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EMPIRICAL ANALYSIS OF IMPACTS ON CHINA AND MONGOLIAN TRANSPORT SERVICE TRADE OF INTERNATIONAL COMPETITIVENESS

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ABSTRACT

This paper aims to make an empirical analysis of the impact of international competitiveness on China and Mongolia's transportation service trade. First, calculating the RCA competitiveness index, China, Mongolia and some developed countries are compared and analyzed, and then an empirical analysis of the main factors influencing China and Mongolia transportation service trade is conducted, and it is concluded that the port freight export volume increased by 1%, China-Mongolia port freight export volume increased by 0.798%. When the opening of the transportation service industry in China and Mongolia increased by 1%, the export value of the transportation service trade increased by 1.232%. Therefore, the port exports of the two countries have a positive impact on the international competitiveness of the transportation service trade and the opening degree of the transportation service industry in China and Mongolia.

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1. Introduction. In recent years, some scholars in Mongolia have begun to study the international competitiveness of transportation service trade from different perspectives. Due to the current status and challenges of transportation logistics in Mongolian transportation countries, and the fact that transportation logistics is limited to railways and Zamyn Uud port, Mongolian economic scientists S. Batkhurel, S. Munkhchimeg and T. Tuvshingerel (2012) was research policies and laws environment, unified regulations, and the responsible for these issues have suggested that the solution to the problem is a management issue, not a source of funds and capital. They also emphasized the need to work closely with an international organization as a landlocked country. Mongolia Post Co., Ltd. explained in a securities manual (2014) that the price of Mongolian consumer goods is relatively high and fluctuates largely because of the development of the logistics industry. It also proposed the establishment of a Mongolian transportation and logistics center in the Zamyn Uud Free Trade Zone. It is possible to provide logistics services in the direction of Zamyn Uud-Ulaanbaatar, Zamyn Uud-Rural, and Ulaanbaatar-Rural.

The head of the Mongolian Logistics Association A. Munkhbold (2012) was research the development level of the logistics industry in Mongolia, determined further measures and expected results, and considered the factors that determine the logistics performance index.

Yo. Manlaibayar (2014), Director of the Railway and Maritime Transport Policy Implementation and Coordination Bureau of the Ministry of Road and Transportation of Mongolia, explained the transportation routes through two neighboring countries to Mongolia's transit corridors and ports, calculating that Mongolia is not only a railway between two large countries, the main transit area for transportation, but also an important time-saving place for two neighboring countries. Professor P.K. Mukherjee (2014) explained in detail the names, formulas, definitions and agreements

related to transportation logistics between the Mongolian government and the People's Republic of China. He emphasized the need to develop strategies and countermeasures aimed to improving Mongolia's status, proposed alternative options for entering the sea through China, and focused on infrastructure development. He also emphasized the positive impact of maritime transportation and marine insurance on the economy and made relevant recommendations.

Mongolian mid-term (2020-2025) sustainable development policy focuses on explaining the potential of professional organizations responsible for implementing the national policy objectives of the road sector in order to strengthen the implementation of the road development policy system, establish an innovative research structure in the sector, and computerize the database. Continuous operation, non-governmental organizations performing some government functions, establishing a system for planning roads and road facilities construction that closely cooperates with the sustainable development concept of Mongolia and population resettlement and industrialization policies.

Taking into account the quality of transportation infrastructure and the high cost of exports, transportation may limit the development of certain sectors, such as agriculture and tourism. But it was concluded that transportation is not a factor limiting economic growth. Recently, the road network has been continuously improved, most of the main roads have been paved, and the economic sectors that depend on transportation are also evolving. Transportation costs for mining operations may be high, but it is not important to the country. However, proper transportation issues, such as railway availability in the mining sector and remote areas, remain a challenge (2016). R. Dagva, Chairman of the Citizens Representative of the Capital, and Koizumi Taiga (2018), a Mongolian national official of JICA, discussed the possibility of developing a new city. Through the development of the city, it can become a transportation and logistics center in Northeast Asia.

Liu Shan (2016) introduced the current status and problems of China's transportation trade in terms of trade scale, structure, and main objectives. Huang Rong (2017) calculated and compared the competitiveness indexes of transportation services trade between China and the United States, Japan and other developed countries, combined with these competitiveness indexes and China's national conditions, analyzed the causes of transportation services trade competitiveness, and proposed a number of countermeasures and suggestions. Meng and Li Yuting (2018) found that some of the main factors affecting China's transportation service exports include cargo trade, transportation capacity structure, transportation and related production auxiliary industries, and the openness of the domestic transportation market.

2. Analysis of the current situation of transportation service trade

Mongolia's economic growth depends on the development of the transportation sector, and its main business and people are largely dependent on the quality and accessibility of entering the country and abroad. As a landlocked country, Mongolia relies on neighboring countries for international trade by sea or rail. Trade facilitation is closely related to the development of transportation routes and the laws, regulations and systems of trade. Although the need to expand the network in the transportation sector is becoming more apparent, the ensuing demands for network management and sustainability are more obvious than ever. As the political and economic dynamics of the 1990s changed, the transition to political democracy and a market-based economic system put new pressure on the country's relatively small transportation network. Although the actual demand for transportation infrastructure is still very low compared to other Asian countries, the Mongolian economy has developed rapidly in recent years, mainly driven by mining and traditional animal husbandry. Insufficient transport infrastructure and services continue to restrict the growth of economic activities in remote areas such as the western and southern regions.

Driven by the scientific and technological revolution and economic globalization, service trade has achieved rapid development, the export structure has been accelerated, the scale of commercial presence is increasing, and the competition in various countries is becoming fiercer. The focus of global competition is shifting from trade in goods to trade in services. The level of development with service trade has become one of the important indicators of the country's competitiveness. Transportation service trade is one of the important components of China's service trade. Since the reform and opening up, China's transportation service trade has maintained a rapid development trend for a long time. After China's accession to the WTO, foreign trade has developed rapidly, and China has become the most important driving force for the development of world shipping. In recent years, China's total transportation service trade has increased significantly compared with 19 years ago.

Table 1. Statistics of the Mongolia's transportation service trade import and export from 2000 to 2018 (unit: 100 million USD, %)

Years	Sum	Growth rate	Export	Growth rate	Import	Growth rate
2000	0.80	-	0.13	-	0.67	-
2001	0.93	16.3	0.26	20.0	0.67	1.0
2002	0.97	4.3	0.25	-3.85	0.72	10.8
2003	1.08	11.3	0.21	-16.0	0.87	20.8
2004	0.45	-58.3	0.09	-57.1	0.36	-58.7
2005	1.63	38.1	0.47	22.2	1.16	22.3
2006	2.32	42.3	0.83	76.6	1.49	28.5
2007	2.61	12.5	0.14	-83.1	2.47	65.8
2008	1.84	-29.5	0.15	7.2	1.69	-31.8
2009	1.12	-39.1	0.17	13.3	0.95	-43.8
2010	0.45	66.6	0.17	1.0	0.28	-70.5
2011	0.75	45.3	0.19	11.76	0.56	20.0
2012	1.09	20.2	0.18	-5.26	0.91	62.5
2013	1.31	96.2	0.21	16.7	1.10	20.8
2014	6.50	-40.8	0.35	66.7	6.15	59.1
2015	3.85	-40.8	0.17	-51.5	3.68	-40.2
2016	5.06	31.4	0.70	11.8	4.36	18.5
2017	7.92	56.5	1.70	42.9	6.22	42.7
2018	11.44	44.7	2.48	57.6	8.96	44.1

Source: 2000-2018 Mongolian transportation service trade import and export statistics.

In the recent years, China's total transportation service trade has increased significantly compared with 19 years ago. However, the ratio of its average growth rate to the total value of service trade is gradually decreasing. China's total transportation import and export service industry increased from 14.14 billion USD in 2000 to 150.059 billion USD in 2018. From the overall situation, the growth rate is not stable, especially from 2010 to 2016 year by year. Since then, there has been a clear recovery trend. As of the end of 2018, the growth rate of total imports and exports rebounded to 15.79%, entering a new stage. The export volume was 4.68 billion USD in 2000 to 42.3 billion USD in 2018. In contrast, imports increased from 9.46 billion USD in 2000 to 108.29 billion USD in 2018, an increase of 11.45% in 19 years.

Table 2. Statistics of China's import and export of transportation services in 2000-2018 (unit: billion USD, %)

Years	Sum	Growth rate	Export	Growth rate	Import	Growth rate
2000	14.14	-	4.68	-	9.46	-
2001	16.00	13.15	5.17	10.47	10.83	14.48
2002	19.45	21.56	5.62	8.70	13.83	27.70
2003	26.22	34.80	13.79	45.7	12.43	-10.13
2004	36.72	40.05	15.32	11.09	21.40	72.16
2005	43.96	19.72	15.43	0.72	28.45	32.96
2006	55.40	26.02	22.48	45.69	34.26	20.42
2007	74.70	34.84	25.08	11.56	33.74	-1.52
2008	88.75	-18.81	38.42	53.19	50.33	49.17
2009	70.14	-20.96	23.57	-38.65	46.57	-7.46
2010	97.47	38.96	34.21	45.15	63.26	35.82
2011	116.02	19.03	35.57	3.97	80.45	27.17
2012	124.77	7.55	38.91	9.40	85.86	6.73
2013	131.97	5.77	37.65	-3.25	94.32	9.86
2014	134.38	1.83	38.24	1.59	96.16	1.94
2015	123.25	-7.77	38.59	0.92	85.34	-11.25
2016	114.53	-7.60	33.83	-12.35	80.58	-5.58
2017	130.05	13.55	37.10	9.66	92.95	15.34
2018	150.59	15.79	42.30	14.02	108.29	16.51

Source: Calculated from China's of transportation service trade import and export statistics.

3. Analysis of International competitiveness

3.1. RCA index (Revealed Comparative Advantages)

The explicit comparative advantage index was proposed by Balasa in 1965 to explain international competitiveness, and then widely used in the field of international trade research. The RCA index represents the ratio of a country's product or service exports to the global export of that product or service divided by the proportion of the country's total exports of all services in the world's total exports of all services. In this article, if a specific product or service is a transportation service, the value of the total export value of the product or service is the total export of the service trade. Therefore, the calculation formula is as follows:

$$RCA_{ti} = \frac{\frac{X_{ti}}{\sum_{i=1}^{n} X_{ti}}}{\frac{X_{si}}{\sum_{i=1}^{n} X_{si}}} \quad (1)$$

In this formula, RCA_{ti} represents the comparative advantage index of the country's transportation service trade. X_{ti} represents the country's exports of transportation services trade, $\sum_{i=1}^{n} X_{ti}$ represents the total exports of world transportation services trade. X_{si} represents the export volume of the country's service trade, $\sum_{i=1}^{n} X_{si}$ represents total export volume of service trade in the world.

3.2. Measurement of RCA Index and Analysis of Revealed Competitiveness of Transport Service Trade

Table 3. RCA Index of Transport Services Trade in six countries

Years	China	Mongolia	Russia	Japan	Korea	USA
2000	0.25	0.77	1.12	1.41	0.34	0.17
2001	0.26	0.13	0.72	0.68	0.35	0.19
2002	0.27	0.21	1.25	0.74	0.44	0.19
2003	0.15	0.38	1.27	0.70	0.47	0.14
2004	1.00	0.12	1.11	0.63	0.49	0.16
2005	0.90	0.54	0.59	0.62	0.49	0.12
2006	1.13	0.85	0.41	0.67	0.51	0.18
2007	0.91	0.19	0.49	0.67	0.48	0.18
2008	1.22	0.12	0.43	0.60	0.44	0.63
2009	0.97	0.20	0.29	0.54	0.59	0.63
2010	1.41	0.17	0.31	0.62	0.58	0.61
2011	0.91	0.55	0.59	0.63	0.67	0.63
2012	0.98	0.14	0.54	0.73	0.51	0.64
2013	0.95	0.16	0.57	0.67	0.56	0.64
2014	0.93	0.33	0.47	0.53	0.51	0.64
2015	1.00	0.14	0.72	0.53	0.65	0.64
2016	0.97	0.59	0.69	0.55	0.60	0.65
2017	0.99	0.42	0.79	0.51	0.69	0.64
2018	1.06	0.49	0.65	0.52	0.48	0.66
average	0.86	0.34	0.68	0.66	0.52	0.48

Source: www.worldbank.org calculated by the data author.

As shown in Table 3, China's RCA index is still at a relatively high level, and the average value of RCA is higher than that of the other five countries. Similar to China, Russia and Japan have high average trade in transportation services between 2000 and 2018, which shows that Russia and Japan have a comparative advantage in transportation service trade. The RCA of the United States and South Korea has been stable at around 0.4-0.6, which shows that although these countries have no obvious comparative advantage in the transportation service trade, the overall level is relatively stable. For Mongolia, from 2000 to 2018, the RCA value of the transportation service trade has always remained below 0.5, which shows that Mongolia's comparative advantage is very weak.

3.3. Empirical Analysis of Impacts on China and Mongolian Transport Service Trade of International Competitiveness

A. Variable selection

Table 4. Variable selection

Variable	Selection of indicators and measurement units
Export volume of transportation services	It is regarded as a quantitative indicator of the competitiveness of China's and Mongolia's transportation services trade. Expressed by Y, unit: 100 million USD
Export volume of goods	Take the export volume of goods from China and Mongolia as the demand factor, expressed by X_1, unit: 100 million USD
Port cargo export volume	Take the export volume of major ports in China and Mongolia as the main factor, expressed by X_2, unit: ten thousand USD
Number of employees in transportation services	Take the staff of the transportation service industry of the two countries as the key factor of production, expressed by X_3, unit: thousand people
Openness of transportation service trade	Take the ratio of the total import and export of China's and Mongolia's transportation services trade to its GDP as a comprehensive reflection of the opening degree of transportation services trade, expressed by X4, unit: %

B. Data Sources

The data in this article was obtained from the original databases (http://data.worldbank.org) of the relevant statistical yearbooks such as “China Statistical Yearbook” and “Mongolia Statistical Yearbook” (between 2000 and 2018) and the World Bank database. The formula for the competitiveness of China and Mongolia’s transportation services trade is:

$$\ln Y = \beta_1 + \beta_2 \ln(X_1) + \beta_3 \ln(X_2) + \beta_4 \ln(X_3) + \beta_5 \ln(X_4) + \varepsilon \quad (2)$$

C. Regression analysis

Table 5.

Dependent Variable: Y
Method: Least Squares
Date: 06/22/20 Time: 21:24
Sample: 1 38
Included observations: 38

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnX1	0.089146	0.057652	1.546288	0.0000
lnX2	0.540169	0.072306	7.470622	0.1313
lnX3	0.308467	0.048328	6.382831	0.0900
lnX4	1.396781	0.509562	2.741142	0.2597

R-squared	0.992588	Mean dependent var	15.84474
Adjusted R-squared	0.991934	S.D. dependent var	2.964284
S.E. of regression	0.266230	Akaike info criterion	0.290389
Sum squared resid	2.409867	Schwarz criterion	0.462766
Log likelihood	-1.517385	Hannan-Quinn criter.	0.351719
Durbin-Watson stat	1.312001		

It can be seen from the regression analysis table that the F statistic is significant, and R-squared and Adjusted R-squared show good fit. Both X_4 and X_1 values are not important. Therefore, in order to eliminate multicollinearity between explanatory variables, so first, needs to calculate the correlation coefficient between each variable.

Table 6. Correlation coefficient

Variable	**ln(X_1)**	**ln(X_2)**	**ln(X_3)**	**ln(X_4)**
ln(X_1)	1.000	0.927	0.081	0.784
ln(X_2)	0.927	1.000	-0.183	0.940
ln(X_3)	0.081	-0.183	1.000	-0.353
ln(X_4)	0.784	0.940	-0.353	1.000

According to the data in the table, there is a high correlation between ln(X_4) and ln(X_2), ln(X_1) and ln(X_3), and ln(X_1) and ln(X_4), so stepwise regression is used to eliminate multicollinearity. Through a separate regression, it can be seen that the export volume of China and Mongolia's transportation service trade is greatly affected by the export volume of merchandise trade, so a gradual regression has been gradually made. The following table shows the results of the first stepwise regression.

Table 7.

Model	ln(X_1)	ln(X_2)	ln(X_3)	ln(X_4)	P	R^2	Durbin Watson	T-Statistic
Y=f(X_1)	0.635				<0.05	0.848	0.59	-4.54
Y=f(X_1, X_3)	0.851		-0.443		<0.05	0.918	0.61	-1.004
Y=f(X_2, X_4)		0.798		1.232	<0.05	0.975	0.61	8.899

The explanatory variables are introduced into the model to compare the fitting results and select the best linear combination. It is verified that the related ln(X_1) and ln(X_2), ln(X_1) and ln(X_3), ln(X_1) and ln(X_4), In(X_2) and ln(X_4) are used to replace ln(X_1). These regression effects are not as good as the combination of ln(X_2) and ln(X_4). Therefore, Y = f(lnX_2, lnX_4) is the optimal linear combination, and the fitting results are shown in the following table.

Table 8.
Dependent Variable: Y
Method: Least Squares
Date: 06/26/20 Time: 18:19
Sample: 1 38
Included observations: 38

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnX2	0.798201	0.053010	15.05744	0.0000
lnX4	1.232970	0.644945	-1.911744	0.0341
C	1.792096	0.759873	2.358416	0.0241

R-squared	0.977496	Mean dependent var	15.84474
Adjusted R-squared	0.976211	S.D. dependent var	2.964284
S.E. of regression	0.457206	Akaike info criterion	1.348290
Sum squared resid	7.316298	Schwarz criterion	1.477573
Log likelihood	-22.61751	Hannan-Quinn criter.	1.394288
F-statistic	760.1566	Durbin-Watson stat	0.734372
Prob(F-statistic)	0.000000		

$$\ln Y=0.798X_2+1.232\ln X_4+1.792 \quad (3)$$

The empirical analysis results show that: Under other conditions unchanged, the port freight export volume increased by 1%, and China and Mongolia's port freight export trade volume increased by

0.798%. When the opening of the transportation service industry in China and Mongolia increased by 1%, the export value of the transportation service trade increased by 1.232%. Therefore, the port exports of the two countries have a positive impact on the international competitiveness of the transportation service trade and the opening degree of the transportation service industry in China and Mongolia.

Conclusions. China's international competitiveness in transportation services trade is stronger than other countries, but its level is still less than 1. Mongolia's international average competitiveness in transportation services trade is particularly weak. The most influential factors for the national competitiveness of the transportation service trade between China and Mongolia in this article are the export volume of goods at the ports of China and Mongolia and the degree of openness of the transportation services between the two countries. 0.8% and 1.232%. Therefore, the Chinese and Mongolian governments may support the border trade between the two countries and improve the border trade conditions and infrastructure.

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