

Empirical analysis of Chinese cultural products trade based on the gravity model

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Received 28 October 2014, www.cmnt.lv

Abstract

Based on date of bilateral cultural trades between China and 26 other countries (regions), the paper uses a gravity model to perform an empirical test on the influencing factors and export potential of cultural products. The research shows that Chinese economic size, importing country's economic scale, GDP per capital, trade openness and preferential trade arrangements have a positive effect on the export of Chinese cultural products. Spatial distance and cultural distance from China have a negative effect on exports of Chinese cultural products. The effect of cultural distance is bigger than that of spatial distance. It is very important for promoting the exports of Chinese cultural products to strengthen communication and overcome "cultural discount". In the 26 samples, the trades of cultural products between China and 7 countries (regions) are sufficient, and the trades of cultural products between China and other 19 countries (regions) are insufficient. China has a great potential for cultural products trades, but China should develop it targeted.

Keywords: gravity model, cultural products trade, influencing factors, export potential

1 Introduction

The cultural products have the following features of low consumption, low pollution and high added value, therefore, it becomes a strategic pillar industry which is an important path for many countries to develop and enhance their "soft power". According to international experience, when the ratio of output value in a certain industry and GDP is more than 5%, the industry can be called a pillar industry. In 2010, the cultural industry accounted for 2.75% of GDP in China, and there is still a large gap to reach the target of 5%. As a result, it's imperative to develop the cultural industry in China.

Accelerating the development of cultural trade and expanding the scale of foreign trade of cultural products, which is an important means to promote the cultural industry to be the pillar industry of China. Therefore, we need to research the factors that determine the scale and direction of China's cultural trade, and explore the export potential of cultural products. This paper analyzes the influence factors and export potential of China's cultural products trade based on the gravity model.

The gravity model is used in various social sciences to predict and describe certain behaviors that mimic gravitational interaction as described in Isaac Newton's law of gravity. Gravity model has been widely used in areas of traditional trade. With the continuous expansion of global cultural trade, gravity model has gradually been studied in the field of culture trade. Schulze introduced the gravity model to the field of culture trade first, and he found that the trade flow of artistic products is proportional to the economy scale of the countries, and inversely proportional to the distance [1]. Disdier et al added dummy variable such as common language and colonial

relationship to the original gravity model, and he found that, compared with non-cultural products, cultural products trade used to happen in countries that have a short distance [2]. The empirical research from Ferreira & Waldfogel shows that the scale of cultural trade between the close countries that have the same language will be large [3]. They also noted that, with the development of transport and communication technology, the spatial distance between the countries will be shorten, but the spatial distance will be one of the main factors that influence the cultural products trade.

Cultural products that are different from the traditional products will have the phenomenon of "cultural discount" in international trade. "Cultural discount" refers to the value of the cultural products that will be discount in another country because of the cultural differences. The experts usually use the cultural distance to measure the possibility of cultural discount. The research from Disdier et al shows that the more similar the culture of the two countries is, the greater the scale of bilateral trade will be [4]. The paper calculates the export potential of China's cultural products trade with major trading partners on the base of the empirical analysis of the factors affecting Chinese cultural products trade.

2 Application of gravity model

2.1 CONSTRUCTION OF GRAVITY MODEL

The gravity model is a basic law in physics, which pointed out that the gravitational force between two objects is directly proportional to the product of their quality, and inversely proportional to the square of the distance between them.

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The gravity model was applied first by Tinbergen (1962) to the study of international trade, introducing GDP of the both sides and geographic distance as explanatory variables to the analysis of bilateral trade volume. The basic form is as follows:

$$T_{ij} = \frac{AY_i Y_j}{D_{ij}}$$

T_{ij} represents the bilateral trade volume between country i and country j , A is a constant, Y_i represents GDP of country i , Y_j represents GDP of country j , D_{ij} represents the geographic distance between country i and country j .

According to the characteristics of cultural products trade, the paper added a new explanatory variable in the original gravity model to extend and modify the model, and established the model for the export of Chinese cultural products. Meanwhile, in order to overcome the heteroskedasticity of gravity model, take the natural logarithm on both sides of gravity model, and the final econometric model is as follows:

$$\begin{aligned} \ln EX_{ijt} = & A_{ijt} + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln Y_{jt} + \\ & \beta_4 \ln SD_{ij} + \beta_5 \ln CD_{ij} + \beta_6 \ln Open_{jt} + \beta_7 FTA_{ijt} + \varepsilon_{ijt} \end{aligned}$$

The subscript i represents China, t represents the time. A_{ijt} represents constant term. EX_{ijt} represents the export of Chinese cultural products to j country(region). GDP_{it} represents China's GDP, and GDP_{jt} represents the GDP of j country (region) as importer. Y_{jt} represents the per capita GDP of j country (region). SD_{ij} represents the spatial distance between China and j country (region). CD_{ij} represents the cultural distance between China and j country (region). $Open_{jt}$ represents the degree of opening in j country (region). FTA_{ijt} is a virtual variable that represents the situation whether China and the importing country (region) j are belong to a trade group. When the two countries are both in the same trade group, the trade flows between them will increase due to preferential trade arrangements. Therefore, FTA_{ijt} was used to investigate the effect of the national or regional economic cooperation on cultural trade. ε_{ijt} represents deviation item.

2.2 SELECTION OD DATA

At present, the popular standard of cultural trade statistics is the "Framework for Cultural Statistics" (FCS for short) issued by UNESCO. "2009 Framework for Cultural Statistics of UNESCO" (2009FCS for short) is the new framework for cultural statistics issued by UNESCO in 2011.

Generalized fields of culture are divided into the narrow field of culture (the field of culture) and related fields. The field of culture represents a series of cultural production, activities and practices, which can be classified into the following categories: cultural and natural heritage (coded as A); performances and celebrations (coded as B); visual arts and handicrafts (coded as C); books and newspapers (coded as D); audio-visual and interactive media (coded as E); design and creative Services (coded as F). In addition, it also includes four

horizontal fields: non-material cultural heritage, archiving and protection, education and training, equipping and supporting material. The related fields include sports, recreation and tourism. Due to some difficulties in the statistics of horizontal field and related field, the research does not include horizontal field and related field, but only six categories A-F of cultural field (called as culture products by UNESCO), which represent the most core culture field.

UNESCO also encourages countries to collect comparable data at least in these areas. "2009FCS" not only delineate the width of the culture field, but also provides SITC code that is accurate to 5 digits in A-F of cultural field.

According to the SITC code of "2009FCS", the bilateral trade data of cultural products have been obtained from the United Nations' commodity trade database (comrade database). The paper selects 16 developed countries and 10 developing countries (regions) as the sample. In 2010, the export of Chinese cultural products to the 26 countries (regions) accounted for 83.91% of China's total export of cultural products; therefore, the sample is representative. GDP and per capita GDP are from WEO database of the IMF site. The spatial distance between China and the importing country (region), indicated by the distance between the capitals of whom, is from the "distance calculator" of www.indo.com. The trade openness index $Open_{jt}$ is the ratio of total goods trade and GDP of the importing country. The total goods trade is from the official website of WTO. The paper takes the Asia Pacific Economic Cooperation (APEC) as the trade group. If China and the importing country (region) are both in APEC, $FTA_{ijt} = 1$, otherwise, $FTA_{ijt} = 0$.

Cultural distance (CD_{ij}) is used to measure the cultural differences between China and the importing country (region). The paper takes Hofstede's research method of five cultural dimensions for reference, the formula of that is as follows:

$$CD_{ij} = \frac{1}{5} \left[\sum_{k=1}^5 I_{kj} - I_{ki} \right]^2 / V_k$$

I_{kj} represents the score of country (region) j in the cultural dimension of k , I_{ki} represents the score of China in the cultural dimension of k , V_k represents the variance of cultural dimension k . The five cultural dimensions are power distance, uncertainty avoidance, individualism/collectivism, degree of male/female, and the orientation of long/short term. The scores of China and its 26 trading partners in 5 cultural dimensions are all from the Hofstede website. The greater CD_{ij} is, the larger cultural distance will be, which indicates the cultural difference between China and its importing country (region).

The period of sample is 1992-2010. The paper makes an empirical analysis with panel data. The econometric method of panel data combines advantages of time series data and cross-section data, which is more comprehensive to reflect the individual characteristics of the research objects, and makes the regression model more persuasive

than pure time series model and cross section model due to the expansion of the sample capacity.

3 The regression results of the gravity model

In order to test the robustness of the gravity model, the paper uses the method of stepwise regression, and gets the regression results in Table 1. With the gradual adding

of independent variables. The goodness of fit (R^2) for the model is improved. The goodness of fit reaches 0.85, and the explanatory power of the independent variables on the equation reaches 85%. The independent variables are stable, and the statistic values (t) of the independent variable pass the significance test, which shows that the model has good robustness.

TABLE 1 regression results of gravity model

	Equation1	Equation2	Equation3	Equation4	Equation5	Equation6	Equation7
constant	8.686 (10.140)	5.020 (5.694)	4.591 (6.385)	5.814 (6.235)	5.672 (8.125)	1.618 (2.587)	1.503 (2.539)
$LnGDP_{it}$	1.369*** (11.164)	1.141*** (9.906)	0.874*** (9.139)	0.332*** (6.541)	0.529*** (13.406)	0.268*** (7.379)	0.303*** (8.744)
$LnGDP_{jt}$		0.546*** (9.166)	0.331*** (6.520)	0.888*** (9.262)	0.773*** (10.738)	0.546*** (9.067)	0.541*** (9.495)
LnY_{jt}			0.698*** (14.585)	0.699*** (14.608)	0.789*** (21.829)	1.215*** (29.954)	1.194*** (31.007)
$LnSD_{ij}$				-0.164** (-2.059)	-0.165*** (-2.779)	-0.117** (-2.417)	-0.120*** (-2.620)
$LnCD_{ij}$					-1.252*** (-18.540)	-0.786*** (-12.547)	-0.718*** (-11.948)
$LnOpen_{jt}$						1.128*** (15.175)	1.037*** (14.511)
FTA_{ijt}							0.234*** (7.292)
R^2	0.220	0.346	0.556	0.560	0.751	0.835	0.852
Adjust- R^2	0.219	0.343	0.553	0.557	0.748	0.833	0.850

Notes: ***, **, * represent 1%, 5%, 10% of significant level, The value in brackets is the value of t .

In the gravity model of Chinese cultural products export the elastic coefficient of the independent variable $LnGDP_{it}$ is 0.303, which indicates that when China's GDP increases by 1%, the export of Chinese cultural products will increase by 0.303%. The expanding of China's economy scale will promote the export of cultural products. The elastic coefficient of the independent variable $LnGDP_{jt}$ is 0.541, which indicates that when GDP of the importing country (region) increases by 1%, the export of Chinese cultural products to it will increase by 0.541%. The rising economic might will be conducive to China's cultural products export.

The elastic coefficient of the independent variable LnY_{jt} is 1.194, and its absolute value is the largest in that of all elastic coefficients with the most significant t , which indicates that when per capita GDP of the importing country (region) increases by 1%, the export of Chinese cultural products to it will increase by 1.194%. The per capita GDP of the importing country (region) has great effect on the export of Chinese cultural products.

The elastic coefficient of the independent variable $LnSD_{ij}$ is -0.120, which indicates that when the spatial distance between China and the importing country (region) increases by 1%, the trade flows of the cultural products will reduce by 0.12%. There is a negative correlation between the spatial distance and the export of Chinese cultural products. The spatial distance is still one of the main factors influencing China's cultural products export. The elastic coefficient of the independent variable $LnCD_{ij}$ is -0.718, which indicates that when the cultural distance between China and the importing country (region) increases by 1%, the trade flows of the cultural products will

reduce by 0.718%. China tends to export the cultural products to the countries (regions) with the similar culture, which is consistent with the conclusion of Disdier et al (2010) [5,6]. From the absolute value of the elastic coefficient, elastic coefficient of cultural distance is far greater than the elastic coefficient of spatial distance, therefore, the effect of cultural distance on the export of Chinese cultural products is much greater than that of spatial distance.

The elastic coefficient of importing country's (region's) trade openness ($LnOpen_{jt}$) is 1.037, which indicates that when the trade openness of the importing country (region) increases by 1%, the export of Chinese cultural products to it will increase by 1.037%. The liberalization of global cultural trade would promote China's export. The elastic coefficient of FTA_{ijt} is 0.234, which indicates that preferential trade policy would promote China's export of cultural products, if the importing country (region) is the member of APEC.

4 The export potential calculation of Chinese cultural products

The calculation of export potential compares the actual export value with the simulate export value, applying potential export value of product in "theory" or "natural" state of the gravity model.

If actual value / simulate value > 1, the actual trade value between the two countries is greater than the simulated values, which indicates "excessive trade"; if actual value / simulate value < 1, the actual trade value between the two countries is less than the simulated values,

which indicates “insufficient trade” and the trade potential. Taking 2010 as an example, the paper calculates the export potential of Chinese cultural products. The results are shown in Table 2.

TABLE 2 Export potential of Chinese cultural products in 2010 (Unit: million dollars)

Country (region)	Trade volume (actual value)	Trade volume (simulate value)	Actual value/Simulate value
Australia	408.290	402.352	0.985
Brazil	145.312	321.388	2.212
Britain	1471.281	1081.288	0.735
Canada	683.725	397.160	0.581
Denmark	744.094	50.655	0.068
Philippines	51.854	106.540	2.055
Finland	106.043	65.844	0.621
France	1810.142	418.791	0.231
Germany	3147.851	1526.109	0.485
Hong Kong of China	875.983	7589.268	8.664
India	195.644	297.329	1.520
Italy	549.314	486.593	0.886
Japan	3814.819	1085.347	0.285
South Korea	869.123	346.982	0.399
Malaysia	187.661	196.129	1.045
Mexico	326.426	111.397	0.341
Holland	593.046	718.851	1.212
New Zealand	39.273	33.629	0.856
Portugal	36.466	30.449	0.835
Russia	469.033	319.456	0.681
Singapore	527.868	260.250	0.493
Spain	333.325	275.972	0.828
Sweden	172.977	81.253	0.470
Switzerland	322.573	32.584	0.101
Thailand	167.646	129.896	0.775
America	4591.946	8240.661	1.795

In the calculation of China’s export potential to 26 countries, 7 countries (regions) who are America, Holland, Hong Kong, Brazil, India, Philippines and Malaysia show “excessive trade”, while 19 countries (regions) who are Japan, Italy, France, Germany, South Korea, Mexico, Russia, Singapore, Thailand and so on, show “insufficient trade”. Ranking first is Hong Kong of China (8.644), and the last is Denmark (0.068), which shows that the potential of China’s export to Denmark is huge. In addition, the ratio of actual value and simulate value in 7 countries, who are France, Germany, Japan, South Korea, Mexico, Sweden and Switzerland, is less than 0.5. It indicates that the potential of China’s export to the 7 countries above is relatively large. Overall, China’s export of cultural products to its main trading partners is in the situation of “insufficient trade”.

5 Conclusions and suggestions

The paper selected the panel data of China’s cultural products export trade with other 26 countries (regions) in 1992~2010, using the gravity model to empirically analyze the influence factors of Chinese cultural products export trade [7]. On this basis, the paper calculated China’s potential of cultural products export. According to the results of empirical analysis, the paper obtained the following conclusions:

First, the traditional factors are still the main factors affecting China’s cultural products export. GDP and per

capita GDP of China and import country (region) have the positive effect on China’s cultural products export, while the spatial distance has the negative correlation with China’s cultural products export.

Second, China’s cultural products export has its own features. Compared with the space distance, the cultural distance has much more negative influence on China’s cultural products export. The trade openness of importing country (region) and whether the trade partners belong to a free trade area, which have a positive effect on China’s cultural products export.

Third, Chinese cultural products have great export potential. The relevant research shows that, the export of China to the major trading partners is on the situation of “insufficient trade”, the ratio of the actual value to the simulation value is 0.740. In China’s 26 major trading partners, only 7 countries’ (regions’) cultural products trade with China show “excessive trade”, and 19 countries (regions) belong to the “insufficient trade”.

Based on the research conclusions above, the paper believes that the following measures should be taken to expand the export scale of Chinese cultural product, to promote the development of China’s cultural industry.

5.1 TO DEVELOP THE REAL ECONOMY VIGOROUSLY

GDP of the exporting country (region) is one of the important influence factors which influent the cultural products export. The sustained growth of China’s GDP is conducive to improve the export capacity of cultural products. The enhancement of cultural products’ export capacity, will not only further stimulate China’s GDP growth in return, but also promote the upgrading of the national complete structure. However, for a long time, China focused on traditional goods export and ignored the cultural products’ export [8]. Therefore, China should not only strive to develop the real economy, but also actively promote the export of cultural industry and make the strategic policy of culture trade:

1) To encourage the establishment of cultural industry organizations (or association), in order to strengthen the development and protection of traditional culture resources;

2) To increase the financial support on the culture industry, for example, supplying export credit subsidy and export credit insurance for the relevant cultural enterprises;

3) To promote the cooperation between cultural enterprises;

4) to promote implementation of the strategy that is “going out” of the domestic cultural enterprises.

5.2 TO STRENGTHEN THE CULTURAL COMMUNICATION AND SHORTEN THE CULTURAL DISTANCE IN ORDER TO AVOID “CULTURAL DISCOUNT”

The cultural distance between import and export country (region) is a very important factor influencing the export of Chinese cultural products. Shortening the cultural dis-

tance to overcome the “cultural discount”, which will promote China’s export of cultural products. The government should:

- 1) Strengthen international cultural communication, positive publicize and spread Chinese cultural products;
- 2) Hold high level cultural communications to promote the understanding of Chinese culture in the world and make Chinese elements melt into the world;
- 3) Vigorously develop the business of teaching foreigner Chinese through the Kong Zi College;
- 4) Spread China’s language and culture philosophy in the world;
- 5) Export China’s rich cultural goods through the Chinese bridge to all over the world. The export enterprises should make market research fully. The cultural products should not only embody Chinese characteristics, but also meet the foreign consumers’ demand and aesthetic habits, in order to avoid “cultural discount” and open the overseas market as soon as possible.

5.3 TO PARTICIPATE IN THE GLOBAL OR REGIONAL ECONOMIC COOPERATION ACTIVELY

Preferential trade arrangement plays an important role in promoting the cultural products export of a country or an

area. On one hand, as the member of WTO, China should actively participate in the formulation of world trade rules, as far as possible to reduce trade barriers and unfair treatment which hinder the export of Chinese cultural products; on the other hand, China should actively participate in various organizations of trade cooperation and regional economic integration, and establish close relations of economy and trade with trading partners to create a good international environment for the export of culture enterprise.

5.4 TO DEVELOP TARGETED CULTURAL TRADE

China should actively develop cultural trade with the countries, which have insufficient trade or the export potential, such as Denmark, France, Germany, etc. In addition, GDP, per capita GDP and trade openness of import country (region) have the positive effect on cultural products export. Therefore, China should focus on developing cultural products export with the developed countries which are rich and relatively open. As for the countries “excessive trade” (such as Brazil), China should adjust the export structure of cultural products and improve the grade of export products, in order to avoid the tendency of “excessive trade”.

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