million per year. Russia's direct investment in China is relatively small, but the overall trend is increasing, with an annual average of US$380.1 million. In 2019, China's investment flow to Russia was negative 379

million U.S. dollars, mainly due to the negative flow of 1.13 billion U.S. dollars in the mining industry. From the perspective of investment fields, China's investment in Russia is mainly concentrated in mining, agriculture, forestry, animal husbandry and fishery, manufacturing, wholesale and retail industries, while Russian investment in China mainly includes technology, construction, transportation and other fields. From the perspective of investment regions, due to the geographical proximity, Chinese investment in Russia is mainly distributed in Siberia and the Far East, while Russian investment in China is also mainly concentrated in China's northeastern region. From the perspective of investment entities, most of the investment enterprises are small and medium-sized enterprises. Factors affecting mutual investment between China and Russia include: the per capita GDP of the two countries, relevant policies and regulations, the state of infrastructure such as transportation and communications between the two countries, and historical factors. These factors will also restrict the level and level of the construction of the Sino-Russian free trade zone. It can be seen Sino-Russian bilateral investment cooperation has yet to be deepened, and there is great potential for development.
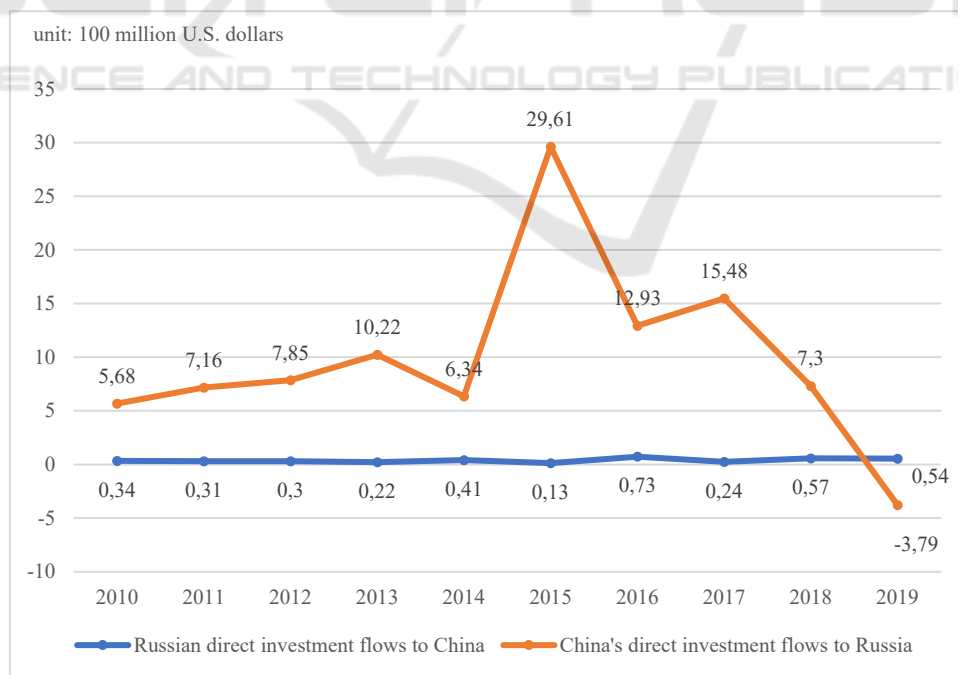

Figure 2: 2010-2019 China's direct investment in Russia and China attracts Russian direct investment flows.

3 EMPIRICAL ANALYSIS OF TRADE EFFECT BASED ON TRADE GRAVITY MODEL

3.1 Construction of Trade Gravity Model and Variable Selections

This article selects the data from 2003 to 2019, and uses the trade gravity model to empirically demonstrate the influencing factors of Sino-Russian bilateral trade, which focuses on the analysis of the impact of tariffs on trade effects.

In the China-Australia FTA, Australia's tax cut transition period is 5 years, and there are three ways to cancel tariffs: one is the 0 category, that is, when the agreement comes into force, the tariffs on products originating in China are reduced to 0; the second is the 3 category, which means that the tariffs on products originating in China will be divided three times and reduced to zero every year when the agreement comes into force; The third is the 5 category, that is, when the agreement comes into force, the tariffs on products originating in China will be divided into five times and will be reduced to zero in equal proportions every year. According to relevant simulation analysis and prediction, the China-Australia FTA will increase China's GDP by 0.33%, exports by 0.53%, and imports by 0.51% within 5 years from the entry into force of the agreement. (Zhao, 2019) Therefore, it is expected that during the construction and subsequent development of the China-Russia Free Trade Area, the gradual reduction of tariffs will promote the continuous growth of Sino-Russian bilateral trade.

In this paper, based on the trade gravity model, the expression of the trade effect between China and Russia is as follows:

$$\ln (Y_t) = \alpha_0 + \alpha_1 \ln (GDP_t) + \alpha_2 \ln (T_t) + \alpha_3 \ln (R_t) + \alpha_4 \ln (FDI_t) + \xi_t \quad (1)$$

Among them, the dependent variable is the total bilateral trade Y_t between China and Russia, and t represents the year. The independent variables are the sum of GDP_t of China and Russia, the average import tariff T_t of the two countries, the average exchange rate of RMB to ruble R_t, and the sum of the two-way direct investment FDI_t between China and Russia. ξ_t is the random error term.

In order to ensure the validity of the estimated value and regression, after the unit root test of the variables, they are all stable time series, so the phenomenon of "false regression" in the model can be avoided. The following uses Stata 14 measurement tool to perform least squares regression calculation. In the first regression, the explanatory variable $\ln (FDI_t)$ is expected to have the same sign, but the significance is not high, so it is deleted. (Huang, 2020) The results of the second regression are shown in Table 4.

The regression equation obtained from Table 4 is:

$$\ln(Y_t) = -2.13 + 1.01\ln (GDP_t) - 0.79\ln(T_t) - 0.98\ln(R_t) \quad (2)$$

This shows that in the regression results, the coefficient signs of the explanatory variables are consistent with the expected results. In addition, $\bar{R}^2 = 0.9830$, indicating that the goodness of fit of the equation is high, F = 310.20, and the P value of the F statistic is 0.0000 <0.01, indicating that the overall effect of the equation is significant. In summary, this regression is generally established and effective.

Table 1: Explanatory variables expected symbols, theoretical analysis and data sources.

Independent variable	Expected symbol	Theoretical analysis	Data Sources
GDP	+	GDP reflects the supply and demand capacity of both sides. The higher the GDP, the greater the bilateral trade volume.	World Bank
T	-	The high level of tariffs will restrict the development of trade, and the reduction or exemption of tariffs will promote the growth of bilateral trade.	World bank WITS atabase
R	-	Changes in the exchange rate level between the two countries have a certain impact on the volume of bilateral trade.	China Statistical Yearbook
FDI	+	Foreign direct investment promotes the development of bilateral trade. The greater the investment, the greater the bilateral trade.	Statistical Bulletin of China's Outward Direct Investment

Table 2: The Regression Results of the Total Volume of Sino-Russian Bilateral Trade and Its Influencing Factors.

Source	SS	df	MS			
				Number of obs	=	17
				F(3, 13)	=	310.20
Model	5.29611701	3	1.76537234	Prob > F	=	0.0000
Residual	.073983871	13	.005691067	R-squared	=	0.9862
				Adj R-squared	=	0.9830
Total	5.37010088	16	.335631305	Root MSE	=	.07544

lnY	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnGDP	1.005187	.0580552	17.31	0.000	.8797664	1.130608
lnT	-.7930366	.2025371	-3.92	0.002	-1.230591	-.3554819
lnR	-.979566	.153746	-6.37	0.000	-1.311714	-.647418
_cons	-2.12978	.9355005	-2.28	0.040	-4.150806	-.1087543

3.2 Empirical Regression Analysis

First, the GDP growth of China and Russia has a significant boost to the bilateral trade volume. When the total gross domestic product of the two countries increases by 1%, the bilateral trade volume will increase by 1.01%. Second, changes in the exchange rate level between the two countries will have a certain impact on the volume of bilateral trade. When the average exchange rate of RMB to ruble increases by 1%, the bilateral trade volume will decrease by 0.98%. Third, the reduction or exemption of tariffs between the two countries will have a positive effect on the growth of bilateral trade. When the average import tariff level of the two countries is reduced by 1%, the bilateral trade volume will increase by 0.79%. On the whole, with the in-depth development of economic and trade cooperation between the two countries, the positive effects of the establishment of a free trade zone will be further expanded.

4 CONCLUSION AND SUGGESTION

Factors affecting Sino-Russian economic and trade cooperation include: the level of economic development of both sides, exchange rates, tariff levels, relevant policies and regulations, infrastructure, and historical factors. However, the continued growth of trade and investment between the two countries, and the complementary advantages of natural resources, human resources, industrial structure, and commodity trade structure have shown a good foundation for cooperation, making the construction of a free trade zone highly feasible. At the same time, the establishment of the China-Russia Free

Trade Area will further promote the in-depth development of bilateral economic and trade cooperation. The construction of the China-Russia Free Trade Area can refer to the China-Korea Free Trade Area and the China-Australia Free Trade Area, formulate a reasonable transition period for tax reduction, optimize the trade structure, and then increase the level of trade and develop the trade potential between the two countries. The relevant countermeasures are as follows:

4.1 Optimize The Sino-Russian Bilateral Trade Structure

Products with low value-added dominate the trade structure between China and Russia, such as labor-intensive manufactured products and energy primary products. These products have low technological content and lack of core competitiveness, thus forming a single trade structure and a lower level of trade, restricting the in-depth development of bilateral trade cooperation. Therefore, the two countries should strengthen cooperation in science and technology, use technology transfer, technology licensing and other forms to promote the flow of factors such as technology, management, and talents, and increase the added value of commodities in bilateral trade, so as to achieve greater benefits. Russia has a good scientific and technological foundation in the fields of aerospace, metallurgy, and chemical industry. After the reform and opening up, China has made significant progress in technological innovation and research and development capabilities, and has great potential for cooperation with Russia in the fields of communications, aerospace, electromechanical manufacturing, and building materials. The two countries can expand new cooperation space in the fields of infrastructure construction and aerospace.

China can strengthen cooperation in production capacity through contracted projects and labor export, and at the same time strengthen cooperation in science and technology through technology trade and R&D cooperation. This can accelerate the transformation and upgrading of Sino-Russian trade, improve quality and efficiency, and optimize the bilateral trade structure, thereby improving the level and level of the construction of the Sino-Russian free trade area.

4.2 Promote the Growth of Sino-Russian Two-Way Investment

The small scale of mutual direct investment between China and Russia limits the breadth and depth of bilateral economic and trade cooperation. Under the strategic opportunity of docking cooperation between the "Silk Road Economic Belt" and the "Eurasian Economic Union", the two countries should increase two-way investment, promote the development of large projects, expand investment areas, and carry out deeper cooperation. In particular, it is necessary to strengthen investment in the field of service trade. At present, the level of service trade between China and Russia lags far behind the goods trade between the two countries, and service trade not only has the advantages of environmental protection and high added value, but also serves the goods trade and can improve trade efficiency and facilitation.

In terms of transportation, facing the pressure of poor infrastructure and interconnection between the two countries and the increasing volume of Sino-Russian cargo transactions, the two sides should vigorously develop bilateral cooperation in the logistics industry, shorten the time of cargo transportation, and improve transportation efficiency. In terms of transportation, facing the pressure of poor infrastructure and interconnection between the two countries and the increasing volume of Sino-Russian cargo transactions, the two sides should vigorously develop bilateral cooperation in the logistics industry, shorten the time of cargo transportation, and improve transportation efficiency. In terms of payment settlement, the two parties should deepen cooperation in finance, insurance, consulting and other industries, further standardize bank settlement, and reduce the import and export risks of bilateral enterprises. In terms of investment consulting, there are situations in which Chinese and Russian companies have incomplete and inadequate understanding of each other's market information. Intermediary agencies with high authority are needed to provide investors with information on the other party's investment environment and government policies.

4.3 Extend the Transition Period for Tax Cuts

In the China-Russia FTA tariff reduction plan officially implemented in July 2017, the two countries implemented tariff reduction plans for approximately 7,000 tax items, laying a good foundation for further tax reduction arrangements between the two countries. Judging from the current trade structure between the two countries, among China's exports to Russia, food, ceramics, mechanical and electrical products, and transportation equipment have obvious market competitive advantages. However, among Russia's exports to China, the competitiveness of Russia's exports is relatively weak, and Russia's status in China's import trading partners continues to decline. The overall and rapid reduction of tariff rates will reduce the income effect brought by Russia to Russia more than the reduction brought to China, which shows that China-Russia negotiations on tariff concessions are still facing inevitable resistance. Therefore, both parties need to appropriately extend the transition period of tax reduction, which can refer to the tax reduction arrangements of China-Australia and China-Korea FTA.

Based on the comparison of the strengths and weaknesses of their own products between China and Russia, trade commodities are divided into general commodities, sensitive commodities and highly sensitive commodities to determine different tariff rates. For general goods, tariffs can be reduced significantly in a relatively short period of time; for sensitive goods, tariffs can be reduced in equal proportions every year within 5 years; for highly sensitive goods, the existing tariff rates can be maintained, and then tariffs can be reduced in a timely manner by dynamic classification. In this process, China can appropriately relax tariff restrictions on superior products and reach a list of tariff concessions within the scope of commodities acceptable to Russia. After that, gradually expand the range of goods subject to tariff reduction. For sensitive areas in the longer transition period, the two sides will gradually release the agreement according to the effective time of the agreement. Finally, the overall tariff level will be reduced to 5% within 10 years.

4.4 Innovative Trade Policy System

In Due to the differences in economic scale and industrial structure between China and Russia, the negotiation process of the free trade agreement will be relatively slow. However, the mutual political trust between the two countries, the continuous growth of

bilateral trade and investment, and other complementary advantages have laid a realistic foundation for the construction of the free trade zone. In the negotiation process, it is necessary to learn from the experience of establishing a free trade area between China and RCEP member states, but also to conform to the specific conditions of the construction of a Sino-Russian free trade area. The main topics of the free trade agreement are related arrangements such as trade in goods, trade in services, and investment liberalization. In the free trade agreement negotiations between China, Vietnam, Singapore and other countries, trade in goods is the main topic. The determination of the main topic is related to the trade structure of the two countries. Therefore, in the negotiation of the China-Russia Free Trade Agreement, the subject of the agreement can be determined as trade in goods, and the tariff concession list will be included as an annex to the agreement. In terms of service trade and investment, China and Singapore negotiated separately after the conclusion of the main agreement and made it a part of the free trade agreement. Taking into account that the development of service trade and investment between China and Russia is not yet mature, the relevant provisions of service trade and investment can be stipulated in the free trade agreement first, and then implemented when the time is ripe.

In addition, a settlement mechanism for Sino-Russian trade disputes should be established in advance. In recent years, there have been more and more trade disputes between China and the United States, ASEAN countries and other countries. For this reason, it is necessary for the establishment of a Sino-Russian free trade zone to formulate an effective plan to prevent and resolve trade disputes in advance. In addition, China should also establish a supervisory mechanism and a preventive mechanism. On the one hand, we should be familiar with Russian law and have relevant information, fully understand the situation of the other party, respond quickly and have effective evidence when there is a trade dispute, and strive for the initiative. On the other hand, we should also establish risk awareness, strengthen self-prevention, and combine the power of the government with the power of enterprises to prevent problems before they occur.

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