

## Analysis of trade competitiveness and complementarity between China and EAEU

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**Abstract:** Under the Belt and Road Initiative, Central Asia, West Asia, the Caucasus region and all the member states of the Eurasian Economic Union (EAEU) are along B&R. With the signing of "Joint statement between People's Republic of China and Russian Federation on the construction of the Silk Road Economic Belt and the construction of the Eurasian Economic Union," the economic cooperation between China and EAEU has attracted the attention of many countries. To provide theoretical support for promoting the docking of B&R Initiative and "One Belt and One Alliance," it is of necessity to analyze the status quo, competitiveness, complementarity of the bilateral trade. Using RTA, ESI, TCI, GL, based on data from UNCOMTADE database, this paper makes an analysis on the competitiveness and complementarity of the bilateral trade between China and EAEU with the UN standard international trade classification method, so as to find out the present features of this bilateral trade and put forward useful suggestions.

### 1. The Status quo of trade cooperation between China and Eurasian Economic Union

#### 1.1 Total volume analysis of import and export trade

In the past ten years, China's import and export trade volume with EAEU has been increasing, and both of them are in the form of rising fluctuation. Among the five countries, Russia accounts for the most significant proportion, followed by Kazakhstan, Belarus, Kyrgyzstan, and China's import and export volume to Armenia is the smallest compared with other four countries. From the perspective of total import and export trade, due to the impact of the financial crisis, China's trade volume with the EAEU members declined to varying degrees in 2008-2009 but then increased in the following five years. Due to the complex and changeable international situation, it fluctuated in 2013-2014. We found that the import and export trade volume between China and EAEU is mainly affected by the trading volume between China and Russia, which also shows that Russia occupies a critical economic position in the development of EAEU.

#### 1.2 Analysis of Trade balance (Net Export) status quo

The trade balance refers to the difference between a country's total export and total import within a certain period of time, which is used to indicate the foreign trade balance of a country, that is the total export value > total import value - trade surplus & surplus; Total value of exports < total value of imports - trade deficit & surplus. By analyzing the trade balance in the past ten years, it is helpful to expand the space and scope of bilateral trade and cooperation. Take Russia as an example. In the past ten years, China's imports and exports to Russia have been larger than imports, resulting in a trade surplus. The trade balance was not evident from 2008 to 2012, gradually increased since 2013, but still in a reasonable state of change.

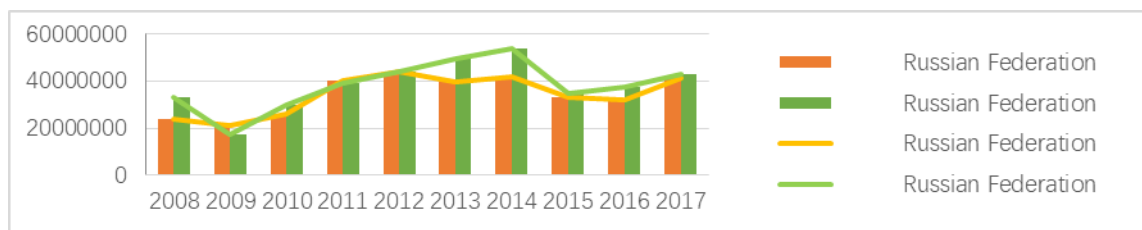


Fig. 1 China and Russia trade balance analysis

As is shown in the figure above, after comparing the other five countries in the same way, except for 2013-2015, China's exports to Kazakhstan are higher than imports, and China is in a surplus position. China's imports and exports to Belarus are mainly in surplus, but volatility has been rising reasonably. China has been running a surplus with Kyrgyzstan too, and the trade balance is relatively large, but the import and export volume of both sides are also on the rise. China has a trade deficit with Armenia since 2014, but the trade volume is rising very fast and showing a growing development momentum.

Generally speaking, China has been running a trade surplus with the EAEU members, which fluctuates in some years, but as usual and reasonable, and the trade scale keeps expanding and climbing year by year, which indicates that China and EAEU are in a sound state of healthy development.

### 1.3 Merchandise structure analysis

In recent ten years, China's imports and exports to Russia are mainly manufactured products. The other four countries import primary products and export machinery and transport equipment. EAEU countries export more products to China, such as processed materials and fossil fuels. China has excellent advantages in mechanical transportation equipment. From the above commodity structure analysis, the trade needs of both sides are highly complementary, which is conducive to long-term cooperation and win-win cooperation with both sides.

Table 1 Trade structure of import and export commodities between China and EAEU based on Standard International Trade Classification (SITC)

	Mainly Import	Mainly Export	Trade Surplus	Trade Deficit	Trend
<b>China - Russia</b>	SITC0 SITC2 SITC3 SITC5 SITC6 SITC8	SITC1 SITC7 SITC9	√		Rising
<b>China-Kazakhstan</b>	SITC0 SITC2 SITC3 SITC4 SITC8	SITC1 SITC5 SITC7 SITC9	√		Rising
<b>China - Belarus</b>	SITC2 SITC5	SITC7 SITC8	√		Rising
<b>China-Kyrgyzstan</b>	SITC4 SITC6 SITC8	SITC1 SITC7	√		Rising
<b>China-Armenia</b>	SITC0	SITC7 SITC9	√		Rising

From the perspective of the import and export trade volume and its development trend of China and the Eurasian economic union, Russia and Kazakhstan are the main trading partners of China in recent years. From the data analysis of the past ten years, the import and export trade volume of China and the other three countries increases faster and has a good development prospect.

## 2. Competitive and complementary analysis of trade cooperation

### 2.1 Trade competitiveness analysis based on RTA ESI trade index

Due to the apparent differences between China and EAEU countries in economic development level and resource endowment, countries have different explicit comparative advantages in different kinds of commodities. Therefore, in order to more accurately measure the trade competitiveness between China and EAEU countries, Relative Trade Advantage (RTA index) and Export Similarity

Index (ESI index) are adopted to estimate the trade competitiveness between China and EAEU countries.

### 2.1.1 Relative Trade Advantage (RTA)

Relative Trade Advantage is used to measure the trade competitiveness of a country in a specific category or commodity. The formula is as follows:

$$RTA_{ij} = \frac{X_{ij}/X_{rj}}{X_{it}/X_{rt}} - \frac{Y_{ij}/Y_{ri}}{X_{it}/Y_{rt}}$$

$X_{ij}$  Is the export amount of category j products of country i,  $X_{it}$  is the amount of exports of all other products of country i,  $X_{rj}$  is the export amount of category j products in other countries except i,  $X_{rt}$  is the amount of all other products exported by countries other than country i, Y means import, its subscript has the same meaning as the X subscript.  $RCA > 0$  means that a particular product of country i has a comparative advantage and is competitive with that of another country.  $RTA < 0$  means that certain products of country i have no comparative advantage and are not competitive. After the above calculation, the list is as follows:

Table 2 Commodities with relative trade advantage

Country	$0 \leq RTA < 0.5$	$0.5 \leq RTA < 1$	$1 \leq RTA < 2$	$RTA < 2$
<b>China</b>	SITC0 SITC5	—	SITC7	SITC6 SITC8
<b>Russia</b>	SITC2	SITC9	SITC6	SITC3
<b>Kazakhstan</b>	SITC2 SITC6	—	—	SITC3
<b>Belarus</b>	SITC5 SITC7	SITC8	—	—
<b>Kyrgyzstan</b>	SITC0 SITC2 SITC8 SITC9	—	—	—
<b>Armenia</b>	SITC0 SITC9	—	—	—

It can be seen from the analysis results: first, China's comparative advantage in labor-intensive products in the material category of finished goods and miscellaneous products shows a trend of decreasing volatility. Second, Russia and Kazakhstan have the most apparent advantages in the commodities of fossil fuels in primary products, and the trade advantages generally show an inverted u-shaped development trend. Third, Belarus's trade advantage in capital-intensive chemicals and machinery and transport equipment has been growing, while Belarus's trade advantage in miscellaneous products has been on the rise. Fourth, the trade advantages of Kyrgyzstan and Armenia in food and livestock products show a fluctuating trend, but the fluctuation range is not significant. Among capital-intensive products, gold resources are abundant, and the trade advantages show a rising trend.

### 2.1.2 Export similarity index (ESI) analysis

Export Similarity Index analysis (ESI index) analyzes the similarity of export commodity structure to judge the competitive relationship between the two countries in the market. The calculation formula is as follows:

$$ESI_{ij} = \left\{ \sum_{k=0}^n \left[ \left( \frac{S_{ik}^v + S_{jk}^v}{2} \right) \times \left( 1 - \left| \frac{S_{ik}^v - S_{jk}^v}{S_{ik}^v + S_{jk}^v} \right| \right) \right] \right\} \times 100\%$$

$S_{ik}^v$  represents the proportion of the amount of v commodity in the products of country i's export market k,  $S_{jk}^v$  represents the proportion of the amount of v commodity in all products exported by country j to market k. The ESI value varies from 0 to 100. The higher the ESI value is, the higher the similarity of the export structure of the two countries' products and the fiercer the competition. The lower the value, the stronger the complementarity of the commodity structures exported by the two countries to the same market.

According to the analysis, the index of trade export similarity between China and EAEU members is all below 30, which indicates that the similarity of product export structure between

China and EAEU and its member countries is low and the competitiveness in the same market is weak.

## 2.2 Trade complementarity analysis based on the TCI GL trade index

### 2.2.1 Trade Complementarity Index (TCI)

The TCI index measures the degree of complementarity and closeness of trade based on comparing the comparative advantages of import and export of respective countries and is used to measure the complementarity of commodity trade. The calculation formula is:

$$TCI_{ij}^v = RCA_{xi}^v \times RCA_{yj}^v \quad RCA_{xi}^v = \frac{S_{iv}}{S_{it}} \quad RCA_{yj}^v = \frac{L_{iv}}{L_{jt}}$$

$RCA_{xi}^v$  is the comparative advantage of country i in export commodity v,  $S_{iv}$  is the ratio of the amount of v product exported by country i to the total amount of v product exported in the world;  $S_{it}$  is the proportion of the total export value of country I in the total export value of world products;  $L_{iv}$  is the proportion of the amount of v product imported by country j in the amount of v product imported by country j in the world;  $L_{jt}$  is the proportion of the total amount of products imported by country j in the total amount of products in the world. If the export of one country matches the import of the other, the TCI of both countries will be larger, and vice versa. It is generally believed that  $TCI > 1$  indicates that the import and export complementarity of the two sides is higher than other levels of the market, and the trade relationship is relatively close, while  $TCI < 1$  indicates the opposite.

Table 3 Commodity trade complementarity

	TCI<1	TCI>1	Import and export complementarity	Trading association
China - Russia		√	Above the rest of the market	Closely related
China-Kazakhstan		√	Above the rest of the market	Closely related
China - Belarus		√	Above the rest of the market	Closely related
China-Kyrgyzstan		√	Slightly above the rest of the market	Relatively close
China-Armenia	√		Lower than the rest of the market	Loosely

From the analysis results, China's trade with Russia, Kazakhstan, and Belarus are highly complementary, with the TCI index above 1. The trade complementarity between China and Kyrgyzstan is weaker among the five EAEU countries. Trade complementarities between China and Armenia have been gradually increasing since 2013. Among the EAEU countries, Russia, Kazakhstan, and Kyrgyzstan are highly complementary to China in trade, with the TCI index of China exceeding one except for some years, while Belarus and Armenia are less complementary to China in trade, especially Armenia's TCI index is low. From the perspective of trade trend, trade complementarity between China and EAEU countries is gradually strengthened in fluctuation, but the growth rate is relatively limited. From the perspective of trade structure, the complementarity of trade between China and EAEU countries mainly lies in SITC6, SITC7, and SITC8. On SITC8, China is highly complementary to Kazakhstan and Armenia. The trade complementarities of EAEU countries to China vary from country to country: the main advantages of Russia and Kazakhstan in trade with China are concentrated on SITC3. Secondly, SITC2 and SITC6 are highly complementary to China. Belarus's trade complementarities with China mainly focus on SITC1 and SITC5, Kyrgyzstan's trade advantages with China focus on SITC0 and SITC1, and Armenia's trade advantages focus on SITC1.

### 2.2.2 Grubber - Lloyd's intra-industry trade index (GL)

The GL index was proposed by Gruber and Lloyd (1975). According to them, trade is generated within and between industries, and the formula is:

$$GL_v = \frac{(X_v + Y_v) - |X_v - Y_v|}{X_v + Y_v}$$

$X_v, Y_v$  Is the export and import volume of a specific industry or a specific commodity  $v$ .  $GL_v$  between 0 and 1, When  $X_v=0$  or  $Y_v=0$ ,  $GL_v=0$ , All trade is inter-industry trade,  $GL_v>0.5$  means dominant intra-industry trade,  $GL_v<0.5$  means dominant inter-industry trade.

According to the GL index analysis table, firstly, trade between China and EAEU is mainly intra-industry trade. Among the member states of EAEU, China and Russia mainly engage in intra-industry trade, while with Kazakhstan, except for some years in 2014 and 2015, the other years mainly involve inter-industry trade. Moreover, with Belarus, Kyrgyzstan, Armenia three countries are mainly inter-industry trade. Second, in terms of the categories of trade goods, the trade between China and EAEU industries mainly focuses on SITC2, SITC3, and SITC4 in primary products, SITC7, and SITC9 in capital-intensive products, and SITC8 in labor-intensive products. Third, from the point of view of development trend, China and the Eurasian economic union countries, in addition to Russia to present the fluctuation trend of inner industry trade, and the other four industry trade between member countries are present, and in addition to Kazakhstan and Belarus in individual years showed a trend of increasing, the GL index value all showed a trend of decline, suggest that China and the Eurasian economic union countries mainly inter-industry trade trends continue to strengthen. It can be seen from the above analysis that China and the EAEU member countries, except Russia, are mainly engaged in inter-industry trade with the other four countries, which fully reflects the trade complementarity.

Table 4 GL index of China and EAEU countries

Country	Interindustry dominant commodity category	Dominant product categories in the industry	Overall	Tendency
China - Russia	SITC1 SITC3 SITC7 SITC8	SITC0 SITC2 SITC4 SITC5	intra-industry	Increasing
China-Kazakhstan	SITC1 SITC2 SITC3 SITC4 SITC7 SITC8	SITC0 SITC5 SITC6 SITC9	intra-industry	Increasing
China - Belarus	SITC0 SITC1 SITC2 SITC3 SITC4 SITC6 SITC7 SITC8 SITC9	SITC5	intra-industry	Decreasing
China-Kyrgyzstan	SITC0 SITC1 SITC3 SITC4 SITC5 SITC6 SITC8	SITC2 SITC7 SITC9	inter-industry	Decreasing
China-Armenia	SITC1 SITC2 SITC3 SITC6 S ITC7 SITC8 SITC9	SITC0 SITC4 SITC5	inter-industry	Decreasing

### 3. Conclusion and suggestion

#### 3.1 Conclusion

From the perspective of trade competitiveness, the trade between China and EAEU countries is weak, and it can be considered that trade is not competitive.

From the comprehensive comparative advantage index of trade, China's commodity trade advantage is mainly concentrated in labor-intensive products: finished products classified by materials and miscellaneous products, as well as capital-intensive products machinery and transportation equipment. The commodity trade advantage of Russia and Kazakhstan is concentrated on primary product mineral resources. Except for some competition with Russia in manufactured goods classified by materials, other categories of goods are less competitive and almost negligible.

From the index of trade export similarity, the similarity of product export structure between

China and EAEU and its member countries is low and shows a gradual weakening trend, which fully shows the trend of decreasing trade competitiveness between China and EAEU countries.

In terms of trade complementarity, trade complementarity between China and EAEU countries has been continuously strengthened. According to the trade complementarity index, China's trade with Russia, Kazakhstan, and Belarus are highly complementary. Among the EAEU countries, the trade complementarity of Russia, Kazakhstan, and Kyrgyzstan to China is relatively stable, and the trade complementarity between China and EAEU countries gradually strengthens in the fluctuation.

From Gruber's intra-industry trade index, the league of China and the Eurasian economic trade mainly intra-industry trade, the trend in addition to the fluctuation of industry inner trade growth was registered in China and Russia, Kazakhstan and Belarus and individual years showed a trend of increasing, the other GL index value all showed a trend of decline, suggest that China and the Eurasian economic union countries mainly inter-industry trade trends continue to strengthen. In a word, the trade characteristics between China and EAEU countries are dominated by complementarity. Although the trade volume between China and EU countries has fallen due to the impact of the world economic downturn, the potential for trade cooperation between China and EAEU countries in the future is still huge.

### **3.2 Put forward countermeasures and Suggestions for the challenges between China and EAEU**

Although China and the Eurasian economic union has a strong trade complementarities, but in the world economic downturn and the reality of the trade barrier gradually increase under the influence of factors, to maximize the potential release of trade between China and the Eurasian Economic Union countries, this article from the political, economic, social, technology from four aspects to the challenges of related Suggestions are put forward.

Under the framework of the "One Belt And One Road" initiative and the integration of the belt and the union, we can carry out all-round and multi-field trade cooperation with the countries.

Through top-level design, countries can provide policy support for commodity trade at the national level and formulate overall plans for trade development direction by taking advantage of their own comparative advantages

The cooperation between China and EAEU in trade in goods, trade in services and economic cooperation is developing rapidly. We can continuously develop the potential sectors of our development cooperation with the EAEU and broaden the development channels.

We could focus on specific projects and form high-level economic and trade cooperation that matches our political friendship.

For a long time, there has been a mismatch between China's economic and trade cooperation and the bilateral comprehensive strategic partnership of coordination, especially between China and Russia. Based on existing industrial parks and cross-border economic cooperation zones, we will open up new ways of cooperation in industrial parks and industrial chains with distinctive features.

To deepen bilateral technical cooperation, the EAEU member countries have great differences in their economic development, which determines that bilateral economic cooperation covers a broader range, including processing technology in the production field, high-end research and development, and scientific and technological cooperation.

Cross-border e-commerce platform between China and Eurasian union countries requires innovative technological products such as communication technology, information exchange, policy governance and industrial development. The development of infrastructure and connectivity projects will promote the long-term development of bilateral cooperation.

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