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MULTI-PERSPECTIVE ANALYSIS OF TRADE DATA BETWEEN CHINA AND FIVE CENTRAL ASIAN COUNTRIES UNDER THE BELT AND ROAD INITIATIVE

Abstract: The Belt and Road Initiative aims to borrow the historical symbols of the ancient Silk Road, hold high the banner of peace and development, actively develop economic cooperative relations with partners, and jointly build a community of interests, destiny and responsibility with political mutual trust, economic integration and cultural tolerance, bringing new opportunities for the development of China and the countries along the route. The five Central Asian countries are the core area of the Belt and Road Initiative construction, which directly determines the success or failure of the Belt and Road construction. Based on the data from the National Bureau of Statistics of China, this paper analyzes the comparison of import and export data between China and Central Asian countries before and after the implementation of the Belt and Road Initiative, the contribution of trade among Central Asian countries, and the correlation between China's imports and exports with those of Central Asian countries from a variety of perspectives, so as to provide scientific basis for decision-making of the relevant departments, and to effectively promote the economic and trade cooperation between China and Central Asian countries.

Keywords: The Belt and Road Initiative; the five Central Asian countries; multi-perspective analysis; import and export trade

1. Introduction

China is linked to the Central Asian countries by mountains and rivers. As early as more than 2,100 years ago, China's Han Dynasty emissary Zhang Qian opened the door to friendly exchanges between China and Central Asia when he set out from Chang'an on a mission to the Western Regions. Central Asia is rich in energy resources, especially oil, natural gas and mineral resources. China is one of the world's largest energy consumers and has obvious advantages in the fields of manufacturing, infrastructure construction and technology. Good complementarity can realize mutual benefits and promote the economic development of China and Central Asia.

The Central Asian region is also the first place to jointly build the "Belt and Road" and a key direction for cooperation on connectivity, and over the past 10 years, cooperation between the two sides has been fruitful. The total trade between China and the five Central Asian countries exceeded \$70 billion in 2022, a record high. However, at the same time, the Central Asian region is geopolitically complex and faces challenges to its security and stability. Against this backdrop, the importance of China-Central Asia cooperation is particularly prominent.

2. Review of research.

Economic and trade cooperation between China and Central Asia has been one of the hot spots of scholars' research. Relevant studies mainly focus on the following aspects: In the context of China's relations with Central Asia such as Hulsewé, A. F. P^[1] systematically analyzed the evolution of China's relations with Central Asia. Fletcher, Joseph F.^[2] analyze the changes in China's relations with Central Asia during the period 1368-1884. Thornton, S. A.^[3] thought the Central Asian countries, though small and with limited capacity, have special attributes that generate bargaining power with China. Swanström^[4] analyzed the reasons for the close cooperation between Central Asia and China, which was re-established in the 1990s and has experienced a boom in the 21st century. SUN Zhuangzhi^[5] thought the present relationship

between China and Central Asia is defined by geographic, political, economic and security factors. This is the basis behind the policy of China towards Central Asian countries. There are even a considerable number of scholars who have studied China's relations with Central Asia from a geopolitical perspective, too numerous to mention here.

In the area of economic and trade cooperation. Such as Xu Xiaojie^[6] suggested the fact that Central Asia enjoys prolific hydrocarbon resources, while China has huge energy demands, there is no doubt about the economic and geopolitical importance of Central Asian resources to China. Hu Bin^[7] investigated Central Asia's oil and gas resources, special geopolitics and energy competition, and approaches, challenges and prospects in cooperation between China and Central Asia. Fazilov, F., & Chen, X.^[8] thought China's relations with Kazakhstan, Turkmenistan and Uzbekistan are a key factor in maintaining China's energy security. Vakulchuk, Roman, et al.^[9] founded that trade promotion and industrial development are the sectors where there is most BRI-related activity in Central Asia. These sectors also receive most investment. In terms of the number of implemented projects, roads is the second key sector, followed by energy. The Belt and Road Initiative has proved to be focused on the integration process and the construction of transcontinental logistics infrastructure. Numerous other scholars have studied the bilateral economic and trade cooperation between China and Central Asian countries in different fields.

In the area of humanistic exchanges. Fewer research results have been achieved in the study of humanistic exchanges between China and Central Asia as a whole. Such as Mei J^[10] thought the early relationship between China and Central Asia seems to be characterised by a two-way traffic of cultural influence. More studies focusing on China's exchanges and cooperation with Central Asian countries in education, tourism, archaeology, etc., will not be repeated due to the lack of relevance to the research topic of this paper.

In summary, the overall study of China's trade with Central Asia is relatively small, and there is still a gap in the comprehensive analysis of import and export data between China and Central Asian countries. This paper focuses on the Belt and Road Initiative before and after the implementation of China and Central Asian countries import and export data for multi-angle comparative analysis, in order to provide a basis for the relevant departments to formulate trade policies, promote trade facilitation, optimize the trade structure, tap the potential of trade, in order to promote the healthy and sustainable development of the bilateral relationship between China and Central Asian countries.

3. Research Methods.

This paper applies statistical analysis tools and methods to process and analyze the import and export trade data between China and Central Asian countries. The extent of the impact of the Belt and Road Initiative on China's trade with Central Asian countries is assessed by calculating the differences between import and export data and changes in growth rates before and after the implementation of the Belt and Road Initiative. The proportions of total imports and exports of each country in overall trade were calculated, and the changes in the contribution of each country before and after the implementation of the Belt and Road Initiative were compared, thus revealing the different performances of each country in the Belt and Road Initiative. The correlation between the import and export data of China and Central Asian countries was also analyzed. By calculating the correlation coefficients, we can assess the degree of correlation between import and export data in order to understand their mutual influence.

4. Analysis and discussion.

The impact of the Belt and Road Initiative on China's trade with Central Asian countries is an issue that needs to be analyzed in depth. In this paper, a total of 10 years from 2003-2012 is selected as the timeframe before the Belt and Road Initiative is proposed, and a total of 10 years from 2013-2022 is selected as the timeframe after the Belt and Road Initiative is proposed. The import and export trade data between China and the Central Asian countries used in the analysis of this paper

come from: 2003-2021 data from the National Bureau of Statistics of China; 2022 data from UN Comtrade, with China as the reporter and the Central Asian countries as the partners.

4.1 Overall import and export situation between China and Central Asian countries.

According to China's Ministry of Commerce, the total trade volume between China and the five Central Asian countries reached \$70.238 billion in 2022, an increase of more than 100 times compared to 1992, when diplomatic relations were established.

Table 1 Total Import and Export between China and Central Asia, 2018-2022

Indicator	2018	2019	2020	2021	2022
Total export value	225.99	260.63	21168	29511	423.65
Total import value	191.02	202.91	174.40	205.46	278.73
Total	417.01	463.54	386.08	500.57	702.38

Source: data from UN Comtrade

In 2022, China's imports of agricultural, energy and mineral products from Central Asian countries will grow by more than 50% year-on-year, and exports of mechanical and electrical products to Central Asian countries will grow by 42% year-on-year. China's cross-border e-commerce trade with Central Asia grew by 95% year-on-year. As of March 2023, China's direct investment stock in the five Central Asian countries exceeded 15 billion U.S. dollars, and the cumulative turnover of engineering contracting was 63.9 billion U.S. dollars.

China's trade with Central Asia is highly complementary, while the five Central Asian countries are key connectors in Europe and Asia, with more than 80% of China-Europe liner trains transiting Central Asia. Against the backdrop of upgraded transportation infrastructure, there is great potential for trade between China and the five Central Asian countries.

4.2 Comparative analysis of China's import and export volume with Central Asia.

In order to conduct an intuitive qualitative comparative analysis, the import and export data of China and Central Asian countries before and after the Belt and Road Initiative were generated on a line graph, as shown in Figure 1.

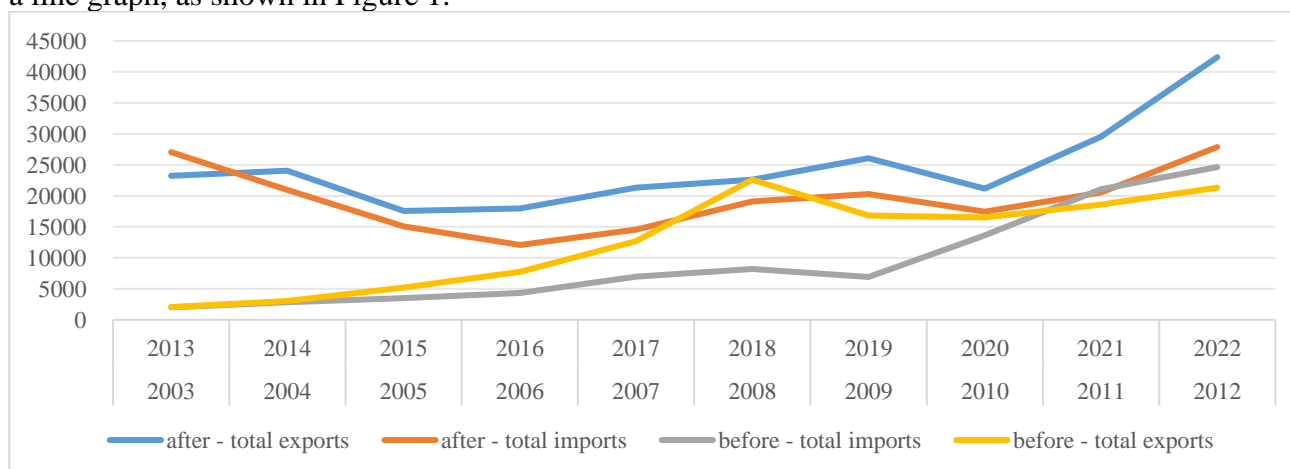


Figure 1. Data on China's imports and exports with Central Asian countries before and after the introduction of the Belt and Road Initiative

Source: 2013-2021 data from the National Bureau of Statistics of China; 2022 data from UN Comtrade.

In Figure 1, the vertical coordinate represents the amount of imports or the amount of exports. The horizontal coordinate indicates the time. "before - total imports" represents total imports between China and Central Asian countries before the Belt and Road Initiative was launched. "before - total exports" represents total exports between China and Central Asian countries before the Belt and Road Initiative was launched. "after - total imports" represents total imports between China and Central Asian countries after the Belt and Road Initiative was launched. "after - total exports" represents total exports between China and Central Asian countries after the Belt and Road Initiative was launched. For "before-total exports" and "before-total imports", the horizontal coordinates represent the years 2003-2012, For "after-total exports" and "after-total imports", the horizontal coordinates represent the years 2013-2022.

Comparing the "before-total imports" and "after-total imports" lines, it is found that before the Belt and Road Initiative was put forward, China's imports from Central Asia showed an increasing trend, especially after 2009, the growth rate accelerated significantly. After the Belt and Road Initiative, China's imports from Central Asia show a decreasing and then increasing trend, with the lowest value in 2016. After being affected by the epidemic, there was an increasing trend after a small recovery in 2020. It shows that the proposal of the Belt and Road Initiative did not significantly increase China's imports from Central Asian countries.

Comparing the "before total exports" and "after total exports" lines, it can be seen that before the Belt and Road Initiative was put forward, China's exports to Central Asia showed a trend of growth and then decline, China's exports to Central Asia peaked and then declined in 2008. After the Belt and Road Initiative, China's exports to Central Asia show a small fluctuation and then a rapid growth from 2020 onwards, with a maximum in 2022.

Overall, there has been no significant growth in imports and exports between China and Central Asian countries since the Belt and Road Initiative was proposed. One reason for this is that the Belt and Road Initiative was first proposed in 2013, and China and the Central Asian countries lacked relevant substantive measures to promote it. Meanwhile, the global economy has been hit hard by the outbreak of the COVID-19 epidemic in 2019, and China in particular has been hit hard due to its strict anti-epidemic blockade measures. In the coming period, the impact of the China-Central Asia Summit and other forms of cooperation platforms will be gradually felt, a large number of pre-existing economic and trade cooperation projects will be completed and put into operation, and China's trade with Central Asian countries will experience rapid growth.

4.3 Comparative analysis of growth rates of imports and exports between China and Central Asia.

In order to conduct a quantitative comparative analysis, it is necessary to calculate the growth rate and percentage of the relevant data for the relevant periods before and after the Belt and Road Initiative was proposed. "The calculation of the growth rate before the Belt and Road Initiative was based on 2003 data, and the results of the growth rate calculation are shown in Table 2.

Table 2. Growth of China's trade with Central Asia prior to the Belt and Road Initiative

	Growth rate of before-total exports	Growth rate of before-total imports
2004	46.12%	40.60%
2005	153.39%	73.91%
2006	274.99%	114.77%
2007	515.10%	246.48%
2008	995.04%	308.99%
2009	715.36%	244.00%
2010	701.08%	576.29%
2011	800.66%	947.27%
2012	932.45%	1125.16%
average annual growth rate	103.61%	125.02%

Source: 2003-2021 data from the National Bureau of Statistics of China;

In the 10 years before the Belt and Road Initiative was proposed, China's total exports to Central Asian countries increased from US\$2.063 billion in 2003 to US\$21.304 billion in 2012, with an average annual growth rate of 103.61 per cent, and China's total imports from Central Asian countries increased from US\$2.011 billion in 2003 to US\$24.644 billion in 2012, with an average annual growth rate of 125.02 per cent. It is worth noting that China's trade with Central Asian countries was in deficit during this period.

The calculation of the growth rate after the "Belt and Road" initiative was based on 2012 data, and the results of the growth rate calculation are shown in Table 3.

Table 3. Growth of China's trade with Central Asia after the launch of the Belt and Road Initiative

	Growth rate of after-total exports	Growth rate of after-total imports
2014	3.50%	-22.47%
2015	-24.43%	-44.31%
2016	-22.68%	-55.32%
2017	-8.26%	-46.14%
2018	-2.76%	-29.34%
2019	12.14%	-24.94%
2020	-8.92%	-35.49%
2021	26.98%	-24.00%
2022	82.29%	3.10%
average annual growth rate	9.14%	0.34%

Source: 2014-2021 data from the National Bureau of Statistics of China; 2022 data from UN Comtrade

In the 10 years since the Belt and Road Initiative was proposed, China's total exports to Central Asian countries increased from US\$23.241 billion in 2013 to US\$42.365 billion in 2022, with an average annual growth rate of 9.14 per cent, and China's total imports from Central Asian countries increased from US\$27.033 billion in 2013 to US\$27.873 billion in 2022, with an average annual growth rate of 0.34 per cent. It is worth noting that China's imports and exports to Central Asian countries gradually turned into a surplus during this period.

A comparison shows that the average annual growth rate before the initiative was much higher than the average annual growth rate after the initiative. On the one hand, during the period of internal political adjustment in the Central Asian countries, the political uncertainty had a certain impact on the export of their own products; on the other hand, the strict control measures of the epidemic situation in China had a significant impact on the import and export trade. Third, the increasing international competitiveness of Chinese industries has effectively reversed the unfavourable situation of import and export. Fourth, the continuous improvement of China's domestic consumption level and the continuous optimisation and adjustment of its industrial structure have resulted in insufficient demand for foreign primary products, while China's export policy has played an obvious role in effectively promoting China's trade balance.

4.4 Analysis of the contribution of Central Asian countries to China's exports and imports.

The degree of contribution is the degree of contribution to the total, i.e. the percentage of total exports or imports of a Central Asian country to China in relation to the total exports or imports of five countries to China. The purpose of the contribution analysis is to increase the trade volume of the countries with the higher contribution when an increase in trade volume is needed, i.e. to capture the main contradiction and find the key to solving the problem of increasing trade volume.

As the current international supply chain pattern is being reshaped at an accelerating pace, the geopolitical situation is becoming increasingly complex, and the reference value of data for a longer period is smaller, the data for 2018-2022 was selected for analysis.

Table 4. China's exports to the five Central Asian countries and each country's contribution, 2018-2022.

		Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
2018	Exports (US\$ million)	11352	5557	1429	317	3945
	Contribution (per cent)	50.23	24.59	6.32	1.4	17.46
2019	Exports (US\$ million)	12729	6281	1590	431	5032
	Contribution (per cent)	48.84	24.1	6.1	1.65	19.31
2020	Exports (US\$ million)	11703	2865	1017	443	5139
	Contribution (per cent)	55.29	13.54	4.8	2.1	24.28
2021	Exports (US\$ million)	13959	7474	1683	513	5882
	Contribution (per cent)	47.3	25.33	5.7	1.74	19.93
2022	Exports (US\$ million)	16355	15421	2217	868	7504
	Contribution (per cent)	38.61	36.40	5.23	2.05	17.71
Total for five years	Exports (US\$ million)	66098	37598	7936	2572	27502
	Contribution (per cent)	46.64	26.53	5.60	1.82	19.41

Source: 2018-2021 data from the National Bureau of Statistics of China; 2022 data from UN Comtrade

From the data in the table, it can be seen that China's export to Kyrgyzstan has the fastest growth rate, the share of Kazakhstan has been on the decline, and the share of the other three countries has not changed much. In order to improve China's export pattern to Central Asian countries, we should focus on studying the product access standards and import trade policies of Kazakhstan, Kyrgyzstan and Uzbekistan. We should strengthen market research and study of these three countries, and carry out product design with the characteristics of demand, so as to make the products more in line with the needs of local consumers. At the same time, strengthen humanistic exchanges to help Central Asian countries get to know China. China should strengthen the cultivation of small language talents, and foreign language departments in domestic universities should encourage students to learn Russian, Kazakh, Kyrgyz, Uzbek and other languages as a third foreign language, so as to solve the problem of shortage of translators for the above languages.

Table 5. China's imports from five Central Asian countries and each country's contribution, 2018-2022

		Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
2018	Imports (US\$ million)	8527	54	77	8119	2324
	Contribution (per cent)	44.64	0.28	0.40	42.51	12.17
2019	Imports (US\$ million)	9274	66	85	8686	2181
	Contribution (per cent)	45.70	0.33	0.42	42.81	10.75
2020	Imports (US\$ million)	9805	35	45	6072	1483
	Contribution (per cent)	56.22	0.20	0.26	34.82	8.51
2021	Imports (US\$ million)	11291	80	175	6844	2155
	Contribution (per cent)	54.95	0.39	0.85	33.31	10.49
2022	Imports (US\$ million)	14819	82	382	10314	2276
	Contribution (per cent)	53.17	0.29	1.37	37.00	8.17
Total for five year	Imports (US\$ million)	53715	317	764	40035	10420
	Contribution (per cent)	51.04	0.30	0.73	38.04	9.90

Source: 2018-2021 data from the National Bureau of Statistics of China; 2022 data from UN Comtrade

From the data in the table, it can be seen that China's imports from Kazakhstan have always increased year on year, even though they were affected by the epidemic; the contribution of China's imports from Turkmenistan has decreased, indicating that China's imports from this country, although growing, are not as high as the average increase of the five countries. In 2020, China's imports from Uzbekistan decreased significantly, while the other years remained basically stable. China's imports from Kyrgyzstan and Tajikistan are lower overall. In order to improve the pattern of China's imports from Central Asian countries, we should increase the opportunities for Sino-Central Asian countries to showcase their goods, strengthen the promotion of Central Asian countries' special and advantageous products, and tap the trade potential of both sides.

4.5 Correlation of imports and exports between China and Central Asian countries

In order to further understand the relationship between China's imports and exports with Central Asian countries, this paper chooses to use the Pearson correlation coefficient to calculate the correlation between China's imports and exports with Central Asian countries. The correlation coefficient is denoted by the letter r , and the calculation formula is:

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} \quad (1)$$

In the formula, n indicates the number of samples, x_i and y_i denote the i the value of the two variables respectively ($i=1, 2, \dots, n$), \bar{x} and \bar{y} are the respective means of the two variables. The equivalent expression for Eq. 1 is:

$$r = \frac{1}{n-1} \sum_{i=1}^n \left(\frac{x_i - \bar{x}}{\sigma_x} \right) \left(\frac{y_i - \bar{y}}{\sigma_y} \right) \quad (2)$$

In order to accurately understand the impact of the Belt and Road Initiative on China's trade with Central Asian countries, 2003-2012 is taken as the period before the Belt and Road Initiative was proposed, and 2013-2022 is taken as the period after the Belt and Road Initiative was proposed. The measurement results are shown in the table.

Table 6. Correlation coefficients between China's imports and exports with Central Asian countries

Countries	2003-2012	2013-2022
Kazakhstan	0.885	0.797
Kyrgyzstan	0.072	0.588
Tajikistan	0.574	0.402
Turkmenistan	0.810	0.687
Uzbekistan	0.517	0.648

Source: Author's analysis.

In the period 2003-2012, the correlation coefficient between China's imports and exports with Kazakhstan was 0.885, indicating a high positive correlation between imports and exports between the two countries. This is evidence of the strong trade links between the two countries. The correlation coefficient between China's imports and exports with Kyrgyzstan is 0.072, indicating that the correlation between imports and exports between the two countries is low and the linear relationship is weak. The correlation coefficient between China's imports and exports with Tajikistan is 0.574, which indicates that the imports and exports between the two countries have a certain positive correlation, but the degree of correlation is low. The correlation coefficient between China's imports and exports with Turkmenistan is 0.810, indicating a high positive correlation between imports and exports between the two countries, indicating that the trade relationship between the two countries is relatively close. The correlation coefficient between China's imports and exports with Uzbekistan is 0.517, indicating some positive correlation between imports and exports between the two countries, but the degree of correlation is low.

In the period 2013-2022, the correlation coefficient between China's imports and exports with Kazakhstan is 0.797, which is still a high positive correlation, although the correlation has slightly decreased compared with the previous period. The correlation coefficient between China's imports and exports with Kyrgyzstan is 0.588, compared with the previous period, a significant increase, showing a certain positive correlation. The correlation coefficient between China's imports and exports with Tajikistan is 0.402, compared with the previous period, a slight decline, although showing a positive correlation, but the degree of correlation is low. The correlation coefficient between China's imports and exports with Turkmenistan is 0.687, although the correlation has slightly decreased, but still shows a high degree of positive correlation. The correlation coefficient between China's imports and exports with Uzbekistan is 0.648, showing a higher degree of positive correlation compared with the previous period.

Thus, holding other external factors constant, an increase in China's imports from the Central Asian countries would contribute to an increase in China's exports to the Central Asian countries. By increasing its imports, China could meet the demand for products from Central Asian countries in its domestic market and further promote trade between the two countries. At the same time, Central Asian countries could buy more products and services from China to fill their domestic supply gaps.

It is important to note that the linear correlation between imports and exports is not the only factor influencing the complexity of trade relations. Trade relations are also influenced by other factors such as market demand, trade policy and the competitive environment. Therefore, multiple factors must be considered, analyzed, and evaluated in depth when formulating trade strategies and decisions.

5. Conclusion.

The analysis shows that China's import and export volume with the five Central Asian countries did not increase significantly due to the Belt and Road Initiative, which can be attributed to various reasons. In 2013, the Belt and Road Initiative was first proposed, and China and the Central Asian countries lacked relevant substantive measures to promote it. At the same time, the domestic situation of the Central Asian countries was adjusted during this period, which also affected foreign trade to some extent. China's epidemic implementation of strict management measures, so that import and export trade has been significantly affected. In the coming period, China - Central Asia Summit and other forms of cooperation platform effect will gradually appear, a large number of preliminary economic and trade cooperation projects will be completed and put into operation, China and Central Asian countries trade will appear rapid growth.

In 2022, China's imports from the five Central Asian countries is Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan. In order to improve the pattern of China's imports from Central Asian countries, we should increase the opportunities for China-Central Asian countries to showcase their goods, intensify the promotion of Central Asian countries' special and advantageous products, and explore the trade potential of both sides.

The scale of China's exports to the five Central Asian countries is ranked as Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan and Turkmenistan. In order to improve the pattern of China's exports to Central Asian countries, we should focus on studying the product access standards and import trade policies of Kazakhstan, Kyrgyzstan and Uzbekistan, strengthen market research and study of these three countries, and carry out product design according to the characteristics of demand, so as to make the products more in line with the needs of local consumers.

Overall, there is a high positive correlation between China's imports from Central Asian countries and China's exports to Central Asian countries, and increasing China's imports from Central Asian countries will help increase China's exports to Central Asian countries, other things being equal.

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