A Comparative Study on the International Competitiveness of China-Korea Cultural Products Trade

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Abstract:

With the diversified development of the global economy, the trade of cultural products has become an important factor affecting the competition of comprehensive strength among countries. As a neighboring country to China, South Korea has a similar cultural development environment to China. As an important pillar of South Korea's economy, cultural product trade and its development experience has reference significance for China. This paper adopts the literature research method, comparative analysis method and empirical analysis method to conduct research. The article firstly analyzes the export level of China and South Korea from the scale of the import and export of cultural products, and finds the difference between the import and export of cultural products. Then, it compares and analyzes the insufficiency of the trade structure of Chinese cultural products and the advantages of South Korea's cultural product trade structure. Finally, this paper uses the stochastic frontier gravity model to conduct empirical analysis to draw relevant conclusions about the trade potential of cultural products between China and South Korea. The research results show that: (1) the international competitiveness of cultural products trade in China and South Korea is relatively high, but the competitiveness of China's cultural products has been improved slowly; (2) compared with South Korea, China's cultural product exports are affected by trade inefficiency factors larger. (3) The improvement of government efficiency has a great effect on reducing the inefficiency of trade in China.

Keywords: Cultural product trade, International competitiveness, Digital cultural trade, Stochastic frontier gravity model.

I. INTRODUCTION

The trade of Korean cultural products is not only an important channel for the dissemination of Korean culture, but also an important pillar industry for the country's economic development. In recent years, China's cultural product trade has grown steadily in the national economy, but its contribution to the overall economic level is low, which does not match China's comprehensive economic strength. As China's neighbor, South Korea's cultural development environment is similar to China's. The development experience that cultural product trade has become an important economic pillar of South Korea has

reference significance for China.

On November 15, 2020, China and the ROK signed the Regional Comprehensive Economic Partnership (RCEP). This means that the world's largest free trade agreement has been reached, which will further promote trade cooperation in cultural products between China and South Korea. In today's world of interdependence, China's cultural products trade policy can learn from South Korea's advantageous experience for better development. By studying the competitiveness of cultural products trade between China and South Korea, we can identify the deficiencies of China's current cultural products trade and seek ways to enhance the competitiveness of cultural products trade. It can also explore ways to fully release the export potential of China's cultural products, so as to realize the vigorous development of China's cultural products trade.

II. LITERATURE REVIEW

2.1 Research on the Competitiveness of Cultural Trade

David Ricardo first proposed the theory of comparative advantage [1]. The theory of comparative advantage asserts that the cost of a product is different between countries due to different production technologies. The country should adopt the policy of importing the products with comparative disadvantage, and adopt the policy of exporting the products with comparative advantage. Mas-colell used the comparative advantage theory analysis in cultural trade research [2]. He found that comparative advantage is one of the reasons for the export advantage of cultural products. Balassa constructed the explicit comparative advantage index (RCA) evaluation method [3]. He believed that under the influence of relevant factors, the strength of trade competitiveness can be reflected by the export value of commodities. The RCA index removes the influence of external economic fluctuations on competitiveness, and can reflect the competitiveness of cultural trade more effectively than the traditional single index.

2.2 Research on Influencing Factors of Cultural Trade Competitiveness

Michael Porter's "diamond model" laid the foundation for the study of international trade competitiveness. Since then, many scholars have enriched and improved the "diamond model". Scholars such as Moon introduced the "international diamond" model into the "diamond model" to conduct research on the competitiveness of international trade, and then put forward the theory of the "double diamond model" [4]. The "double diamond model" is better than Porter's single "diamond model". The difference is that the former considers the impact of transnational activities on competitiveness. The Korean scholar Cho (1994) pointed out the relevant deficiencies of Porter's "diamond model". Its research found that the human factor has a significant impact on South Korea's trade competitiveness. Based on the trade data of the vast developing countries, he explained the development and changes of the international competitiveness of developing countries by analyzing the nine elements of competitiveness [5]. Yang Li and Wang Xiaoxiao take ten One country is the research object, combined with the network analytic hierarchy process and Porter's "diamond model" to establish a cultural trade competitiveness evaluation

system [6]. The study found that China's cultural trade comprehensive competitiveness ranks second among 11 countries. The research shows that, China has a competitive advantage in terms of trade environment and enterprise operation, but it is insufficient in human capital and cultural structure.

2.3 Research on Trade Potential

Tinbergen and Poyhonen pioneered the use of gravity models in the study of international trade theory, extending the methodology of international trade flow research [7-8]. Linnemann extended the gravitational model and introduced population variables into the gravitational model [9]. Baldwin measured the trade potential between Eastern and Western European countries. He compared it with the actual trade value to judge whether the level of European integration meets the standards of Western countries [10]. Egger used a traditional gravity model for regression estimation to obtain different countries and regions [11]. Tu Yuanfen used the relevant data of China and 26 countries as samples, and used the gravity model to calculate the trade potential between China and these countries [12]. The results show that variables such as per capita GDP and cultural distance have a greater impact on trade efficiency.

At present, researchers use more stochastic frontier trade gravity models to measure trade potential. Stochastic frontier estimation techniques have been widely used since Battese and Coelli used stochastic frontier methods to efficiently process panel data [13]. Kang and Fratianni used both the stochastic frontier gravity model and the extended gravity model to measure the trade potential of nearly 200 countries, and their research found that the potential predicted value of the stochastic frontier gravity model was closer to the actual value [14]. Ravishankar and Stack (2014) selected the export data of Western European countries to the new EU member states as a sample, and calculated the export efficiency of bilateral trade for 13 years [15].

III. COMPARATIVE ANALYSIS OF THE CURRENT SITUATION OF TRADE

3.1 Comparison of Import and Export Scale of Cultural Products Trade between China and South Korea

China's cultural trade maintains a steady development trend [16-18]. Its foreign cultural trade is dominated by export product trade, and cultural service exports account for a small proportion. China's cultural product trade is generally in surplus, with exports far exceeding imports. China's cultural trade import and export market is dominated by cultural commodity trade. The main export markets are the United States and Hong Kong, and the largest import market is South Korea. South Korea's cultural product trade export market is mainly concentrated in Asia, mainly China and Japan. This is because the cultural background of South Korea and neighboring countries is similar, which can minimize the trade barriers formed by cultural barriers.

TABLE I shows the status quo data of the import and export scale of cultural products in China and South Korea from 2010 to 2019. The import and export data of Chinese cultural products come from the

Ministry of Commerce. The import and export data of Korean cultural products comes from the official website of the Korea Cultural Promotion Institute (https://www.kocca.kr/cop/bbs/list/B0158948.do?menu).

TABLE I. Import and Export of Cultural Products between China and South Korea from 2010 to 2019 (unit: USD 100 million)

Year	Nation	Total import and Export		Export Value		Import Value	
		Amount	year-on-year %	Amount	year-on-year %	Amount	year-on-year %
2010	China	487.0	25.2	428.9	23.8	58.1	37
	South Korea	47.7	-	30.7.	-	17.0	-
2011	China	671.3	37,8	582.1	35.7	89.3	53.6
	South Korea	60.1	26.0	41.6	35.5	18.5	8.8
2012	China	887.5	32.2	766.5	31.7	121.0	35.6
	South Korea	61.3	2.0	44.6	7.2	16.7	-9.7
2013	China	1070.7	20.6	898.5	17.2	172.2	42.3
	South Korea	62,2	1.5	47,7	7,0	14.5	-13.2
2014	China	1273.6	18.9	1118.2	24.5	155.4	-9.8
	South Korea	64.0	2.9	51.1	7.1	12.9	-11.0
2015	China	1013.2	-20.4	870.9	-22.1	142.3	-8.4
	South Korea	66.7	*4.2*	54,9	7.4	11.8	-8.5
2016	China	881,5	-13.0	784.9	-9.9	96.6	-32.1
	South Korea	69.8	4.6	58.2	6.0	11.6	-1.7
2017	China	971.2	10.2	881.9	12.4	89.3	-7.6
	South Korea	98.1	40.5	86.1	47.9	12.0	3.4
2018	China	1023.8	5.4	925.8	5.0	98.6	10.4
	South Korea	106.1	8.2	94.0	9.2	12.1	0.8
2019	China	1114.5	8,9	998.9	7.9	115.7	17.4
	South Korea	-	-	-	-	-	-

Data source: Ministry of Commerce of China and National Bureau of Statistics of Korea

As can be seen from TABLE I, Chinese cultural products developed rapidly in 2010. China's import and export of cultural products increased significantly from 2010 to 2014, began to decline in 2015, and gradually recovered in 2017. This is because China's cultural product import and export scale is affected to a certain extent by the international market demand. In addition, the import scale of Chinese cultural products is relatively large, indicating that the supply of cultural products in the Chinese market cannot fully meet the cultural needs of Chinese consumers.

Judging from the import and export data of Korean cultural products, the import and export of Korean cultural products are less affected by international economic factors, and the import and export scale is steadily increasing year by year. From the perspective of imports, the supply of Korean cultural products can basically meet the cultural needs of domestic consumers. From the perspective of exports, when the international economic situation in South Korea is down, the export scale of cultural products still grows steadily, which shows that the market of South Korean cultural products is relatively low in substitutability and has strong competitiveness and influence.

3.2 Comparison of the Trade Structure of Cultural Products between China and South Korea

3.2.1 China's Cultural Product Trade Structure

The categories of Chinese cultural products can be divided into four categories: publications, arts and crafts and collectibles, stationery and cultural equipment. The structure statistics are shown in TABLE II.

TABLE II. China's Cultural Products Import and Export in 2019 by Commodity Category

Commodity	Total Import and Export	Unit: US$100 Million		Trade Balance	Growth Rate %	
		Export Value	Import Value		Export Value	Import Value
Total	1114.5	998.9	115.7	883.2	79	17.4
Publication	53.7	37.2	16.5	20.7	4.8	13.1
Arts and Crafts and Collectibles	354.0	317.3	36.8	280.5	5.6	100.3
Arts and Crafts	350.1	316.0	34.1	281.8	5.2	93.2
Collection	3.9	1.3	2.6	-1.3	448.6	284.0
Stationery Total	547.0	523.0	23.9	499.1	11.7	23.5
Stationery	1.8	1.8	0.0	1.8	5.1	26.0
Musical Instrument	22.7	17.4	53	12.1	6.7	8.2
Creative Toys	318.9	311.4	7.6	303.8	24.1	16.5
Equipment and Recreational Goods	203.5	192.4	11.1	181.4	-3.5	38.3
Cultural Special Equipment	159.8	121.4	38.4	83.0	0.2	16.8

Data source: General Administration of Customs of China

From TABLE II, in 2019, there was a large imbalance in the proportion of four types of cultural commodities in China's exports. Among them, stationery, arts and crafts and collectibles accounted for a relatively large proportion, while the export of publications accounted for a relatively low proportion. The export of publications is the least, mainly concentrated in the export of paper books such as books and newspapers. The export of audio-visual and electronic publications is relatively low, indicating that there is still a lot of room for the export value of China's digital publications. In terms of cultural product trade imports, the growth rate of China's cultural product imports is higher than that of exports. The import value is also relatively balanced in the distribution of the four categories of cultural products.

Driven by China's "cultural power" strategy, China's cultural product trade exports and trade balances have grown steadily in recent years, but the trade structure still needs to be optimized. First of all, China should enhance the international competitiveness of cultural products by enhancing the added value of cultural products; secondly, it should also learn from some designs of foreign cultural products to enrich the cultural characteristics and diversity of Chinese cultural products, so as to meet the needs of the Chinese market for cultural products. demand; finally, it is necessary to vigorously develop digital cultural products and release the export potential of digital cultural products.

3.2.2 Korean Cultural Products Trade Structure

The export value of Korean cultural commodities far exceeds the import value, and the degree of import dependence is extremely low. There are many advantageous industries and the degree of imbalance is low. Based on the data of the "2019 Korean Cultural Industry Statistical Survey Report" released by the Korea Culture Promotion Institute, this article subtracts the total import and export of cultural services in Korea from the total import and export of Korean cultural industries to obtain the total import and export of Korean cultural products. The results are shown in TABLE III.

TABLE III. Imports and Exports of Korean Cultural Products (Unit: USD Million)

Industry	2017				2018			
	Export	year-on-year%	Import	year-on-year%	Export	year-on-year%	Import	year-on-year%
Issue	220.95	17.9	264.11	3.2	249.00	12.7	268.11	1.5
Comics	35.26	8.6	6.57	0.2	40.50	14.9	6.59	0.3
Music	512.58	15.8	13.83	1.2	564.23	10.1	13.88	0.3
Game	5923.00	80.7	262.91	78.4	6411.49	8.2	305.78	16.3
Movie	40.73	-7.2	43.16	-3.7	41.61	2.2	36.27	-16.0
Animation	144.87	6.8	7.60	3.8	174.51	20.5	7.88	3.6
Broadcasting	362.40	-11.9	110.19	-14.7	478.45	32.0	106.00	-3.8
Advertise	93.23	-15.1	322.18	-15.0	61.29	-34.3	285.23	-11.5
Performing Arts	663.85	8.3	172.49	1.2	745.14	12.2	167.63	-2.8
Knowledge Information	616.06	8.8	0.74	6.1	633.88	2.9	8.85	1102.7
Total	8612.93	48.0	1203,78	4.2	9400.10	9.13	1206.22	0.2

Data source: Korea Culture Promotion Institute

In terms of exports, South Korea's online game industry has shown strong competitiveness. In 2018, the Korean game industry developed rapidly, with an export value of 6.41149 billion US dollars, accounting for 66.7% of the export scale of the Korean cultural industry, an increase of 8.2% year-on-year. The Korean game industry imported only US$306 million in 2018, accounting for 25.1% of the total import of the Korean cultural industry. Comparing the data of the Korean game industry, it is found that Korean game manufacturers have strong game R&D capabilities, and game development talents have strong innovation capabilities, which have formed an international competitive advantage. The export growth rate of other industries in Korea is relatively stable and balanced.

In terms of imports, South Korea mainly imports advertising, games, and publishing industries. The advertising industry has a clear trade deficit, while the publishing industry has a slight trade deficit. The import dependence of other cultural industries in South Korea is extremely low, indicating that the supply of cultural products in the domestic market of South Korea can basically meet the needs of consumers, so that consumers have a low degree of demand for foreign cultural products. Judging from the export and import of Korean cultural products, the domestic cultural market in South Korea is relatively saturated, and cultural products have greater international competitiveness and influence.

3.2.3 Comparison of the Trade Structure of Cultural Products between China and South Korea

From the import and export structure of cultural products from China and South Korea, it can be found that cultural products with lower added value account for a higher proportion of Chinese cultural product exports, while digital cultural products account for a lower proportion of exports, and their trade structure is unbalanced. South Korea, on the other hand, mainly exports high value-added cultural products. The game industry is one of South Korea's dominant cultural industries. At the same time, the export of high value-added industries such as knowledge information, music, character performance, radio and television, and animation has also driven the efficient growth of South Korea's national economy. Since the growth of high value-added industries is inseparable from the technical support provided by the talent factor, South Korea has more advantages than China in the cultural talent factor, especially the training of game development talents earlier than China. Therefore, the structure of Chinese cultural products needs to be further adjusted to cultivate a group of high-quality cultural talents. Colleagues, China should also actively develop cultural industries with high added value.

3.3 Comparison of International Competitiveness of Chinese and Korean Cultural Products

3.3.1 Market Share (MS) Comparison

International market share (MS) refers to the proportion of a country's total exports of a certain type of product or industry to the world's total exports of that product or industry. By observing the changes of the MS index, we can roughly judge the changes in the international competitiveness of a country's products or industries. A higher MS index indicates that the export competitiveness of the product or industry is enhanced, and vice versa.

The international market share of China-Korea cultural products trade can be calculated by the proportion of the two countries' cultural product exports to the world's total exports. Currently, data on the world's total exports of cultural products in the World Bank database are only updated to 2017. Based on the HS code catalogue of core cultural products in the UN Comtrade database, this paper calculates the MS index of core cultural products in the two countries in recent years, as shown in TABLE IV.

TABLE IV. 2012-2019 International Market Share of Core Cultural Products in China and South Korea (Unit: %)

Nation	2012	2013	2014	2015	2016	2017	2018	2019
China	2136	20.73	18.53	20.64	1930	19.29	17.94	17.92
South Korea	1.20	1.22	1,28	L45	1.39	1.31	1.85	2.75

Data source: According to UN comtrade database

It can be seen from TABLE IV that China's core cultural product exports account for more than South Korea's export share in the international market, which has a certain market foundation. However, in recent years, China's MS index has shown a continuous downward trend, which shows that in the face of the

severe international situation, China's core cultural products are not competitive enough. Although the proportion of core cultural products in South Korea is relatively low, it has shown a continuous growth trend in recent years, indicating that it has strong international competitiveness. The development experience of South Korea's steady growth of MS indexes every year has certain reference significance for China.

3.3.2 Competitiveness Index (TC) Comparison

The Trade Competitiveness Index (TC) is one of the commonly used indicators to analyze the competitiveness of international trade. It represents the ratio of the difference between the import and export trade of a certain product or industry in a country to the total import and export trade, and can exclude changes in macroeconomic factors such as inflation. The impact of the TC index is highly comparable. The value range of the TC index is [-1, 1]. Usually, the value range of the TC index can be divided into [-1, -0.6), [-0.6, [-0.6, -0.3), [-0.3, 0), [0, 0.3), [0.3, 0.6), [0.6, 1] six intervals. Different value ranges represent the country's trade competitiveness of the product.

The TC index can exclude the influence of macroeconomic factors to evaluate the international competitiveness of Chinese and Korean cultural products. In order to better compare the trade competitiveness of cultural products between China and South Korea. This question is calculated based on the import and export data of cultural products of various countries released by the Ministry of Commerce of China and the Korea Statistics Bureau, as shown in TABLE V.

TABLE V. 2010-2019 China-Korea Cultural Products Trade TC Index

Nation	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
China	0.761	0.734	0.727	0.678	0,756	0.719	0.781	0.816	0.807	0.792
South Korea	0.287	0.384	0.455	0.533	0.597	0.646	0.668	0.755	0.772	-

Data source: Ministry of Commerce of China, Korea Statistics Bureau

From TABLE V, China's TC index has stabilized between 0.67 and 0.82 in the past decade, with a very strong international competitive advantage. In recent years, South Korea's TC index is lower than China's, but it maintains a steady growth trend and shows a trend of catching up with China. Comparing and observing TABLE V, it can be found that the TC index of China's cultural products trade has entered a bottleneck period of growth and fluctuated within a certain range.

3.3.3 Revealed Comparative Advantage (RCA) Comparison

The Revealed Comparative Advantage Index (RCA) refers to the ratio of a country's total exports of a certain product in the country's total exports to the proportion of global exports of this product in the world's total exports. The RCA index reflects a country's comparative advantage in trade in a certain product. The RCA index can better reflect the relative advantages of a country's export of certain products and the world's average export. In a general sense, the value of the RCA index can be divided into (0, 0.8),

[0.8, 1.25], (1.25, 2.5), [2.5, +oo). The scores represent very low, average, strong, and extremely strong levels of competitiveness. The higher the RCA index, the stronger the international competitiveness of a certain product trade in the country.

TABLE VI. mainly calculates and organizes the Revealed Comparative Advantage Index (RCA) of China and South Korea's core cultural products from 2013 to 2019. In the UN Comtrade database, the data is aggregated according to the HS code catalogue of core cultural products, and then the RCA index of the trade of core cultural products between China and South Korea is calculated. From the overall point of view of core cultural products, although the RCA index of China's core cultural products is greater than 1.25 and has strong competitiveness, it has shown a downward trend in recent years. The RCA index of South Korea's core cultural goods trade is lower than that of China, but maintains an increasing trend. This shows that the competitiveness of South Korea's core cultural products is gradually improving.

TABLE VI. RCA Index of Core Cultural Products in China and South Korea from 2012 to 2019

Nation	2012	2013	2014	2015	2016	2017	2018	2019
China	1.798	1.709	1.472	1.464	1.442	1.469	1.361	1.300
South Korea	0.377	0.398	0.416	0.443	0.441	0.439	0.578	L035

Data source: UN Comtrade database

IV. Empirical Analysis on the Export Efficiency and Potential of Cultural Products in China and South Korea

The comparative analysis of the status quo of cultural products trade competitiveness between China and South Korea has been carried out before. In this section, the stochastic frontier gravity model will be used to forecast the prospects for the export competitiveness of cultural products between China and South Korea, and to study the impact of cultural product exports between China and South Korea. Finally, the efficient trade value calculated by the model is used to measure the trade potential of China and South Korea to 25 countries and regions.

4.1 Design of the Study

4.1.1 Stochastic Frontier Gravity Model

Stochastic Frontier Analysis (SFA) and Data Envelope Analysis (DEA) are the two most commonly used methods to measure trade efficiency. DEA is a nonparametric method that deviates from the real data in measuring bilateral trade flows. SFA uses a parameter estimation method that takes into account the impact of random factors on output, so that the estimated efficiency value is more stable. The formula of the SFA model is shown in formula (1):

$$T_{\mathrm{ijt}} = f\left(X_{ijt}, \beta\right)\exp\left(v_{ijt} - u_{ijt}\right), u_{ijt} \geq 0 \tag{1}$$

In formula (1), i and j represent the exporting country and the importing country respectively, T_i represents the actual bilateral trade volume during t; X_i is some natural factors that affect the trade between the two parties; v represents the random disturbance term; efficiency term. If u_n is greater than 0, trade is hindered.

In the stochastic frontier gravity model, the trade potential is expressed as follows:

$$T_{ijt}^* = f\left(X_{ijt}, \beta\right)\exp\left(v_{ijt}\right) \tag{2}$$

T_{ijt} refers to the trade potential of the exporting country and the importing country in period t, and the trade efficiency is:

$$TE_{ijt} = \frac{T_{ijt}}{T_{ijt}^*} = \exp\left(-u_{ijt}\right), u_{ijt} \geq 0 \tag{3}$$

where TE_{jt} represents the trade efficiency between country i and country j in period t, T_{it} is the actual trade value between the two countries in period t, and T_{ijt} is the trade potential between the two countries in period t. When $u_{ijt}=0$, it means that the trade is efficient, the trade volume is the same as the trade potential, and TE_j is 1 at this time; when $u_{ijt}>0$, the trade is inefficient, and the trade potential needs to be tapped, $TE_{ij} \in$ (0, 1).

4.1.2 Time-varying Stochastic Frontier Gravity Model

Considering that there are cross-section and time series factors in the panel data in this paper, its technical efficiency may change with time, so the panel data in this paper is not suitable for analysis using traditional frontier analysis methods. Battese & Coelli (1992) designed a time-varying decay model to address the problem that technical efficiency may vary over time. The specific model is as follows:

$$T_{ijt} = f\left(X_{ijt}, \beta\right)\exp\left(v_{ijt} - u_{ijt}\right) \tag{4}$$

$$u_{ijt} = \left\{\exp\left[-\eta\left(t - T\right)\right]\right\}u_{ij}; \exp\left[-\eta\left(t - T\right)\right] \geq 0 \tag{5}$$

Among them, $\eta>0$ means that the trade efficiency increases with time; $\eta=0$ means that the trade efficiency does not change with time; $\eta<0$ means that the trade efficiency decreases with the increase of time.

4.2 Variable Selection and Model Construction

4.2.1 Construction of time-varying stochastic frontier gravity model

On the basis of the above analysis, this paper selects the export value of cultural products between China and South Korea as the dependent variable, and selects the gross domestic product, whether there is a common language with China and South Korea, population, geographical distance and whether to sign a free trade agreement as independent variables to construct Model. In the model, all variables except dummy variables were logarithmically processed to ensure dimensional consistency.

$$\ln EXP_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt}$$
$$+ \beta_5 \ln Dis \tan ce_{ij} + \beta_6 LAN_{ij} + v_{ijt} - u_{ijt}, u_{ijt} \geq 0 \qquad (6)$$

In formula (6), i and j represent the exporting country and the importing country, respectively. A description of each indicator is shown below.

(1) GDP represents the total GDP of exporting countries or trading partners of cultural products in year t. It is generally believed that GDP plays an active role in promoting the export scale of cultural products. From the perspective of the supply side, the higher the GDP of the exporting country (region), the higher the level of economic development, and the exporting country will have more capital to invest in the development of cultural industries. From the perspective of demand, the higher the country's GDP, the greater the demand for culture.

(2) POP represents the population size of the cultural product exporting country or its trading partners in year t. Population size affects not only the supply of a country's cultural products but also the demand.

(3) Distance represents the geographical distance between the exporting country of cultural products and the trading country (region). It refers to the distance between the capitals or regional centers of two countries. The increase of geographical distance will lead to the increase of logistics cost, which is not conducive to the development of trade. In addition, the length of geographical distance will also affect the degree of cultural exchanges between the two countries.

(4) LAN indicates whether the exporting country and importing country (region) of cultural products have a common language. This variable takes into account the language similarity between China and South Korea as a whole with their trading partners. The closer the language, the higher the acceptance of cultural products and the greater the demand for cultural products. This variable is a dummy variable, if the language similarity is large, it is marked as 1. If the language similarity is weak, the flag is 0.

4.2.2 Construction of trade inefficiency model

Based on the above analysis, this paper selects the cultural distance between China and South Korea,

government efficiency, whether to sign free trade agreements with trading partners and trade freedom as explanatory variables, and constructs the following model.

$$u_{ijt} = \alpha_0 + \alpha_1 FTA_{ijt} + \alpha_2 GULD_{ijt} + \alpha_3 GE_{ijt} + \alpha_4 TF_{ijt} + \varepsilon_{ijt} \tag{7}$$

In formula (7), i and j represent the exporting country and the importing country, respectively, and the explanation of each variable is as follows.

(1) FTA_{ijt} represents whether the exporting and importing countries (regions) of cultural products have signed a Free Trade Agreement (FTA) in year t. If the two countries (regions) signed a free trade agreement, the variable value is 1, otherwise it is 0. Signing a free trade agreement can reduce the restrictions on the trade of products between the two countries, thereby promoting the trade of cultural products.

(2) $GULD_{ijt}$ represents the cultural distance between the exporting country and the importing country (region) of cultural products in year t. Similar cultures can promote the residents of the exporting country to accept the cultural products of the exporting country, thereby promoting the trade of cultural products between the two countries.

(3) GE stands for Government Efficiency. The development of a country's trade depends to some extent on the efficiency of its government. Generally speaking, the better the government efficiency, the better the trade growth between the two countries (regions).

(4) TF represents the degree of freedom of trade. It refers to the degree of openness of a country or region to imported goods or services. Export trade efficiency increases with the degree of trade facilitation in importing countries.

4.2.3 Sample selection and data sources

This paper includes the trade data from 2002 to 2019 of 25 countries or regions that trade more cultural products with China and South Korea. 25 countries are China, South Korea, Japan, the United States, Italy, India, Singapore, Malaysia, the Netherlands, Spain, Canada, the United Kingdom, Germany, France, Brazil, the Philippines, Vietnam, Saudi Arabia, the United Arab Emirates, Thailand, Indonesia, Mexico, Russia, South Africa and Hong Kong.

The export value of cultural products of China and South Korea to trading partners is from the UN Comtrade Database. The GDP of the trading countries and the population of the trading countries are from the WDI database. Whether China uses a common language with other countries (regions) comes from the CEPII database. In this paper's trade inefficiency model, the data on whether the two countries have signed a free trade agreement come from the China Free Trade Zone Service website. The cultural distance data comes from the official Hofstede website. Data on trade freedom comes from the Economic Freedom

website. Government efficiency data comes from the World Data Atlas.

4.3 Hypothesis Testing

Whether to introduce a trade inefficiency term and use a time-varying stochastic frontier gravity model requires an LR test. First, this paper needs to test whether the trade inefficiency term exists. Assuming that the trade inefficiency term does not exist, if the original hypothesis is rejected, it means that the value of γ is relatively close to 1, and u_{ijt} accounts for a high proportion of the random error term, so it is more reasonable to use the stochastic frontier gravity model. Conversely, the reason for the actual export inefficiency is v_{ijt}.

In this paper, the value of LR=-2[ln(H0)-In(H1)] is compared with the critical value of 1% of the chi-square distribution. The test results are shown in the following TABLE VII:

TABLE VII. Hypothesis Test of Stochastic Frontier Gravity Model

Null Hypothesis	Constraint Model	Unconstrained Model	LR Statistic	P-value	Test Results
U_{ijt} does not exist (China)	-1149.12	-62937	1039.49	0.0000	reject
U_{ijt} time-invariant (China)	-913.13	-531.21	763.84	0.0000	reject
U_{ijt} does not exist (South Korea)	-756.59	-648.19	216.79	0.0010	reject
U_{ijt} time-invariant (South Korea)	-324.67	-231.25	186.84	0.0000	reject

According to the hypothesis test results, it can be found that the empirical research effect of using the time-varying stochastic frontier gravity model is better for South Korea and China.

4.4 Empirical Results

The data of cultural products trade from 2002 to 2019 in China and South Korea for 25 countries or regions were regressed, and the results are shown in TABLE VIII.

TABLE VIII. Time-varying Stochastic Frontier Model Results for China and South Korea

Variable	Export of Chinese Cultural Products		Export of Korean Cultural Products	
	Stochastic Frontier Gravity Model	Trade Inefficiency Model	Stochastic Frontier Gravity Model	Trade Inefficiency Model
$LnGDP_{it}$	1.2055***		-11.6809	
	(0.309)		(14.000)	
$LnGDP_{jt}$	0.9875***		16.6904***	
	(0.045)		(2,266)	
$LnPOP_{it}$	•18.2210**		-3.7742	
	(8.699)		(5.560)	
$LnPOP_{jt}$	-0.5265***		-0.1295	
	(0.040)		(0.090)	
$LnDistance_{ij}$	-0.4333***		-1.0670***	
	(0.069)		(0.073)	

LAN_{ij}	0.0999***		-0.0000	
	(0.109)		(0.000)	
GE_{ijt}		-5.4860***		-0.2035*
		(4.286)		(0.110)
$GULD_{ijt}$		8.4426***		-0.0467
		(1.777)		(0.074)
TF_{ijt}		11.9164		-1.0149**
		(8.497)		(0.421)
FTA_{ijt}		-1.8267*		-0.1952**
		(1.920)		(0.134)
Constant	353.1275**	-144.4157***	79.8440	5.5699
	(173.949)	(34.400)	(65.637)	(28.212)
u	2.3746***		0.2473***	
	(0.312)		(0.488)	
v	-0.2867***		0.3669***	
	(0.074)		(0.392)	
γ	0.8346***		0.3124***	
η	0.027***		0.009***	
Observations	450	450	450	450

Data source: STATA 17 calculation and finishing

4.4.1 Analysis of results

In China's time-varying frontier gravity model for 25 countries (regions), the coefficients of China's GDP to 25 countries (regions) are all positive. Compared with other factors, the estimated coefficients of both are relatively large and both pass the 1% significance test. The higher the level of China's economic development, the more funds China invests in the development of the cultural industry, and the stronger its ability to export to the outside world. At the same time, the improvement of China's economic strength is conducive to foreign countries' understanding of China and enhance their understanding and recognition of Chinese culture. In contrast, the estimated coefficient of $LnGDP_{it}$ is 0.218 larger than that of $LnGDP_{ji}$. This shows that China's own GDP growth has a stronger impetus for its cultural product exports. In Korea's time-varying frontier gravity model for 25 countries (regions), the coefficients of Korea's GDP to 25 countries (regions) are inconsistent. Korea's GDP coefficient fails the significance test. The $LnGDP_{jt}$ coefficient of the trading countries (regions) is very large, which means that the larger the GDP of the trading countries (regions), the greater the demand for Korean cultural products. This shows that the Korean cultural product trade is more competitive with China.

For the indicator geographic distance LnDistance, the coefficients of China and South Korea are negative and significant. This shows that with the development of productive forces, the logistics level of various countries has been greatly improved, but the geographical distance is still an important factor hindering the trade of cultural products between the two countries. The absolute value of the LnDistance coefficient of South Korea is larger than that of China, which indicates that geographical distance has a greater impact on the export of Korean cultural products.

In terms of population factors, in China's model results for 25 countries (regions), the coefficients of $LnPOP_{it}$ and $LnPOP_{jt}$ are -18.2210 and -0.5265, respectively, and are significant at the 5% and 1% confidence levels, respectively. This may be due to the increase in demand caused by the growth of China's population. The consumption of cultural products gives priority to domestic demand. In South Korea's model results for 25 countries (regions), the coefficients of $LnPOP_{it}$ and $LnPOP_{jt}$ are not significant. This may be due to the fact that South Korea has a small population and it is difficult to form a scale effect.

The results of the indicator LAN are only significant in China's time-varying stochastic frontier gravity model for 25 countries (regions). This shows that language exchange between the two countries (regions) is conducive to promoting the export of Chinese cultural products. Although the popularity of the Internet and the development of economic globalization have lowered the barriers to language communication, language factors still have a great impact on cultural trade.

4.4.2 Analysis of trade inefficiency model results

As shown in TABLE VIII, the values of the Y coefficients for China and Korea are 0.8346 and 0.3124, respectively. China's Y coefficient is close to 1, which shows that trade inefficiency is the main reason for hindering trade exports. The Y coefficient of South Korea is smaller than that of China, which indicates that South Korea's trade inefficiency level is lower than that of China.

Among the coefficients of the indicator GE_{ijt}, the model coefficients of China and South Korea for 25 countries (regions) are -5.4860 and -0.2035, respectively, and are significant at the 1% and 10% confidence levels. This shows that government efficiency has played a role in promoting the export of cultural products between China and South Korea. China's government efficiency index model coefficient is very large, which shows that the improvement of government efficiency will greatly improve China's cultural product exports. The improvement of government efficiency is less of a boost for South Korea.

The coefficient of Chinese cultural distance index $GULD_{ijt}$ is 8.4426, which is relatively large. This means that the cultural distance between China and the importing country is an important factor hindering the export of cultural products. The large cultural distance between the two countries indicates that the cultural differences between the two countries are relatively large, which is not conducive to the understanding of the exporting country's culture by importers and exporters.

The trade freedom index TF_{ijt} is only significant in South Korea's model results for 25 countries (regions), and its coefficient is -1.0149. This shows that the improvement of trade freedom can improve the foreign trade efficiency of Korean cultural products. For China, trade freedom has a weaker role in promoting the export of Chinese cultural products.

In terms of the indicator FTA_{ijt}, the coefficients of China and South Korea are -1.8267 and -0.1952, respectively, and are significant at the 10% and 5% confidence levels, respectively. This shows that the

signing of FTAs between trading countries can effectively reduce trade inefficiencies. The signing of free trade agreements can effectively reduce trade costs.

V.CONCLUSION

Comparing the import and export scale and structure of cultural products between China and South Korea, it is found that the import and export scale of Chinese cultural products is relatively large. However, exports are mainly low value-added products, and the structure of cultural products needs to be improved. The import and export scale of cultural products in South Korea is relatively small, but the export is mainly high value-added products, and the international competitiveness is relatively strong. Using MS, TC, and RCA indices to quantitatively compare the competitiveness of cultural products in China and South Korea, it is found that the international competitiveness of cultural products trade between China and South Korea is relatively high, but the competitiveness of China's cultural products improves slowly. China should seize the opportunity to strengthen the development of the digital cultural industry and further enhance the international competitiveness of cultural products.

From 2002 to 2019, the overall efficiency of China's cultural products export trade was relatively high. However, compared with South Korea, the export of Chinese cultural products is greatly affected by the inefficiency of trade, and there is a lot of room for improvement. However, the export efficiency of Korean cultural products is relatively high, and the development has been relatively stable. There is little room for improving the level of trade exports by improving the inefficiency of trade. The factors affecting South Korea's foreign trade exports are mainly affected by other unexpected factors.

From the perspective of the factors affecting the export of cultural products between China and South Korea, the size of the GDP of both sides of the trade has a greater impact on the export of cultural products. The export of Korean cultural products is mainly driven by the GDP of the trading country, and is less affected by the GDP of the country. besides. Whether there is a common language with the exporting country is also an important factor in promoting the trade of cultural products. Although the logistics cost of import and export is decreasing with the development of productivity, geographical distance is still an important factor restricting export.

From the perspective of the influencing factors of the trade non-efficiency item, the cultural differences, trade freedom, government efficiency and whether to sign a free trade agreement between the two countries have different effects on the export of cultural products between China and South Korea. Among them, the improvement of government efficiency has a great effect on reducing the inefficiency of trade in China.

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