



# Analysis of Trade Dependency between China and Northeast Asian Countries under the Perspective of The Belt and Road Initiative

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**Abstract.** Starting from The Belt and Road Initiative, based on the import and export trade volume and other related indicators between China and Northeast Asian countries from 2015 to 2022, the Comprehensive trade share index, Trade Intensity index and HM index are used to analyze the trend of trade dependence between China and Northeast Asian countries. The study shows that with the promotion of The Belt and Road Initiative, the trade scale between China and Northeast Asian countries has been expanding year by year, the trade dependence has been increasing, and the trade relationship has become increasingly close, but the trade dependence has obvious asymmetry.

**Keywords:** The Belt and Road, Northeast Asian trade, Trade Dependency

## 1 INTRODUCTION

Since the Chinese government put forward The Belt and Road Initiative in 2013, as of October 2023, 152 countries have signed cooperation documents on The Belt and Road Initiative with the China. As a member of the Northeast Asian region, China has been committed to building a Northeast Asian community of destiny and promoting the construction of The Belt and Road Initiative and cooperation in Northeast Asian economic development.

This paper analyzes the trade dependence between China and the countries in Northeast Asia based on the 2015-2022 Statistical Yearbook, China Customs, the World Bank database, and the total import and export amount between China and the five countries in Northeast Asia as well as the world, and analyzes the trade dependence between China and the countries in Northeast Asia by using the Comprehensive trade share index, the Trade Intensity, and the HM index to explore the impact of the "Belt and Road Initiative" on the trade relations between China and the countries in Northeast Asia. The impact of The Belt and Road initiative on the trade relations between China and Northeast Asian countries is analyzed.

## 2 OVERVIEW OF THE STUDY AREA AND ANALYTICAL METHODS

### 2.1 Overview of the study area

In terms of the level of economic development, the economic level of the Northeast Asian region varies greatly, and the economic development and industrial structure of each country is different and has a certain degree of complementarity<sup>1</sup>.

Under the background of the construction of The Belt and Road Initiative, the trade between China and Northeast Asian countries has been deepening, and as of 2023, the five Northeast Asian countries, except Japan and North Korea, have signed the cooperation documents of The Belt and Road Initiative with China. According to the import and export data of both sides, the import and export trade volume between China and the five countries in Northeast Asia has been on an upward trend from 2015 to 2022, and the total import and export trade volume between China and the five countries in Northeast Asia in 2022 reached 918.816 billion dollars, accounting for about 15% of China's total foreign trade volume in the same period.

### 2.2 Analytical methods

Trade dependence refers to the degree of dependence of a country's trade on another country's market, due to differences in comprehensive national power and other differences in trade dependence of the two countries, there will be asymmetry, so through the trade dependence between countries to analyze the trade relationship between the two countries.

Currently there are three main approaches to the measurement of trade dependence:

First, the Comprehensive trade share index can reflect the degree of closeness between the two countries, the larger the value, the closer the trade relationship between the two countries, the formula is<sup>2</sup>:

$$S_{AB} = \frac{X_{AB} + Y_{AB}}{X_A + Y_A} + \frac{X_{BA} + Y_{BA}}{X_B + Y_B} \quad (1)$$

Trade Intensity can measure the degree of closeness between the two countries, if the result of the calculation is greater than 1, it means that the two countries have high trade intimacy, the formula is<sup>3</sup>:

$$TI_{AB} = \frac{X_{AB}/X_A}{Y_B/(Y_W - Y_A)} \quad (2)$$

Hubness Measurement (HM index) can reflect the dependence of trade asymmetry, the value of the formula range of [0,1], the higher the result of its calculation, it means that a country's exports for the market of country B the higher the degree of dependence, the calculation formula is<sup>4</sup>:

$$HM_{AB} = \frac{X_{AB}}{X_A} \times \left(1 - \frac{Y_{AB}}{Y_A}\right) \times 100\% \quad (3)$$

Note:  $X_{AB}$  and  $Y_{AB}$  are the exports and imports of country A to country B;  $X_{BA}$  and  $Y_{BA}$  are the same;  $X_A$  and  $Y_A$  are the total exports and imports of country A, respectively;  $X_B$  and  $Y_B$  are the same; and  $Y_W$  represents the total global imports in the same period.

### 3 TRADE DEPENDENCE MEASUREMENT AND ANALYSIS

#### 3.1 Trade dependency

According to the formula and the relevant values, the Comprehensive trade share index and TI of China and the five countries in Northeast Asia from 2015 to 2022 can be calculated respectively in Table 1 and Table 2. From the values, it can be seen that the Comprehensive trade share index of China and the five countries in Northeast Asia in general maintains at the average level and the TI is greater than 1, which indicates that in recent years China and the five countries in Northeast Asia have had a closer trade relationship.

The Belt and Road Initiative is the most prominent trade relationship between China and Russia in terms of the time when the policy has been put into practice; in 2015, China and Russia signed a joint statement on the docking cooperation between the construction of the Silk Road and the Eurasian Economic Union, and in 2018, they realized the docking between the Eurasian Economic Union and the Belt and Road Initiative. Therefore, the Comprehensive trade share index between China and Russia has increased from 0.14 to 0.25, an increase of nearly 80%, and the TI has increased from 1.20 to 1.73. This shows that the trade relationship between China and Russia has become closer under the guidance of The Belt and Road Initiative.

**Table 1.** Comprehensive trade share index between China and five Northeast Asian countries, 2015-2022.

	2015	2016	2017	2018	2019	2020	2021	2022
<b>Russian</b>	0.14	0.17	0.16	0.18	0.19	0.21	0.21	0.25
<b>Japan</b>	0.29	0.29	0.29	0.29	0.29	0.32	0.30	0.27
<b>Mongolia</b>	0.64	0.56	0.61	0.62	0.60	0.53	0.57	0.58
<b>South Korea</b>	0.36	0.35	0.33	0.34	0.33	0.35	0.34	0.31
<b>Korea</b>	0.62	0.83	0.90	0.85	0.86	0.62	0.42	0.66

Source of data: Summarized from China Customs and Worldbank databases.

**Table 2.** China's Trade Intensity with Five Northeast Asian Countries, 2015-2022.

	2015	2016	2017	2018	2019	2020	2021	2022
<b>Russian</b>	1.20	1.36	1.28	1.38	1.36	1.29	1.31	1.73

<b>Japan</b>	1.39	1.49	1.46	1.40	1.38	1.38	1.27	1.23
<b>Mongolia</b>	2.75	2.06	2.04	2.00	2.07	1.87	1.91	2.11
<b>South Korea</b>	1.54	1.61	1.54	1.45	1.53	1.47	1.41	1.41
<b>Korea</b>	4.06	5.59	6.14	6.04	5.99	3.89	2.29	4.00

Source of data: Summarized from China Customs and Worldbank databases.

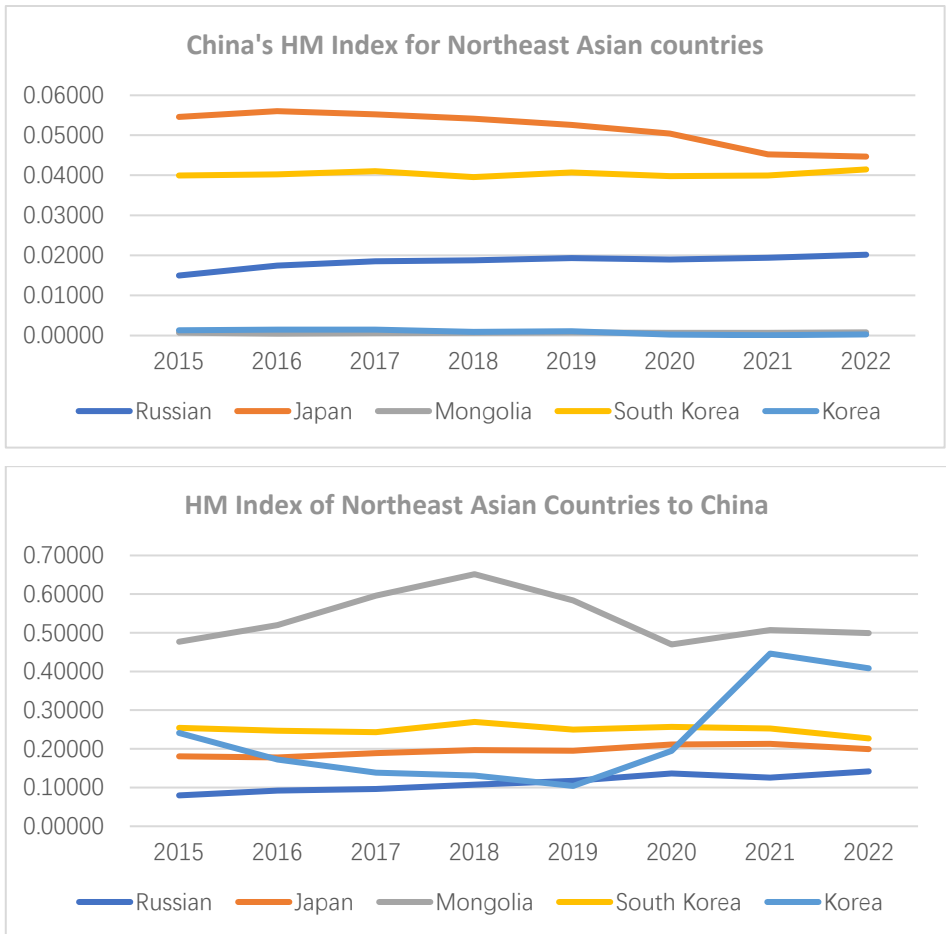
Numerically, North Korea has the largest Comprehensive trade share index and Trade Intensity mean value with China, which are 0.72 and 4.75 respectively, but the higher trade dependence between China and North Korea is mainly caused by North Korea's unilateral dependence on China's imports and exports. Secondly, Mongolia's comprehensive trade share and the average value of Trade Intensity with China also reached 0.59 and 2.11. Since the signing of the Belt and Road Initiative cooperation document between Mongolia and China in 2017, the total import and export volume of China to Mongolia reached 7.989 billion U.S. dollars in 2018, and the import and export volume of China to Mongolia has reached 12.197 billion U.S. dollars as of 2022, which shows that the trade volume in the "The Belt and Road Initiative" the trade dependence between China and Mongolia has increased significantly.

In terms of index changes, since the signing of the Memorandum of Understanding on The Belt and Road Initiative between China and South Korea in 2015, South Korea and China's Comprehensive trade share index and Trade Intensity have changed the least, which indicates that South Korea's trade relationship with China is relatively close, and it is China's most important trade partner in the Northeast Asian region at present.

### 3.2 Dependence on symmetry

Numerically, there is an obvious asymmetry in the trade dependence between China and the five countries in Northeast Asia, the dependence of China on the other five countries is much smaller than the dependence of the other countries on China. From the trend of change, after joining The Belt and Road Initiative, the HM indexes of Russia, South Korea, Mongolia and China show a rising trend, which indicates that China's trade dependence with Northeast Asia has been somewhat improved in this context. Among them, the HM index of China and Russia has increased the most, the HM index of Russia to China from 2015-2022 increased from 0.015 to 0.02, an increase of about 33%, while the HM index of China to Russia increased from 0.08 to 0.14, an increase of 75%, which shows that the degree of economic and trade exchanges between China and Russia continues to deepen. As show in figure 1.

**Fig. 1.** Mutual HM Index between China and Northeast Asian countries.



Source of data: Summarized from China Customs and Worldbank databases.

#### 4 CONCLUSIONS

The Belt and Road Initiative is an important policy of China's opening-up in the past ten years, and it has become an international public product and international public platform recognized by the world<sup>5</sup>. As one of the main regions of Asian economic development, Northeast Asia has gradually expanded its international influence and occupies an important position in the world's political and economic pattern, and it is also one of the important regions for the development and urgent expansion of the current and even future The Belt and Road world pattern, so the study of trade dependence between China and Northeast Asian countries is of great significance to China's future regional development and comprehensive opening up. Therefore, the study of trade

dependence between China and Northeast Asian countries is of great significance to China's future regional development and comprehensive opening up, and the results of the study are as follows:

Since 2015, China's total trade with Northeast Asian countries has been increasing. The countries that account for the largest share of trade transactions are Russia, South Korea, and Japan, while the share of trade transactions with North Korea and Mongolia is smaller, but also increasing overall; the degree of interdependence between China and Northeast Asian countries is growing, but there is an obvious asymmetry in the degree of trade dependence. As The Belt and Road Initiative advances, trade relations between China and Northeast Asian countries will become increasingly close.

In response to the above findings, the following two suggestions are made: on the one hand, countries should make good use of The Belt and Road Initiative to strengthen the joint construction of infrastructure. At present, there is still room for infrastructure development in Northeast Asia, and China can make good use of its own infrastructure advantages and the resource advantages of the Northeast Asian region to promote the construction of railroads, ports, and aviation, which will not only improve the platform foundation for China's realization of the "Northeast Asian Community of Destiny", but also bring more employment opportunities to the Northeast Asian region, realizing a win-win situation.

On the other hand, it is necessary to strengthen trade and cultural exchanges between countries to reduce trade friction. China needs to emphasize the basic starting point of the concept of The Belt and Road Initiative of interconnectivity and mutual benefit, to achieve communication and interoperability on the basis of transportation interoperability, and to do a good job in economic and cultural exchanges such as the Northeast Asia Expo and the Northeast Asia Economic Forum, in order to deepen the cooperation and create a good atmosphere.

## ACKNOWLEDGEMENT

Project Fund: 2022 Scientific Research Project of Jilin Provincial Department of Education (JKH20220250K).

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