An Empirical Analysis of Factors Influencing Trade in Cultural and Creative Products Based on Big Data and Extended Gravity Model

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Abstract: In recent years, the global trade has been undergoing historical changes due to the global epidemic and the ups and downs of the international situation. Focusing on cultural and creative products, this paper collects data from 20 sample countries along the " Belt and Road" from 2011 to 2020, uses data on the degree of openness of each country and the number of years of diplomatic relations, dynamizes the variables of geographical distance and cultural distance respectively, and introduces innovative explanatory variables such as the level of intellectual property protection and Internet penetration. The extended gravity model is used to empirically analyze the direction and effect of the factors affecting the trade of cultural and creative products. The study shows that the level of economic development, the level of intellectual property protection and the degree of Internet penetration promote the trade of cultural and creative products, while the geographical distance and cultural distance will hinder the trade development. China should develop differentiated trade strategies, improve infrastructure connectivity, enhance core competitiveness of products, and pay attention to intellectual property protection and Internet penetration to promote high-quality development of China's cultural and creative products trade.

Keywords: Extended gravity model; Big data; Trade in cultural and creative products; Cultural distance

1 INTRODUCTION

In recent years, the new coronavirus epidemic has swept the world, and the global economic uncertainty has become more severe, and international trade has been severely impacted. China has been in surplus for a long time in the trade of cultural and creative products, but problems such as lack of core competitiveness and unreasonable trade structure need to be solved urgently. This paper hopes to propose solutions to the existing problems through research. At present, the sensitivity of cultural and creative products in China to intellectual property needs to be improved, and cultural and creative workers should be guided to pay attention to patent applications [1]. In the cooperation of cultural and creative products with countries along the route, exchanges and cooperation in publishing trade can be deepened by establishing publishing houses across borders, holding summit forums, and strengthening school-enterprise cooperation [2]. Cultural discounts will increase the cost of cultural communication and exchange, and have a negative impact on trade [3]. Digital differences have little impact on the trade of cultural and

MSIEID 2022, December 09-11, Chongqing, People's Republic of China

DOI 10.4108/eai.9-12-2022.2327730

creative products, but the popularity of the Internet and the cultural closeness of the two sides of the trade will effectively expand the scale of trade in cultural and creative products [4].

To sum up, the factors affecting the trade of cultural and creative products in China include economic, geographical factors, different cultural systems and other factors. This paper selects indicators from different aspects to explore the influencing factors and effects of cultural and creative product trade.

2 ANALYSIS OF THE STATUS QUO OF TRADE IN CULTURAL AND CREATIVE PRODUCTS

2.1 Analysis of trade scale

Figure 1 shows that from 2011 to 2020, the total trade volume of cultural and creative products between China and countries along the route fluctuated and increased rapidly, and the total trade volume with countries along the route in 2020 was about 1.98 times that of 2011.

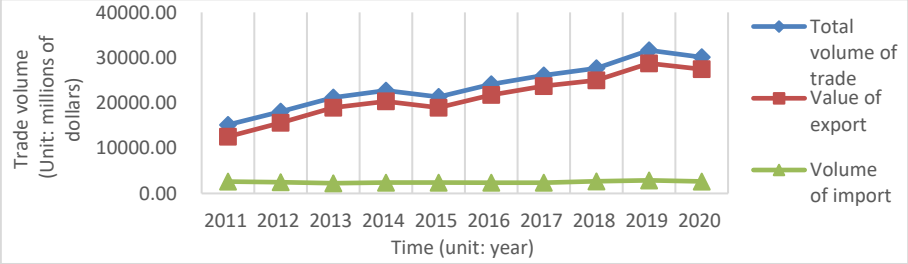

Fig. 1. Changes in China's trade volume of cultural and creative products with countries along the "Belt and Road" [Photo credit: Original]

2.2 Analysis of trade structure

2.2.1 Product structure.

There are significant differences in the export and import trade volume between different cultural and creative product categories in China, and the product trade structure is unbalanced. Figure 2 and Figure 3 show that from 2011 to 2020, creative design products accounted for the largest proportion of China's exports to countries along the route, and audio and video products and creative design products accounted for the largest absolute import trade. The product structure needs to be improved.

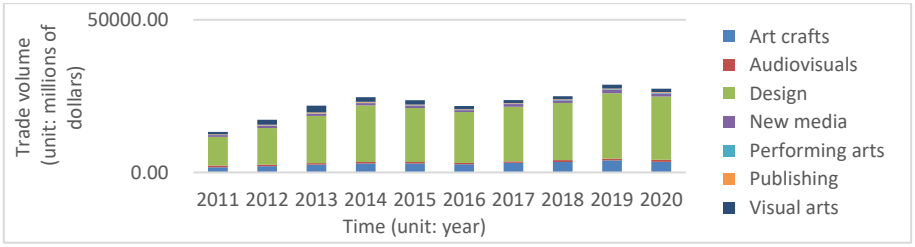

Fig. 2. China's exports of cultural and creative products to countries along the "Belt and Road" [Photo credit: Original]

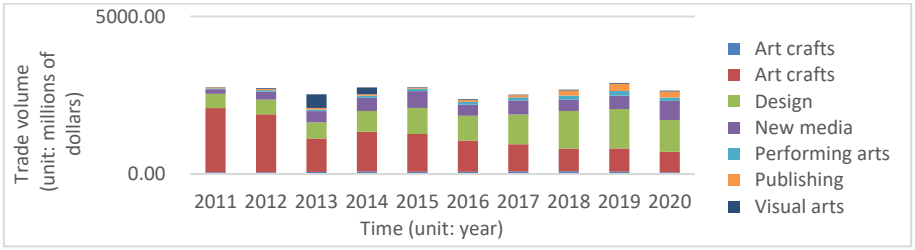

Fig. 3. China's imports of cultural and creative products from countries along the "Belt and Road" [Photo credit: Original]

2.2.2 Market structure.

Figure 4 shows that China's cultural and creative products trade market structure is not balanced. The results show that the cultural background is similar, the cultural distance is small, the weaker the cultural discount phenomenon, the higher the utility satisfaction of consumers in various countries, and the more prosperous the trade.

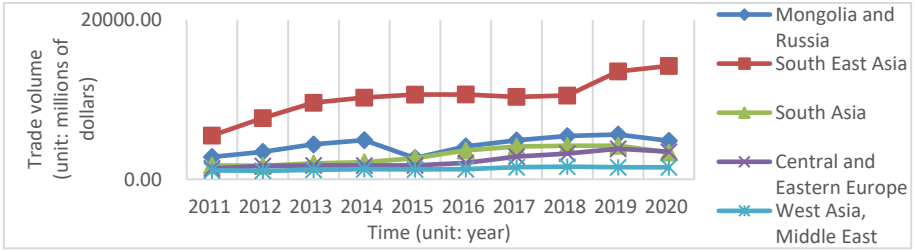

Fig. 4. Changes in China's total trade volume of cultural and creative products along the "Belt and Road" [Photo credit: Original]

3 EMPIRICAL ANALYSIS OF CULTURAL AND CREATIVE PRODUCT TRADE

3.1 Variable selection and assumption description

3.1.1 Variable selection.

This paper applies the gravity model, selects the trade volume of cultural and creative products as the explained variable, and selects 6 explanatory variables covering different fields. The specific variables and their meanings are shown in Table 1:

Table 1. variable selection

Variable name	Variable symbol	Variable type	Relative meaning	Data sources
Trade volume of cultural and creative products	$Trade_{cit}$	Explained variable	The trade volume of cultural and creative products between China and countries along the "Belt and Road"	UNCTAD database, UN Comtrade database,
Economic development level of trading countries	GDP_{it}	Explanatory variable	The GDP of the countries along the "Belt and Road"	WDI database
China's economic development level	GDP_{ct}	Explanatory variable	China's gross domestic product	WDI database
Geographic distance	DIS_{it}	Explanatory variable	Geographical distance and degree of openness between China and trading countries	CEPII database
Cultural distance	$culgap_{cit}$	Explanatory variable	Cultural distance between China and trading countries	Geert Hofstede Cultural Distance Website
Degree of intellectual property protection	IPQ_{it}	Explanatory variable	IP royalties for trading countries	WDI database
Internet penetration	INT_{it}	Explanatory variable	Number of secure Internet service systems per million people in trading countries	WDI database

3.1.2 Model Assumptions.

The theories involved in this paper include factor endowment theory, cultural discount theory and demand preference similarity theory. The premise of trade is that the abundance and shortage of factors vary from country to country, and cultural creativity is also a resource endowment. Countries export and import according to their advantages and disadvantages to promote the improvement of distribution efficiency. Based on the above theoretical basis, the following assumptions are put forward:

H1: The economic development level of countries along the route positively affects the trade of cultural and creative products;

H2: China's economic development level is positively affecting the trade of cultural and creative products;

H3: Geographical distance negatively affects the trade of cultural and creative products;

H4: Cultural distance negatively affects the trade of cultural and creative products;

H5: Internet penetration is positively affecting the trade of cultural and creative products;

H6: The level of intellectual property protection has a positive impact on the trade of cultural and creative products.

3.2 Data Description and Data Processing

3.2.1 Data Description.

(1) Definition of countries along the "Belt and Road".

Following the principles of accurate, available and representative data, select Russia, Thailand, Malaysia, Singapore, Indonesia, the Philippines, India, Pakistan, Bangladesh, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia along the "Belt and Road", Bulgaria, Latvia, Romania, Israel, Turkey, a total of 20 sample countries.

(2) Definition of the concept of cultural and creative products.

This article uses the latest version of UNCTAD (DimHS2012Products_Creatives_Hierarchy) to conduct statistics on cultural and creative products. There are 7 major categories and 25 subcategories of product categories, including 197 HS codes.

3.2.2 Data processing.

Perform a series of processing on the raw data:

(1) The GDP and the trade volume of cultural and creative products calculated in current US dollars are excluded from inflation.

(2) Processing geographic distance data, the method is shown in formula (1):

$$DIS_{it} = DIS_{i2011} \times [1 + (OPEN_{i2011} - OPEN_{it})] \quad (1)$$

Among them, DISit represents the geographical distance between China and the countries along the route, and OPEN represents the degree of openness of a country.

(3) Processing cultural distance data. Based on the KSI index proposed by Kogut and Singh (1988), it reflects the dynamic setting of cultural distance (Qi Jianhong, 2012) and the specific method is shown in formula (2):

$$culgap_{cit} = \sum_{j=1}^{4}\left[(cul_{ij} - cul_{cj})^2/V_j\right]/4 + 1/T_{ic} \quad (2)$$

3.3 Model establishment

Based on the traditional gravity model, this paper establishes a static panel data model such as formula (3):

$$LN(Trade_{cit}) = \alpha + \beta_1 LN(GDP_{it}) + \beta_2 LN(GDP_{ct}) + \beta_3 LN(DIS_{it}) + \beta_4 LN(culgap_{cit}) + \beta_5 LN(IPQ_{it}) + \beta_6 LN(INT_{it}) + \varepsilon \quad (3)$$

The best fit is the random effects model (6), as shown in Equation (4):

$$LN(Trade_{cit}) = -9.6152 + 0.6086 * LN(GDP_{it}) + 0.7353 * LN(GDP_{ct}) - 0.9074 * LN(DIS_{it}) - 0.3992 * LN(culgap_{cit}) + 0.1369 * LN(IPQ_{it}) + 0.0716 * LN(INT_{it}) + \varepsilon \quad (4)$$

At the same time, this paper established model (1), model (2), model (3), model (4), model (5), model (6) to verify the model multicollinearity and model robustness, the specific results are shown in Table 2 shown:

Table 2. Regression Results

Variable	**Model** (1) $Trade_{cit}$	**Model** (2) $Trade_{cit}$	**Model** (3) $Trade_{cit}$	**Model** (4) $Trade_{cit}$	**Model** (5) $Trade_{cit}$	**Model** (6) $Trade_{cit}$
GDP_{it}	0.7012*** (9.9209)	0.6927*** (9.0005)	0.7305*** (9.8736)	0.6875*** (11.2068)	0.5984*** (9.3239)	0.6086*** (11.60498)
GDP_{ct}		1.5543*** (27.3699)	1.5885*** (22.9024)	1.5754*** (24.7384)	1.5223*** (23.9736)	0.7353*** (5.5989)
DIS_{it}			-1.0004*** (-5.1667)	0.7584*** (-3.0430)	-0.6633*** (-2.7464)	-0.9074*** (-4.9018)
$culgap_{cit}$				-0.3201 (-1.1251)	-0.3612 (-1.5004)	-0.3992** (-1.8693)
IPQ_{it}					0.1301*** (2.7793)	0.1369*** (3.2587)
INT_{it}						0.0716*** (6.4223)
individual effect	control	control	control	control	control	control
Adjusted R^2	0.2531	0.5655	0.5738	0.6733	0.6831	0.7122

Note: ***, **, and * represent the 1%, 5%, and 10% significance levels, respectively; the values in the brackets are the T statistic values for robust estimation.

3.4 Model Results and Implications

Model (6) is the final form of the regression model, and the regression results are as follows:

(1) The variable coefficient of economic development level of countries along the route is 0.61, which is in line with the H1 assumption. The economic development level of countries along the route has a significant positive impact on the trade of cultural and creative products.

(2) The coefficient of China's economic development level is 0.74, which is positive at the significant level of 1%, which is in line with the H2 assumption. China should focus on economic development, open up markets to encourage trade.

(3) The variable coefficient of geographic distance is -0.91, which is in line with the H3 assumption. It is necessary to break the geographical shackles through infrastructure construction and further improve the level of openness.

(4) The coefficient of cultural distance is -0.39, which is in line with H4 assumed. Cultural exchanges and publicity should reduce the effect of cultural discounts and enhance the sense of cultural identity of various countries.

(5) The coefficient of intellectual property protection level is 0.14, which is positive at the significant level of 1%, which is in line with the H5 assumption. We must pay attention to the important guarantee of intellectual property protection.

(6) The coefficient of Internet popularity is 0.07, which is a positive value at the significant level of 1%. Meets the H6 assumption. The popularity of the Internet is a powerful tool to discover and locate the market.

4 CONCLUSION

(1) Promote high-quality economic development and formulate differentiated trade strategies. The government should stimulate the domestic consumer market of cultural and creative products from the perspective of structure and quality, create conditions for the prosperity and development of trade. Improve facility connectivity and promote trade connectivity. Enterprises should adopt reasonable trade methods according to local conditions, and at the same time make full use of digital technology, actively expand online trade channels, and increase the added value of cultural and creative products.

(2) Strengthen cultural exchanges and accurately locate the market. The Chinese government should adhere to an inclusive attitude and introduce cultural and creative products from various countries. At the same time, export cultural and creative products according to local conditions to reduce "cultural discounts". Enterprises should accurately grasp the preferences of consumer groups of cultural and creative products in different countries. Through measures such as investing in the establishment of publishing houses abroad to reduce cultural discounts and improve cultural identity.

(3) Improve the intellectual property protection system and promote international cooperation in intellectual property rights. The government should comprehensively deepen intellectual property protection in terms of quality, strength, openness and system coordination, and enterprises should establish a sound innovation incentive mechanism to strengthen the protection of the entire chain of intellectual property rights. The government should strengthen the construction of network information infrastructure, and enterprises should use the Internet big data method to locate the demand preferences of different consumers and accurately meet the needs.

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