Analysis of Sino-Indian trade structure based on the Belt and Road Initiative

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Abstract: The structure of trade commodities can reflect the trade relations, trade interests and specific positions of the international division of labor between the two countries. India is an important trading partner of China. Significance. Therefore, use the data of sitc rev.4 to analyze the trade structure of China-India commodities, and construct a model to conduct an empirical analysis of the main factors affecting the trade structure of China-India commodities. From the empirical results, China ’s export commodities structure lags behind by one order Items, direct investment in India, patent application grants, China-India industry trade index and other four variables are more significant. After data compilation, after stability analysis, ARDL modeling is performed to obtain the results.

1. Introduction

2018 is the 68th anniversary of the establishment of diplomatic relations between China and India. At present, China and India are the two largest developing countries in the world and are developing the fastest. The geographical location of the two countries is close, so the industrial structure will have many similarities. Although the international trade volume of the two countries is not very large, an analysis of the trade structure of the two countries and the use of their own advantages can better promote the trade development of China and India. Therefore, it is particularly important to study the trade commodity structure of China and India. We can see the technical level of various commodities in foreign trade, the industrial structure of a country, the degree of future economic development and the direction of adjustment. This article studies the influencing factors of the development of trade between the two countries by analyzing the structure of commodities. The results show that the China-India commodity trade structure is related to the first-order lagging items of the export structure, the number of patent applications granted, foreign direct investment, and the development of the Belt and Road Initiative has promoted the continuous development of China-India trade and not only helped China's industrial structure upgrade. At the same time, China's rich experience and technology have driven the development of related industries in India, achieving mutual benefits while achieving a win-win situation.

Since 2008, the outbreak of the financial crisis has slowed the development of the world economy. With the continuous development of economic globalization, no country can stay out of the situation. The Chinese economy is growing steadily, and during President Xi’s visits to Central and Southeast Asia in September and October 2013, he proposed the strategic concept of building the "Silk Road Economic Belt" and the "21st Century Maritime Silk Road". As a geographically adjacent country with China, from a historical perspective, India played a very important role in both the ancient Northern Silk Road and the Southern Silk Road[1]. In the new era of the "Belt and Road" strategy, India's status is equally important . Therefore, an in-depth study of the structure of Sino-Indian trade commodities has a major impact on China-India economic and trade cooperation. Many scholars have done a lot of research on China-India trade commodity structure. Zhu Shujin, Chen Yan, Xie Rui(2009)[2] .Based on the export product data of China and India classified by SITC REV.2.3 digits, the changes before and after the export trade between the two countries are analyzed. Between them does not constitute complete trade competition, but there is a clear upward trend of complementarity. Song Zhouying, Han Mengyao (2019)[3].From Starting from a trade

perspective, it analyzes the development trend of China-India trade relations, discusses the structure of China-India trade commodities and sensitive industries, evaluates the leading role of China-India trade in the economic development of the two countries, and introduces China-India trade Economic pull. Ma Yuxia, Li Ying, Chen Jing (2008)4].Quantitative analysis of China-India trade at this stage through the TB index, RCA index and IIT index shows that China has a comparative advantage in India's merchandise trade. Xu Xiaoqiong, Cai Dongmei(2016)[5] The competitiveness and complementarity of China-India trade are studied through five indicators. It is believed that the structure of China-India trade is somewhat competitive, but there is also great complementarity. Chang Jing, Li Zhongbin(2007)[6].Through the two countries The structural analysis of merchandise trade proposes countermeasures for developing Sino-Indian trade. Liu Yang(2019)[7].In the context of the "Belt and Road", the status of China-India trade cooperation and existing bottlenecks were analyzed, and countermeasures for deepening China-India cooperation were put forward. Gao Yang, Hu Ruifa(2017)[8] .Based on 2005-2015 UN The relevant data of Comtrade and the World Bank, they summarize the characteristics of the changes in China-India trade. The changes in China-India trade are caused by the decline in India's export trade to China, which in turn leads to the reasons for the stagnation of China-India trade growth and proposes countermeasures. This paper attempts to use more comprehensive indicators to measure the trade structure of commodities for empirical analysis, which includes the industrial trade index, the number of patent authorization applications, and the first-order lag of the export structure to explore the factors that affect the trade structure of China and India.

2. Problem analysis

2.1. Characteristics of China-India Commodity Trade

2007-2018 China-India Trade Changes are as shown in table 1.

Table 1 2007-2018 China-India Trade Changes

Unit (100 million USD)

Time	Total export	Growth rate	Total import	Growth rate	Total import and export	Growth rate
2007 Year	240.11	64.67%	146.17	42.22%	386.29	55.39%
2008 Year	315.85	31.54%	202.59	38.60%	518.44	34.21%
2009 Year	296.56	-6.11%	137.27	-32.24%	433.83	-16.32%
2010 Year	409.15	37.97%	208.46	51.86%	617.61	42.36%
2011Year	505.37	23.52%	233.71	12.11%	739.08	19.67%
2012Year	476.78	-5.66%	187.96	-19.58%	664.73	-10.06%
2013Year	484.32	1.58%	169.7	-9.71%	654.03	-1.61%
2014Year	542.17	11.94%	163.59	-3.60%	705.76	7.91%
2015Year	582.28	7.40%	133.69	-18.28%	715.97	1.45%
2016Year	584.15	0.32%	117.64	-12.00%	701.79	-1.98%
2017Year	680.42	16.48%	163.45	38.94%	843.88	20.25%
2018Year	766.76	12.69%	188.33	15.22%	955.09	13.18%

Data source: data compiled by the National Bureau of Statistics

Note: The total export value is China's exports to India, and the total import value is India's imports to China.

The trade between China and India is increasing year by year, but the overall volatility is very large. From Table1, we can see that after the economic crisis in 2008, China-India trade declined

sharply. In total, China has a trade surplus with India in trade in goods. From the perspective of China, the long-term trade surplus with India accounts for a large proportion of China's total trade surplus. In 2007, the growth rate of China-India trade import and export was 55%.But in 2009, the growth rate of trade between China and India was -16.32%. Since 2012, China-India trade has picked up and shown a slight upward trend. From 2007 to 2018, China-India trade maintained an average growth rate of 13.7%, indicating that there is a large space for trade development between the two countries[9].Growth rate of imports and exports of china-india trade 2007-2018 is shown in figure 1.

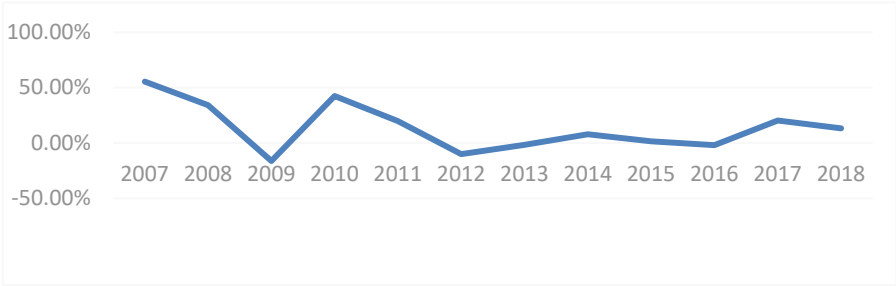

Figure 1 growth rate of imports and exports of china-india trade 2007-2018

2.2. Analysis based on international trade standard classification

The United Nations Standard Classification of International Trade divides trade commodities into 10 categories, and the commodity codes are from SITC0-SITC9. In this classification, SITC0-SITC4 products are primary products, and SITC5-SITC8 products are industrial products. Among industrial manufactured products, SITC5 and SITC7 products are classified as capital and technology-intensive products, and SITC6 and SITC8 products are classified as labor-intensive products.

The most imported products in China are SITC6 commodities, mainly manufactured products classified by raw materials, reaching US $ 34.398 billion, accounting for 51% of the imports and exports of industrial manufactured products. As shown in Figure 2.

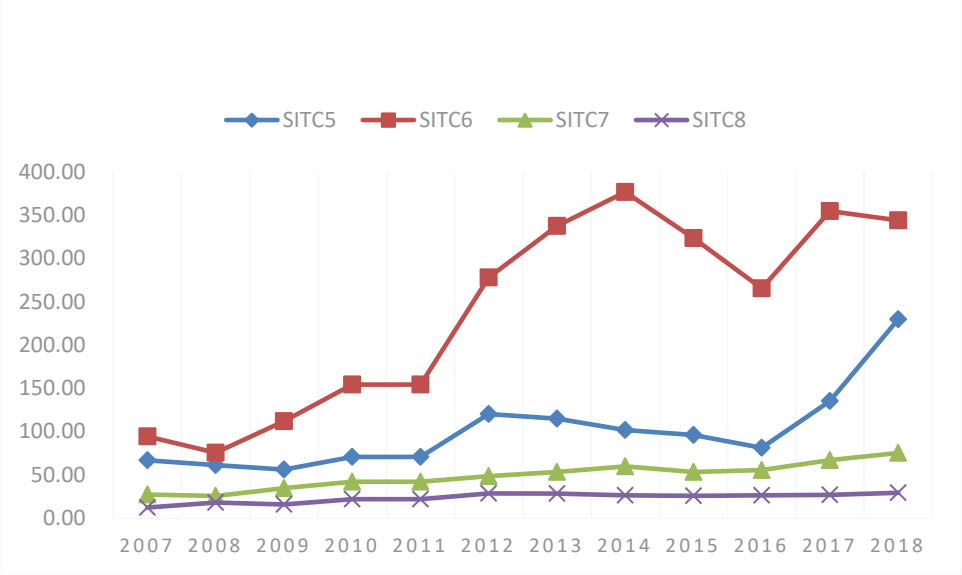

Figure 2 Import volume of sitc5-sitc8 for 2007-2018

The commodities exported by our country to India are mainly SITC5, SITC6, SITC7, and SITC8. Among them, the largest trade volume is SITC7 commodities represented by machinery and transportation equipment, and the most exported are SITC7 commodities represented by machinery and transportation equipment. In 2018, it reached US $ 186.287 billion, accounting for 50.98% of the proportion of industrial exports. This is also because China has become the world's largest trading commodity country, the scale of exports has increased, the structure of commodities has changed, and the focus of trade commodities has changed from the export of primary products to

industrial manufactured products. As shown in Figure 3.

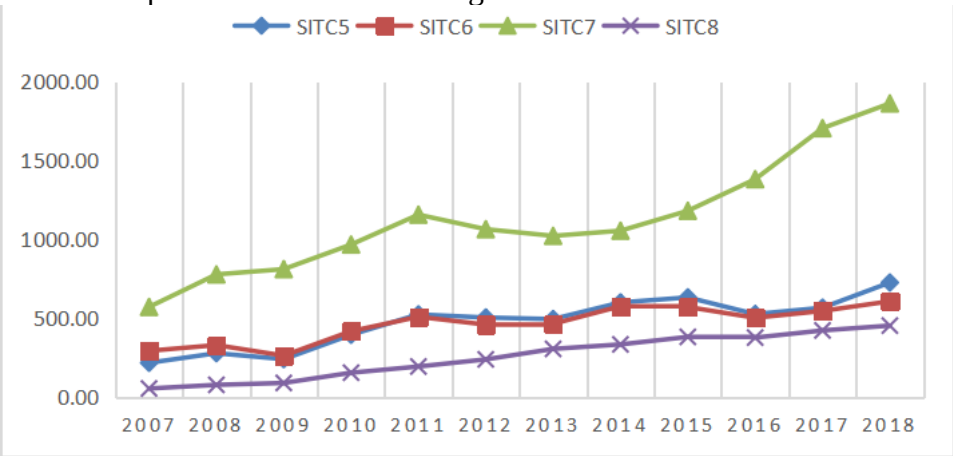

Figure 3 export volume of sitc5-sitc8 in 2007-2018

The calculation shows that the proportion of China's imports and exports to India in the total Sino-Indian trade is shown in Table2.

Table 2 The proportion of primary products and industrial manufactured products in China-India trade volume.

The share of primary products and manufactured goods in sino-indian trade													
Product categories		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Capital technology intensive products	import	2.69%	3.77%	1.99%	2.29%	2.60%	1.84%	2.32%	2.44%	2.09%	1.73%	1.84%	2.07%
Capital technology intensive products	export	68.15%	78.85%	63.36%	67.85%	59.21%	44.61%	32.89%	27.28%	22.33%	23.85%	24.79%	24.02%
Labor-intensive product	import	97.31%	96.23%	98.01%	97.71%	97.40%	98.16%	97.68%	97.56%	97.91%	98.27%	98.16%	97.93%
Labor-intensive product	export	31.85%	21.14%	36.63%	32.14%	27.99%	55.39%	67.11%	72.72%	77.66%	76.14%	75.21%	75.98%

Source: United Nations Trade Commodity Trade Statistics Database

The characteristics of industrial manufactured products that China only exports to India are very obvious, and there are many industrial manufactured products exported, among which are mainly machinery and transportation equipment such as SITC7, which also requires imported industrial manufacturing The products have been improved year by year, but after 2015 there has been a gradual increase. It can be seen that industrial manufactured products have occupied a dominant position in the Sino-Indian trade, and the import and export trade structure of the two countries has been upgraded.

From 2007 to 2018, China‘s exports to and imports from India of capital, technology-intensive and labor-intensive commodities accounted for the proportion of industrial manufactured goods trade, as shown in Table3.

Table 3 proportion of industrial manufactured goods trade

The proportion of capital - and technology-intensive and labor-intensive goods in manufactured goods													
Product categories		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Capital technology intensive products	import	46.92%	48.22%	41.52%	39.07%	39.07%	35.53%	31.48%	28.64%	29.97%	31.94%	34.66%	44.97%
Capital technology intensive products	export	69.30%	72.08%	74.79%	70.35%	70.45%	69.13%	66.28%	64.49%	65.52%	68.40%	70.06%	70.90%
Labor-intensive product	import	53.08%	51.78%	58.48%	60.93%	60.93%	64.47%	68.52%	71.36%	70.03%	68.06%	65.34%	55.03%
Labor-intensive product	export	30.70%	27.92%	25.21%	29.65%	29.55%	30.87%	33.72%	35.51%	34.48%	31.60%	29.94%	29.10%

3. Model Establishment

3.1. Trade competitiveness index

When analyzing the trade-related characteristics of the two countries, a commonly used indicator is the Trade Competitiveness Index, or TC Index for short. The trade competitiveness index can be expressed by the following equation:

$$TC = (\text{export value} - \text{import value}) / (\text{export value} + \text{import value}) \quad (1)$$

The Trade Competitiveness Index is an important measure of the trade between the two countries, effectively avoiding currencies and the impact of economic fluctuations. The value range of this

indicator: -1 <TC <1, when the value is close to -1, it means that its trade competitiveness is weaker, the value is close to 0, which means that its trade competitiveness is at an average level, and the value is close to 1, it means that its The stronger the trade competitiveness[10].

In order to draw a more detailed conclusion, this paper calculates the trade competitiveness index of the three industries, as shown in Table4.

Table 4 Trade competitiveness index of sub-industries of China and India from 2007 to 2018

Year	Resource intensive	Labor intensive	Capital and technology intensive
2007	-0.86	0.53	0.79
2008	-0.84	0.63	0.85
2009	-0.86	0.47	0.84
2010	-0.86	0.53	0.85
2011	-0.81	0.60	0.87
2012	-0.80	0.39	0.81
2013	-0.66	0.36	0.80
2014	-0.53	0.39	0.82
2015	-0.42	0.46	0.85
2016	-0.46	0.50	0.87
2017	-0.52	0.44	0.84
2018	-0.47	0.48	0.79

Source: United Nations Trade Commodity Trade Statistics Database

Competitiveness index of China and India by industry have changed. China's index of India's resource-intensive products is very small. Since 2007, although the trade competitiveness index of resource-intensive products has decreased, it has remained above -0.6. Both China and India have abundant labor resources, so the trade competitiveness index of China's labor-intensive products remains at around 0.5. Capital and technology-intensive products represent a country's high-level technology products. China’s index of India’s capital and technology-intensive products has been above 0.8 in recent years and is very competitive.

The index of resource-intensive products has been negative, and the index of labor-intensive products has also declined in recent years, but the trade competitiveness index of technology-intensive products has been very stable above 0.8, which has a strong competitiveness.

3.2. Analysis of factors influencing China-India trade commodity structure

3.2 The explained variable

In the Sino-Indian trade commodity structure, industrial manufactured products account for a large proportion of China's exports to India. Because capital and technology-intensive products represent a relatively high level of technology and capital elements, this paper selects the proportion of capital-intensive products to come As the basis of commodity trade structure.

3.2 Explanatory variables

Per capita GDP of the two countries. GDP per capita can reflect the level of national economic development, and thus has an impact on a country's commodity trade structure. This article obtains the historical GDP of the two countries as explanatory variables from the World Bank website.

Foreign direct investment. This article selects the cumulative amount of Chinese direct investment in India as an indicator. The data comes from the China Foreign Investment Statistical Bulletin.

R & D investment ratio. The proportion of R & D investment in GDP has a great effect on the development of a country's technology. The data comes from the China Statistical Yearbook.

Intra-industry trade index. The intra-industry trade index is used to measure the degree of intra-industry trade of an industry, indicating that there is complementary trade demand in the industry. Data source United Nations Trade Statistics Database.

The amount of patent application authorization. The amount of authorized patent applications

can increase the variety of China's export commodities. The data comes from the National Bureau of Statistics.

3.3. Model setting

Based on the above analysis, the following regression models are established:

$$lnGS=\beta_1 lnGS_{t-1}+\beta_2 lnOFDI+\beta_3 lnPAG+\beta_4 lnTC+\beta_5 lnIPGDP+\beta_6 lnPCGDP+\beta_7 lnRD+\alpha \quad (2)$$

The explanation of related variables is shown in table 5.

Table 5 Unit root test results

symbol	variable	Sample size	Mean value	Standard deviation	Minimum value	maximum value
InGS	export commodities	26	0.687	0.048	0.518	0.785
InGS(t-1)	The structure of export commodities lagged behind by one logarithm	25	0.687	0.049	0.518	0.785
InPGDP	China's GDP per capita	26	9.698	0.912	8.015	11.098
InIPGDP	India's GDP per head	26	6.673	0.615	5.736	7.628
InOFDI	Chinese direct investment in India	15	8.368	2.421	2.708	11.164
InR&D	China's r & d ratio	26	-4.821	0.078	-5.020	-4.704
InPAG	Number of patent applications granted	24	12.724	1.291	10.687	14.711
InTC	China-india intra-industry trade index	26	-0.221	0.116	-0.462	-0.010

3.4. The stationarity test

In order to test the effect of the model in the long term and prevent non-stationary series data from causing false regression, the unit root test is performed before the analysis. The results are as follows Table 6.

Table 6 Unit root test results

The variable name	The ADF statistics	1% critical value	5% critical value	10% critical value	stationarity
lnGS	-4.65	-3.72	-2.99	-2.63	Trend stationary
lndGS	-9.40	-2.66	-1.96	-1.61	smooth
lnR&D	-4.71	-4.37	-3.60	-3.24	Trend stationary
lndR&D	-6.50	-2.66	-1.96	-1.61	smooth
lnOFDI	-0.55	-5.52	-4.11	-3.52	Not smooth
lndOFDI	-22.81	-6.29	-4.45	-3.70	smooth
lnPAG	-3.61	-4.57	-3.69	-3.29	Trend stationary
lndPAG	-4.62	-3.77	-3.00	-2.64	smooth
lnPCGDP	-1.04	-3.79	-3.01	-2.65	Not smooth
lndPCGDP	-2.74	-3.79	-3.01	-2.65	smooth
lnIPGDP	-3.84	-4.47	-3.64	-3.26	Trend stationary
lndIPGDP	-3.70	-3.74	-2.99	-2.64	smooth
lnTC	-3.77	-3.72	-2.99	-2.63	Trend stationary
lndTC	-7.62	-2.66	-1.96	-1.61	smooth

After the ADF stationarity test, at the 10% significance level, the first-order difference of the above 7 variables satisfies the stationarity uniformly.

4. Regression analysis

Model ARDL on variables to get expressions:

$$\ln GS=0.5084\ln GS_{t-1}-0.0107\ln OFDI+0.1366\ln PAG+0.4127\ln TC- \quad (3)$$

$$(0.1993)\ (0.0049)\ (0.0629)\ (0.4127)$$

$$0.0231\ln IPGDP+0.3928\ln PCGDP-0.3779\ln RD-0.1568$$

$$(0.1925)\ (0.2906)\ (0.2178)\ (0.0761)$$

After eliminating the insignificant variables, the final expression can be obtained:

$$\ln GS=0.5084\ln GS_{t-1}-0.0107\ln OFDI+0.1366\ln PAG+0.4127\ln TC \quad (4)$$

$$(0.1994)\ (0.0048)\ (0.0628)\ (0.1368)$$

$$R^2=0.8500 \qquad Adjusted R^2=0.5501$$

(Standard error in brackets)

4.1. Inspection Results and Analysis

From the empirical results, the structure of China's export commodities is related to its lagged first-order items, direct investment in India, the number of patent applications granted, and the China-India Industry Trade Index. = 0.85, indicating that the model fitting effect is better. Among them, the three coefficients of lagging first-order items, the amount of patent applications granted, and the China-India Industry Trade Index are positive, indicating that the selected influencing factors have a positive correlation with China-India capital technology-intensive exports. These factors can promote China The export of India's capital and technology-intensive products promotes the optimization of the trade commodity structure between the two countries.

The biggest impact is that the export structure lags the first-order term, and the regression results are very significant, which has a positive impact on the export structure.

The second is the China-India Intra-Industry Trade Index. The regression results are significant and have a positive impact on China's export structure. The expression of the China-India intra-industry trade index is: (export value-import value) / (export value + import value), the ratio increases, indicating that China's exports of capital and technology-intensive products increase, indicating that capital and technology-intensive products are in China and India Competitive in trade. After the 19th National Congress of the Communist Party of China, China proposed to optimize the industrial structure, while the level of science and technology is constantly improving, so that we have greatly improved the production level of capital and technology-intensive products, China’s demographic dividend is gradually decreasing, human capital It is gradually improving and the export structure is constantly being upgraded. It has changed from labor-intensive to capital-intensive.

In this case, the number of patent authorization applications increased by 1%, and the export ratio increased by 0.14%, indicating that the increase in the number of patent applications granted is conducive to the export of capital and technology-intensive products. Today, with the rapid development of China's economy, technological innovation is already the supporting point for us to improve social productivity and overall national strength, and has been placed at the core of the country's overall development. The state encourages mass entrepreneurship and innovation, the reform of the scientific and technological system has been continuously deepened, and the ability to innovate has been greatly enhanced, so that China has increased the number of patent applications and authorizations, ranking first in the world.

Finally, for China's direct investment in India, the regression showed a negative result. The possible reason is that foreign direct investment has promoted the development of local related industries. Taking millet mobile phones as an example, millet mobile phones and other manufacturers and ODMs have nearly 50% market share in India. With the growth of India's per capita economy, the demand for electronic products will also increase, which will inevitably drive

the country’s development of the industry and will also lead to a decline in the export ratio.

5. Conclusions

There is a lot of room for growth in trade between China and India. Since 2009, the amount of trade between China and India has increased year by year, and the growth rate is relatively large. With the continuous deepening of the One Belt One Road policy, China can better achieve trade cooperation with India. India provides China with a stable energy supply, and at the same time, China can provide India with technology and other support. At the same time, China's strong capital, medium-level technology and rich experience can also help India provide assistance in capital, technology and other industrial support, and better promote the development of the two countries.

Foreign direct investment can also promote China's overseas markets. Through the continuous expansion of the market size, we can increase the technological innovation of our enterprises, so that trade is not only reflected in the trade of goods, but also can make progress in culture and service providers and upgrade of China's industrial structure.

5.1 Countermeasures and Suggestions

To strengthen basic research, China is still relatively weak in this respect, and strive for breakthroughs in basic research and seize the commanding heights of the new technological revolution before it can become the leader and leader of the technological revolution.

Reform the project approval system to improve the quality of project approval. In our country, there are generally more applications and fewer implementations, so projects that have no scientific or economic value can be rejected. The selected topics are all oriented to economic issues. Breaking everything is a process from the beginning to the end of the expert. The leading link is handed over to the enterprise. The enterprise finds the problem and the enterprise pays for it. Under the guidance of the government, the expert solves a process of breaking the problem. " The traditional model of what will be done, what to do, and the establishment of a new model of "what is needed, what to study".

To create an elite talent plan and improve the quality of the project, the number of top talent in China is still not enough. Customize the "top talent plan" to change the top talent pattern. High-tech talents must be able to access high-quality topics to promote two-way promotion and promote China's technology landscape and economy pattern.

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