Journal of Global Information Management
Volume 30 • Issue 2 • March-April 2022

Differences in Distance and Spatial Effects on Cross-Border E-Commerce and International Trade:

An Empirical Analysis of China and One-Belt One-Road Countries

Qunyang Du, Zhejiang University of Technology, China

Danqing Deng, Zhejiang University of Technology, China & Institute of Science and Technology Information of Zhejiang Province, China

Jacob Wood, James Cook University, Singapore & Chungnam National University, South Korea

ABSTRACT

Distance and space are important factors affecting international trade, but they have different effects on cross-border e-commerce (CBE) due to the creation of the Internet. This study utilizes spatial autocorrelation, the multi-dimension gravity model, and the spatial Durbin model to conduct a comparative analysis of international trade and CBE within one-belt one-road (BR) countries. The study obtained several key findings. Firstly, the spatial autocorrelation effect which exists in international trade does not exist in CBE. Secondly, the geographical distance effect of CBE is not significant, which is different from that of international trade. Thirdly, CBE is affected by GDP, culture, policy, and institution distances which are not entirely consistent with international trade. Finally, the spatial Durbin model shows that the spillover effect of CBE and international trade are both significant in the inverse distance weight matrix. These findings provide not only important theoretical contributions but also a practical guide for government policymakers of the BR and CBE.

KEYWORDS

Cross-Border E-Commerce, Multi-Dimensional Distance, One Belt One Road, Spatial Durbin Model

INTRODUCTION

Since the One Belt, One Road (BR) initiative was first proposed by Chinese President Xi Jinping in 2013, this ambitious foreign and economic policy framework has become a significant ideological objective of the Chinese Government. Following its initial introduction, a more formal proposal document was released which outlined in greater detail the specific objectives of the plan. The BR gets its name from the original Silk Road which was opened by Emperor Wu during the Western Han Dynasty in an effort to send Zhang Qian, a leading government official, and diplomat at the time, out into the Western Regions of the empire (Hu et al., 2014). However, in its modern day context, the BR initiative encapsulates both the 21st Century Maritime Silk Road and the Silk Road Economic Belt. In an effort to promote a new generation of internationalization and economic globalization,

DOI: 10.4018/JGIM.20220301.oa6

the initiative has seen China's total trade with BR countries reach 9.27 trillion (yuan) in 2019, which an annual growth rate is 10.8%; an amount significantly higher than China's overall foreign trade growth rate of 3.4%[1].

Cross-border e-commerce (CBE) is a new form of international trade. It has been instrumental in not only increasing global competitiveness but also in helping to provide the retail industry with modern, global, virtual features. As part of international developments, CBE has emerged as a means of driving further growth and internationalization across the region. (Qi et al., 2018; Mou et al., 2020). According to trends highlighted in Media Research[2], the scale of global business to consumer CBE transactions value exceeded 650 billion US dollars in 2018, representing a 27.5% increase from the previous year. China and the US are the most popular cross-border destinations for global shoppers, while western European markets are the next most popular market along with Japan. From a global marketplace perspective, 26% of online shoppers have bought merchandise from China, while the US and UK are placed second and third in the world with 21% and 14% of sales respectively. As the leading global player, China has seen year-on-year growth of 20% in CBE transactions since 2008, with the total volume of transactions reaching 8.2 trillion yuan in 2017[3]. As the marketplace has grown, further E-commerce platforms have been developed. For example, Aliexpress, the most popular online retail platform in China, has almost 500 million registered users, with more than 60 million people visit the Aliexpress website every day, purchasing over 48,000 items every minute (Chen, 2017).

CBE is an important means from which China is able to drive new economic growth opportunities with BR countries. As of April 2017, products from China's E-commerce marketplace were sold to BR countries, including Russia, Ukraine, Poland, Thailand, Egypt, and Saudi Arabia. Of these products, mobile phones, computers, and network products, electronic accessories, and household items are the most popular. At the same time, more than 50 BR countries have exported products to China through e-commerce sales activities. Among the goods imported by China from BR countries are, food items, alcoholic beverages, home textiles, fruits, watches and clocks, and seafood have proven to be the most popular[4].

As a product that combines both international trade and internet-based technologies, CBE allows businesses to break through traditional geographical restrictions and in doing achieve so-called 'zero-distance' transactions. The ability for these changes to drive new commercial opportunities has been generally well-recognized (Goldenberg and Levy, 2009; Kim et al., 2017). Given developments in the Internet and web-based technologies, the distance and spatial characteristics of CBE have posed several important questions for researchers. Firstly, is the gravity model, which is a classic model of assessing international trade attributes, still suitable for assessing CBE issues? Secondly, how does the Internet's "death of distance effect" (Lendle. et al., 2016; Sempsey, 1998) influence CBE? Thirdly, how do spatial patterns differ between CBE and traditional forms of international trade? Such questions require further examination. In order to address them, and fully examine the distance and spatial effects of CBE our study uses BR country data to conduct a quantitative analysis to: (i) compare the spatial autocorrelation effect of CBE and international trade; (ii) expand the gravity model by conducting a multi-dimensional distance analysis; (iv) apply a spatial Durbin Model. Overall, our research makes not only important theoretical contributions, but also provides an important reference for promoting the development of CBE across the BR.

LITERATURE REVIEW

Conceptualization

The e-commerce industry has been instrumental in improving the global outlook and competitiveness of the retail industry and as such has been the focus of many scholars. The development of e-commerce is affected by economic environment, consumer perception and marketing strategy – etc. (Evans, 2014; Huy et al., 2012; Kraemer et al., 2002; McKnight et al., 2003; Zhao et al., 2020), with many studies analyzing these influences from both B2B and B2C perspectives. B2B e-commerce has been driven by global patterns, such as global competition and MNCs, with E-commerce consisting of global suppliers, customers, and subsidiaries. While, B2C has been seen to be more of a local phenomenon that is pulled by mainly local consumer markets. (Kraemer et al., 2002; Oliveira & Dhillon, 2015; Sohaib et al., 2019). Despite such developments, e-commerce has not yet fundamentally changed the status quo of the original business structure, more reinforcing the existing relationships among subjects, hierarchies and income distribution (Evans, 2014). International trade continues to be the main form of goods exchange between countries, with scholars conducting a lot of research on its characteristics, distribution and factors of influence (Bergstrand, 1989; Chaney, 2008; Eaton & Kortum, 2002). Nonetheless, e-commerce has been instrumental in further developing international trade flows, with their fusion forming an emerging model that is CBE (Terzi, 2011).

The exponential development of the Internet has allowed CBE to flourish on a global scale (Tian & Lan, 2009). Compared to traditional forms of international trade, CBE has a number of significant differences such as institutional environment (Oxley & Yeung, 2001), structural foundations, competitiveness (Evans, 2014; Prashar et al., 2019), various policy provisions (Paton et al., 2002), dispute resolution, as well as spatial considerations (Edwards & Wilson, 2007; Kraemer et al., 2002; Tan & Thoen, 2000). In recent years, scholars have further explored the development model and factors that influence CBE. Gessner and Snodgrass (2015) explored the problem of overcoming barriers to CBE, by examining customs and tariff systems. Their results indicate that governments have looked to remove barriers by establishing tax-free zones and analyzing how to help SMEs overcome barriers to CBE. Valarezo et al. (2018) explored the determinants of individual implementation of CBE. The results showed that education, computer, Internet skills, and positive consumer comments all had positive effects. Moreover, Han and Kim (2019) explored the role of information technology behind CBE and established a theoretical link between different types of motivation, information technology usage patterns, consumer information and purchase intentions. Their research model shows utilitarian, social and hedonistic motives explain the root causes of consumers' participation in CBE. Finally, Song et al. (2019) proposed a commodity risk assessment method based on text mining and fuzzy rule inference to measure the significant risks in CBE.

Multi-Dimensional Distance

Tinbergen (1962) was the first to introduce the universal gravitational law model in the field of international trade. Currently, the gravity model is the most widely used spatial interaction ability model for the assessment of international trade flows (Fotheringham & O'Kelly, 1989). The basic gravity model postulates that bilateral trade depends on the geographical distance and economic size of the trade partners (Deardorff, 1998). Existing research indicates that there is a negative correlation between geographical distance and bilateral trade, and a positive correlation between the economic size of the trade partners and bilateral trade (Wood et al., 2017a; Wood et al., 2017b; Wood et al., 2019; Wood et al., 2020). Such findings are often considered to be some of the most important discoveries in economics (Disdier & Head, 2008; Lankhuizen et al., 2015; Leamer & Levinsohn, 1995; Thomas & Hu, 2011).

International trade research has reached a basic consensus on the law of gravity model. However, for CBE, another form of international trade, the law of gravity model is worth further discussion, in particular, the "death of distance" and the growth of the Internet. Distance-related trade costs have been reduced when compared to that of the offline trade in the same goods. (Gomez-Herrera et al., 2014). The rapid development of express delivery (Kim et al., 2017), logistics (Ai et al., 2016), cross-border payment (Weng, 2018), language (Gomez-Herrera et al., 2014) as well as a significant reduction in transaction costs have provided a solid foundation for the further development of CBE (Hoffman et al., 1999). These factors have changed the sensitivity of CBE to distance, which has enabled CBE to break through the constraints of distance and achieve true international success (Kim et al., 2017). Analyzing the distance factors associated with CBE allows researchers to better understand the Internet's ability to weaken the negative impact of geographic distance. Moreover, as a country's economy size helps to determine its consumer base and level of purchasing power, it also acts as an important influencing factor of CBE (Thomas, & Hu, 2011). Therefore, as stated below:

Hypothesis 1: CBE is affected by economic size and not geographical distance.

The smoothness of international trade and CBE transactions between two countries is not only related to the factors of geographical distance and economic scale as shown in the classic gravity model, but also to the cost of information exchange and contract execution. These other costs are related to the multi-dimension distance that exists between two countries. The gravity model has been continuously expanded and improved by scholars, with new variables being introduced allowing the model to contain more potentially influential trade-related factors (Kirat & Lung, 1999; Meister & Werker, 2004). In particular, the contribution made by Wang and Xu (2014), in which the distance factor affecting bilateral trade was expanded from one which was singular to one that was multi-dimensional.

Given such developments, the existing literature explores transportation infrastructure, and economic-, cultural-, policy-, industry-, and institutional-distances (Anderson et al., 2014; Linders et al., 2005; Melitz & Toubal, 2014). Of these variables, economic distance is generally calculated using per capita income and total national income data. It is argued, that the level of imports or exports will be greater between countries with similar demand structures (Linders et al., 2005). In other words, the smaller the economic gap between countries, the higher the level of bilateral trade flows. However, some scholars believe there is no correlation between the two (Linders et al., 2005). Institutional barriers such as the distance between governance- or economic-systems are very important in explaining the persistence of transactional distance between countries (McKnight et al., 2003). From a cultural perspective, the distance between national cultures has been found to have a negative impact on trade (Gill & Butler, 2003), with cultural differences increasing the cost of communication that can exist between two countries (Vasilaki, 2011) and in doing so becoming an important obstacle (Tian & Lan, 2009). In order to assess cultural distance, several studies have adopted the cultural dimension theory proposed by Geert Hofstede (Hofstede et al., 2008; Vasilaki, 2011; Yeganeh, 2011). Local protection is a key concern in national trade research as well, with numerous studies confirming the impediment that local protectionist measures can have on inter-regional bilateral trade (Brewer & Young, 1998). Given these findings the following hypotheses are drawn below:

Hypothesis 2: CBE is affected by multi-dimensional distances which are the same as international trade.
Hypothesis 2-a: CBE is affected by economic-distance.
Hypothesis 2-b: CBE is affected by cultural-distance.
Hypothesis 2-c: CBE is affected by policy-distance.
Hypothesis 2-d: CBE is affected by institutional-distance.

Spatial Effect

Spatial dynamics are an important economic characteristic when trying to explain international trade behavior. The theory of spatial econometrics argues that the value attributed to a specific region is related to the same phenomenon or attribute value in spatial units in neighboring regions (Anselin, 1988). The field of spatial economics describes the interaction of economic growth in different regions. In today's environment, consumers are able to use search engines to conduct in-depth and non-linear searches, allowing them to quickly find the products they want, and directly purchase them online (Hoffman et al., 1999). Given this environment, a small business in rural China is now able to reach an individual consumer in Russia without having any physical footprint in the country; a type of transaction that was not possible before the advent of e-commerce (Bieron, & Ahmed, 2012). As a product combing features of international trade and Internet, the kind of spatial pattern and spatial characteristics that CBE forms deserves further discussion.

Many methods can analyze the spatial characteristics of economic phenomena. The most common methods are the spatial autocorrelation and spatial spillover effects. As the spatial autocorrelation seeks to identify spatial dependence, the correlation degree, and autocorrelation of a spatial location, provide an effective means of studying both spatial relationships and identifying possible trends (Diniz-Filho et al., 2003). From a spatial spillover effect perspective, the interaction occurs through the mutual promotion of both supply and demand. The development of international trade in a certain region will also spread through inter-regional crowd communication, commodity flows, and technology spillovers, etc. (Evans, 2014), resulting in spillover effects. The spatial spillover effect believes that the market potential of a region and its economic situation will have a strong driving effect on its surrounding areas (Krugman, 1991). There are spatial spillover effects in many economic phenomena and this formulation has been recognized and applied by many scholars (Glass et al., 2015; Groenewold et al., 2010; Miranda et al., 2017). Therefore, CBE as a derivative of the Internet may have different characteristics with international trade from a spatial perspective. Such findings allow for the for the creation of the following hypotheses below:

Hypothesis 3: Unlike international trade, there is no spatial autocorrelation of CBE, and the distribution of the two are also inconsistent.

Hypothesis 4: There is no spatial spillover effect in CBE which is not the same as other economic phenomena.

DATA SOURCES AND METHODOLOGY

Data Sources

In this study, 64 countries along the BR were selected for econometric analysis. According to preliminary estimates, the total population of these target countries is approximately 4.4 billion (63% of the total world population), with a total economic volume, measured by way of GDP, of approximately 21 trillion US dollars (29% of global GDP). Moreover, in 2019, the level of bilateral trade between China and its BR trading partners totaled approximately 9.27 trillion (yuan), or almost 30% of its total trade volume. Such findings highlight the tremendous opportunity to develop CBE trade in the region. In addition, leading companies such as Alibaba and Jingdong have specifically issued CBE development reports for countries situated along the BR. Given such a context, these countries form an appropriate sample to explore the developmental modes and trends involving CBE.

This study utilizes data from a range of sources. Independent variable data was obtained from the CEPII, World Bank, Hofstede Insights, China Ministry of Foreign Affairs and Heritage Foundation. While dependent variable data was gathered from the UN Comtrade database and relevant Alibaba financial reports. The underlying GDP and trade data were all valued using US dollars (USD). Finally, the CBE transactions were represented using an E-Commerce Connectivity Indicator released by Alibaba.

Methodology

Spatial Autocorrelation Analysis

Using ArcGIS software, the geographic information visualization method was used to visualize the data of the samples and conduct the associated analysis. Spatial autocorrelation analysis is an important method for studying spatial dependence and is used for the classification and comprehensive evaluation of data. To evaluate the spatial autocorrelation of international trade and CBE, a Moran Index was conducted for this study, which is detailed as follow:

$$I = \left(\frac{n\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i - \overline{x})(x_j - \overline{x})}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i - \overline{x})^2} \right) \tag{1}$$

where x_i and x_j are values of the variable x in two countries, $\overline{x}$ is the mean value of variable x. w_{ij} is the neighboring weight, and n is the number of sample countries. The weighting scheme used in the equation for the Moran Index was set to a default level, and was calculated using ArcGIS. The Moran Index ranges from –1 to 1. This variable was used to test Hypothesis 3. A higher positive Moran Index indicates a higher degree of spatial positive dependence among countries. In other words, it implies that international trade flows and CBE in neighboring countries have a greater positive impact on the other country. While the closer to zero the Moran Index is, the lower the spatial dependence is.

Multi-Dimensional Gravity Model

Based on the existing research, geographical distance and economic scale are key aspects affecting the offline trade flows that exist among countries (McKnight et al., 2003). The effect of geographic distance on trade has been shown to be persistent over time (Disdier & Head, 2008; Thomas & Hu, 2011). While for CBE, there is a need to determine whether a negative correlation of geographical distance also exists. In addition, the notion of economic scale, an important influential factor in the gravity model should also be tested (Thomas & Hu, 2011). When utilizing the gravity model, it is important that efforts are made to circumvent any gold medal silver medal and/or bronze medal mistakes that could be made (Yotov et al., 2016).

The traditional gravity model is formally represented as:

$$X_{ij} = A(Y_i Y_j) / D_{ij} \tag{2}$$

where X_{ij} is international trade flow or CBE of country i from country j. A is the constant term, Y_i is the total income of import country i. Y_j is the total income of export country j. D_{ij} represents the distance between country i and country j is usually expressed as the distance between the capitals or economic centers of each country. This study uses the latitude and longitude data for each country's capital disclosed in the CEPII database. It is based on the linear distance between capitals calculated using Google Earth Pro.

This research draws on the concept of multi-dimensional proximity, first proposed by the field of economic geography, when examining the interaction that exists between regions (Meisters & Werker, 2004; Wang & Xu, 2014). Based on the previous research, economic-, cultural-, policy- and institutional- and geographical-distances were included within the framework of this study.

As the economic development levels of the BR countries are quite different and examining the economic distance is of great significance to them, the economic distance was calculated as follows (David & David, 1987):

$$D_e = \frac{(\overline{Y}_A - \overline{Y}_B)^2}{Y_A Y_B} \tag{3}$$

where, D_e represented the economic distance between country A and country B, $\overline{Y}$ is the per capita GDP and Y is the GDP.

Most countries in the BR region are well known for their strong religious backgrounds, and as such, the issue of cultural distance is of particular importance. Also, in terms of CBE, the transaction process functions without the need of a middleman, as consumers are able to communicate directly with the businesses involved. In this context, differences in the way cultures communicate can also have an impact on the process. Given the importance, the issue of cultural distance was added to our multi-dimensional distance study and is calculated as follows (Kogut & Nath, 1988):

$$D_{ic} = \frac{1}{\sqrt{\sum_{j=1}^{4}[(C_{ij} - C_{ci})^2 / V_j] + 1 / T_{ic}}} \tag{4}$$

where, D_{ic} indicates the cultural distance index between countries i and c. j represents the dimension of the Hofstede cultural index. V indicates the variance of culture index differences in a certain dimension. The variance of the value, T represents the number of years of diplomatic relations that exist between the countries.

At the beginning of the BR development, an understanding of the political environment and relevant supporting policy is also helpful. As such, measures for institutional and policy instruments form an important part of our multi-dimensional distance analysis. The dummy variable indicating whether countries signing the free trade agreement was also created as a means of assessing policy distance. According to our model, the dependent variables utilized in this study are the intensities of international trade and CBE between China and BR countries. In order to reduce the size of data difference and avoid algorithmic mistakes, all data are logarithmically calculated and normalized. The description and representation of all factors are shown in Table 1.

The following extended gravity equation was used:

$$X_{ij} = A + lnY_iY_j + lnD_{ij} + lnED_{ij} + lnCD_{ij} + lnPD_{ij} + lnID_{ij} \tag{5}$$

Spatial Econometric Model

To further examine the spatial effect of international trade flows and CBE, this study introduces emerging space economics into the model. The spatial lag model (SLM) and spatial error model (SEM) are common spatial econometric models that were estimated through the maximum likelihood method (Anselin, 1988) and are almost always used in combination and applied extensively (Durbin, 1960; Du & Deng, 2015). The Spatial Durbin Model (SDM) is a modification of a model originally developed by Durbin (1960) in the context of time series analysis. SDM can explain the direct and indirect effects of various variables between regions and is usually selected when solving environmental problems and analyses of economic growth (Anselin, 2010). Therefore, SDM is more suitable for this study. It is formally written as:

$$y = \rho Wy + X\beta_1 + WX\beta_2 + \xi \tag{6}$$

$$\xi \sim (0, \sigma^2 I_n)$$

where W_y is the spatial lag term of the dependent variable and WX is the spatial lag term of the independent variable. The SDM explains the impact effects of neighboring regions factors in addition to the influence of domestic factors. So, the spatial Durbin model was used to analyze the spatial

Table 1. The description of multi-dimensional distance indicator

Variable	Abbreviation	Description	Data Source
Dependent variables			
Total international trade		Chinese total trade with countries along the BR	UN Comtrade
Cross border e-commerce	CBE	Chinese CBE transactions with countries along the BR	Alibaba report
Explanatory variables			
GDP	$Y_i Y_j$	The product of the two countries' total economic volume	World Bank
Distance	D_{ij}	The geographical distance between the capitals of the two countries.	CEPII
Economic distance	ED_{ij}	Calculated based on GDP and GDP per capita	World Bank
Cultural distance	CD_{ij}	Cultural distance between countries based on Hofstede cultural dimension data	Hofstede's cultural dimensions
Policy distance	PD_{ij}	whether the two countries with the free trade agreement	China Ministry of Foreign Affairs
Institutional distance	ID_{ij}	The distance between the level of economic freedoms of the two countries	Heritage Foundation

effects of international trade and CBE in countries along the BR. Building a spatial Durbin model based on the gravity model helps to observe the influence of space on gravity model.

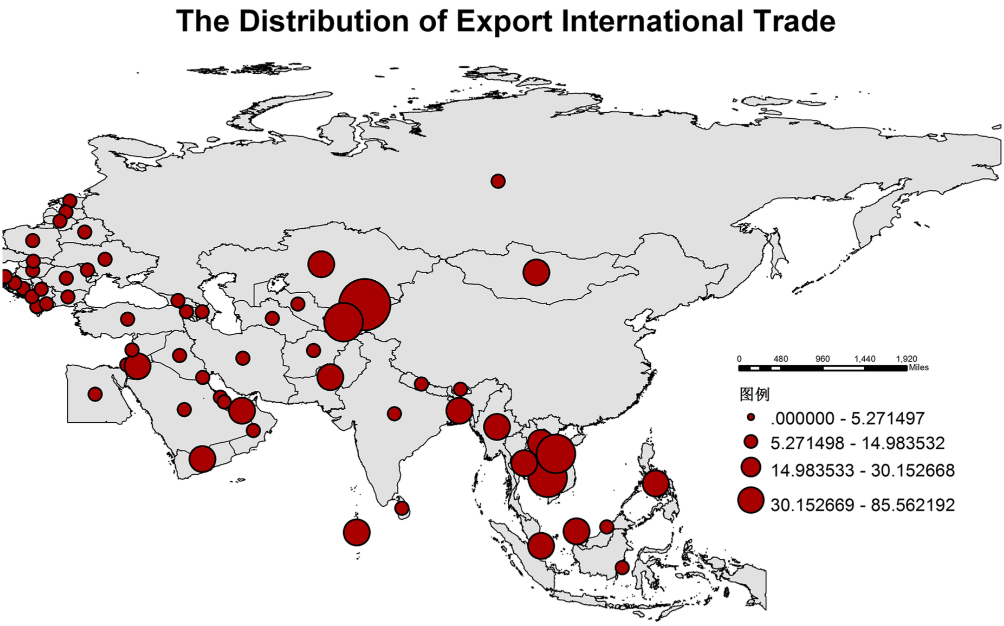
An issue that deserves careful attention when modeling using a spatial regression approach is the use of an appropriate spatial weighting matrix (Elhorst, 2010; Stakhovych & Bijmolt, 2009). A spatial weight matrix is used to reflect the structure of spatial effects. Various alternative weighting methods are suggested in the literature, among which the most widely used, are adjacency and inverse distance between localities (Dacey, 1968). As recommended by the existing research (Bodson & Peeters, 1975; Cliff & Ord, 1973), an inverse distance weight matrix was used in which both adjacency and distance are employed.

A COMPARATIVE ANALYSIS OF INTERNATIONAL TRADE AND CBE

Spatial Distribution

As Figures 1-6 illustrate, our study maps the spatial distribution of international trade and CBE for 64 BR countries. The larger circles are representative of the countries with higher levels of international trade or CBE trade with China, while the smaller circles have less. In order to exclude the impact of scale, CBE and international trade were divided by GDP so as to represent the strength of data. Maps in Figures 1-3 detail the findings of the descriptive analysis by mapping the spatial distribution of international trade between China and other countries. Our results show that the larger circle areas are located in the ASEAN and West Asia regions. Of those countries along the BR, China's top five bilateral trading partners are Vietnam, Malaysia, Thailand, Singapore, and India. According to our results, 6 of the top 10 countries are members of ASEAN, and 5 of the top 20 are in West Asia. The larger circle areas in Figures 4-6 demonstrate that Central and Eastern Europe, the Commonwealth

Figure 1. The spatial distribution of Export International Trade



of Independent States are regions in which higher levels of CBE trade exist. The top five countries involving CBE transactions were Russia, Israel, Thailand, Ukraine and Poland. Furthermore, 8 of the top 20 countries belong to Central and Eastern Europe, while only 4 of the top 20 were members of the Commonwealth of Independent States.

The distance effects of CBE and international trade were compared in Figures 7 and 8. Prima facie, in an attempt to illustrate potential differences and presents the impact of the geographic distance on the intensity of CBE and international trade. As can be seen in Figures 7 and 8, the gradient of the line on the right-sided scatterplot (Distance vs. CBE) is more gently sloping than that of the scatterplot on the left (Distance vs. international trade). The data also shows the coefficient of international trade and distance is -0.5302, while the coefficient of CBE and distance is -0.0347, which is much smaller. This indicates that the relationship between CBE and distance has a much smaller gradient, which suggests that distance has a much greater effect on international trade than CBE. From such a finding, we can preliminary judge that the development of information technology has greatly improved the efficiency of transportation services and the information exchange of goods, etc., which provides CBE with the advantage of being more distance-insensitive than that of international trade.

Spatial Autocorrelation

Besides the spatial distribution characteristics for international trade and CBE, the Spatial autocorrelation effect is also studied. The Moran's I was calculated in order to explore spatial concentration in Figures 9-12. It was produced by building a weight matrix by calculating the inverse distance. The results show that the Moran's I for international trade is 0.22 (P=0.01), while the Moran's I for CBE is -0.01 (P=0.36), which is significantly smaller than the coefficient for international trade. More importantly, the coefficient of international trade is significant at the 1% level, while the coefficient of CBE is not significant. All of the above results indicate that the spatial concentration

Figure 2. The spatial distribution of Import International Trade

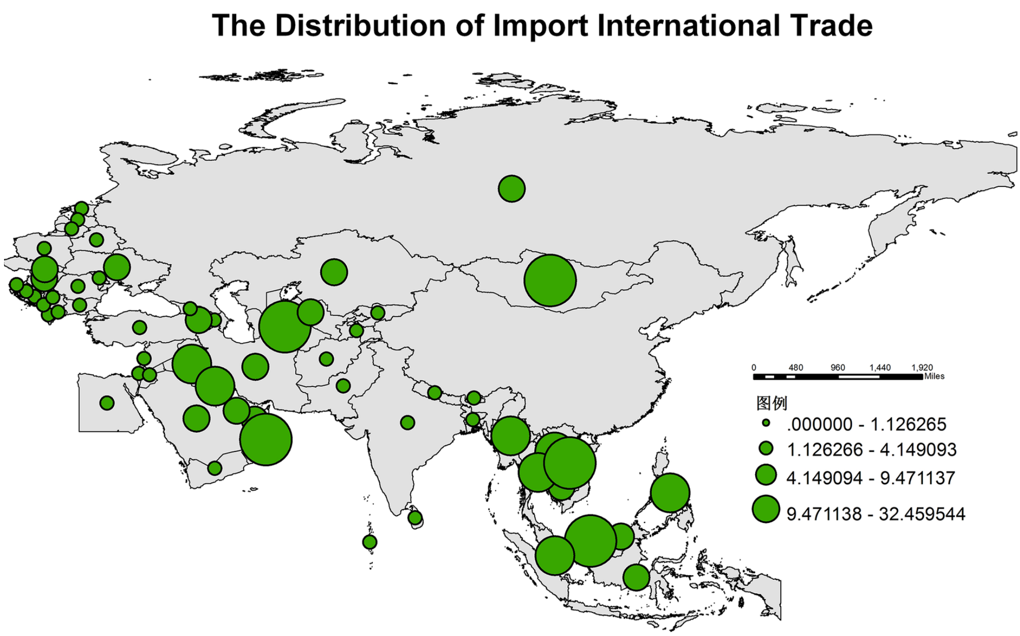


Figure 3. The spatial distribution of International Trade

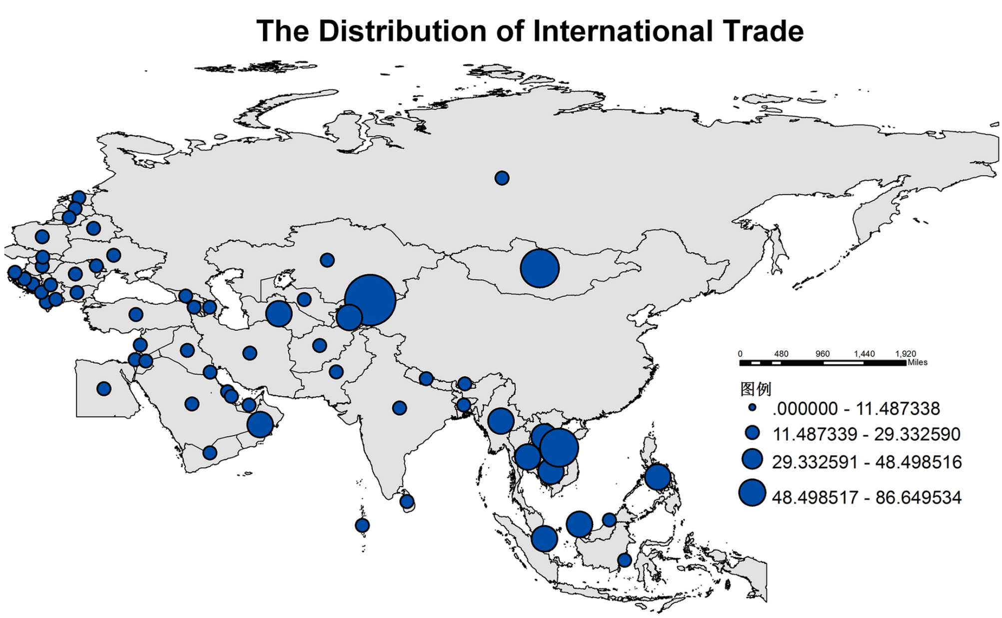


Figure 4. The spatial distribution of Export CBE

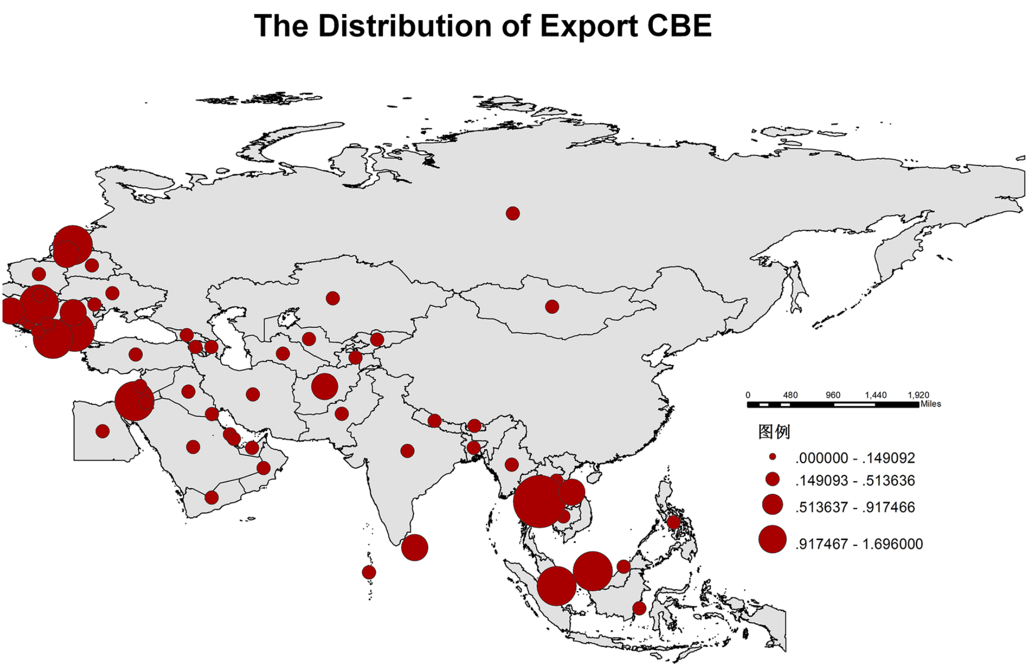


Figure 5. The spatial distribution of Import CBE

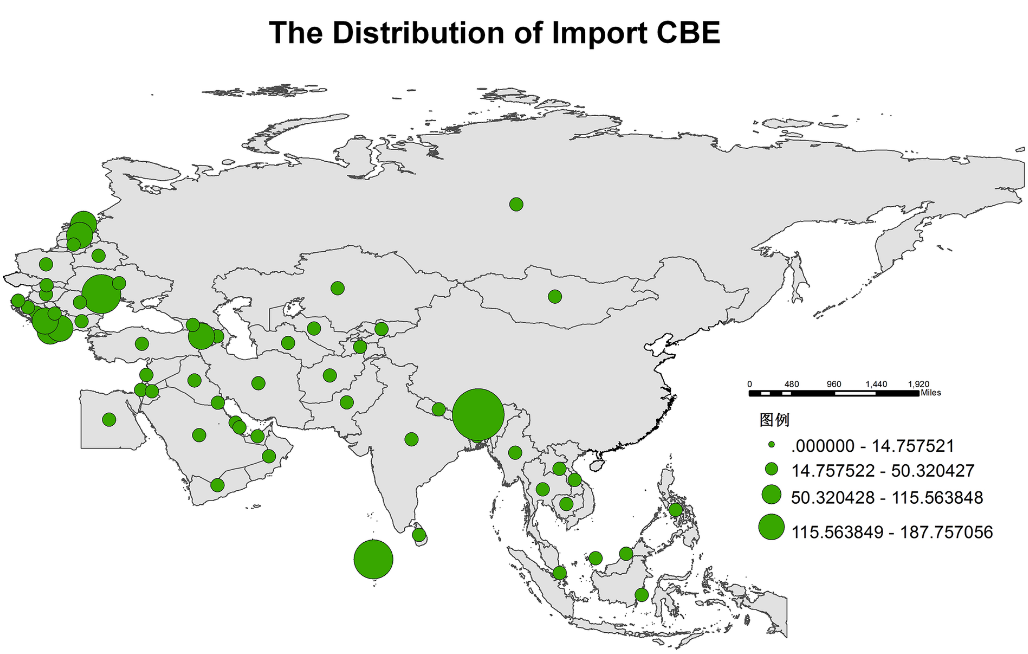
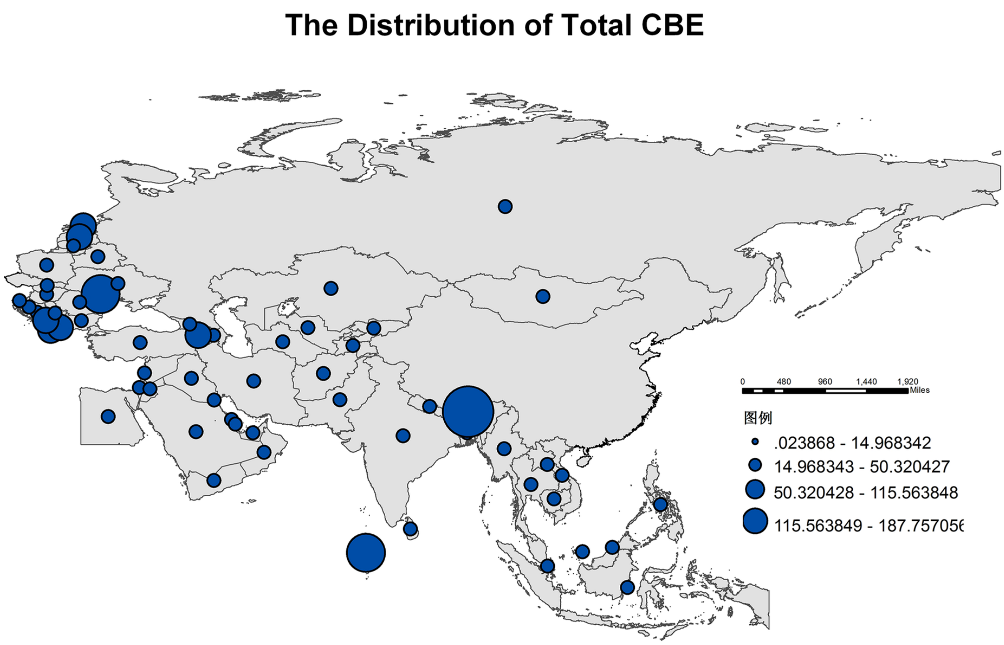


Figure 6. The spatial distribution of CBE



of international trade is more conspicuous than CBE. The result solved research question 1 and in doing so Hypothesis 3 was proven.

RESULTS AND DISCUSSION

In order to obtain more robust results, log likelihood indicators were used in the tests. Table 2 illustrates the results of the gravity model[5]. In Table 2, columns 1 and 2 represent the classical gravity models, while columns 3 and 4 represent multi-dimensional distance gravity models. The F statistics for the four regression models are all significant, which indicates that these models have statistical significance. The adjusted R2 of multi-dimensional distance models are higher than those in classical gravity models. This indicates that the goodness of fit for multi-dimensional distance models are higher than that of the classical gravity models, which implies stronger explanatory power for analysis of international trade and CBE. At the same time, the adjusted R2 of international trade models are higher than those for CBE, which implies that the degree of fit for CBE is lower than that of international trade.

In terms of the specific indicators in Table 2, both international trade and CBE are positively influenced by GDP. And the geographical distance coefficient of international trade is negative and significant, while the distance coefficient of CBE is insignificant in both models, which is in accordance with Kim et al. (2017) and Ma et al. (2019). It shows that international trade flows are influenced by geographical distance, while CBE is not. Therefore, Hypothesis 1 was proven. When compared with columns 1 and 2, the coefficients of GDP in columns 3 and 4 were reduced due to the shock of other multi-dimension distance indicators. This indicates that both international trade and CBE are affected by multi-dimension distances, which substitutes some of the economic and distance impacts. In addition, the results also show that the adjusted R2 increased form 0.4046 in

Figure 7. Scatter plot of International Trade vs. Distance

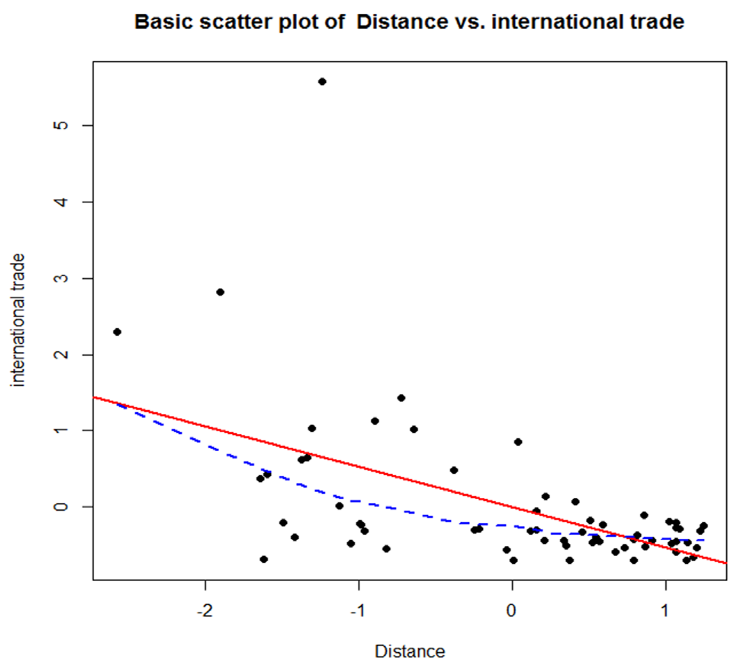


Figure 8. Scatter plot of CBE vs. Distance

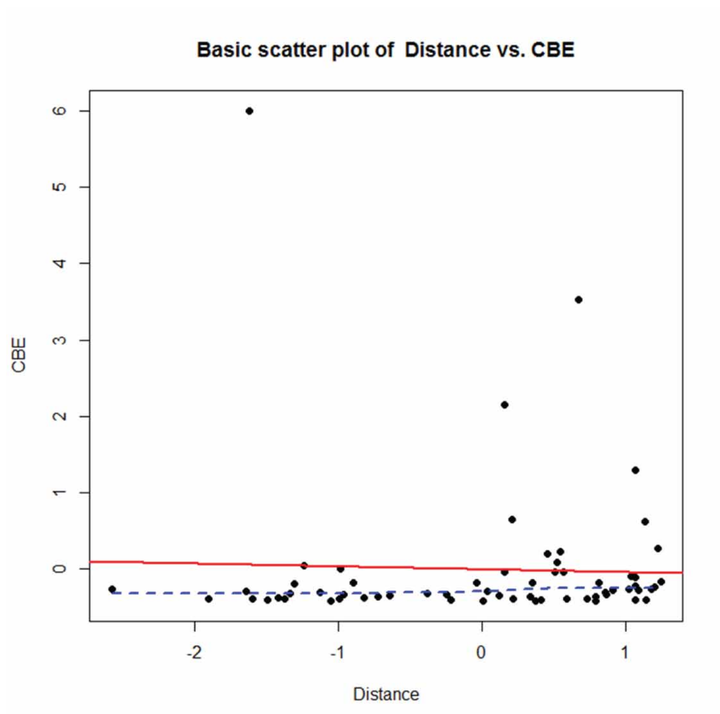


Figure 9. Moran's I of International Trade

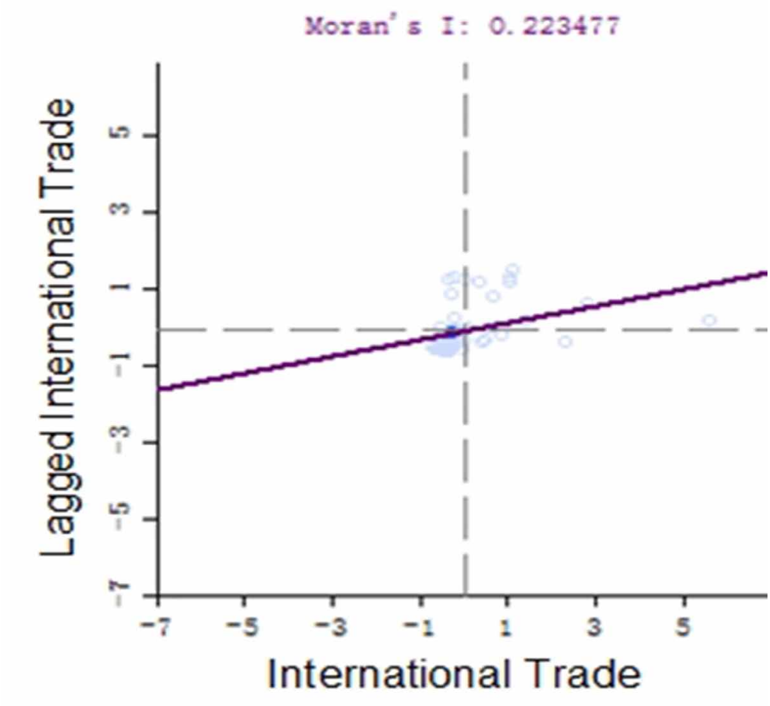


Figure 10. Moran's I of CBE

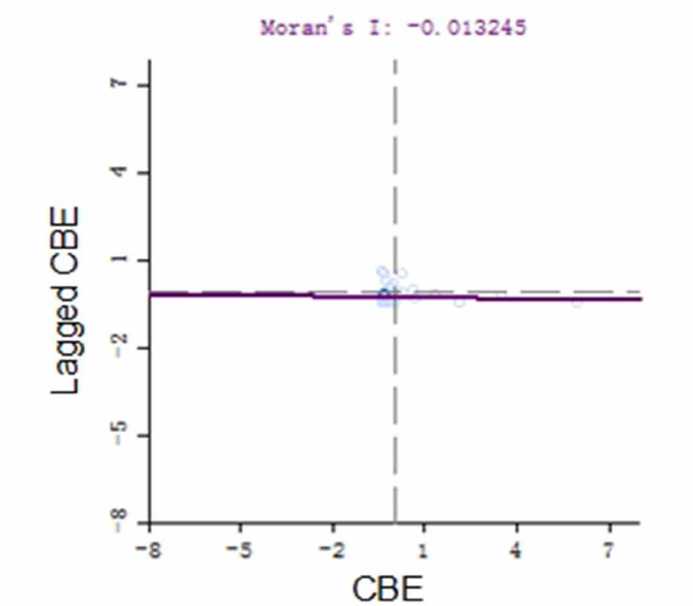


Figure 11. Randomization of International Trade

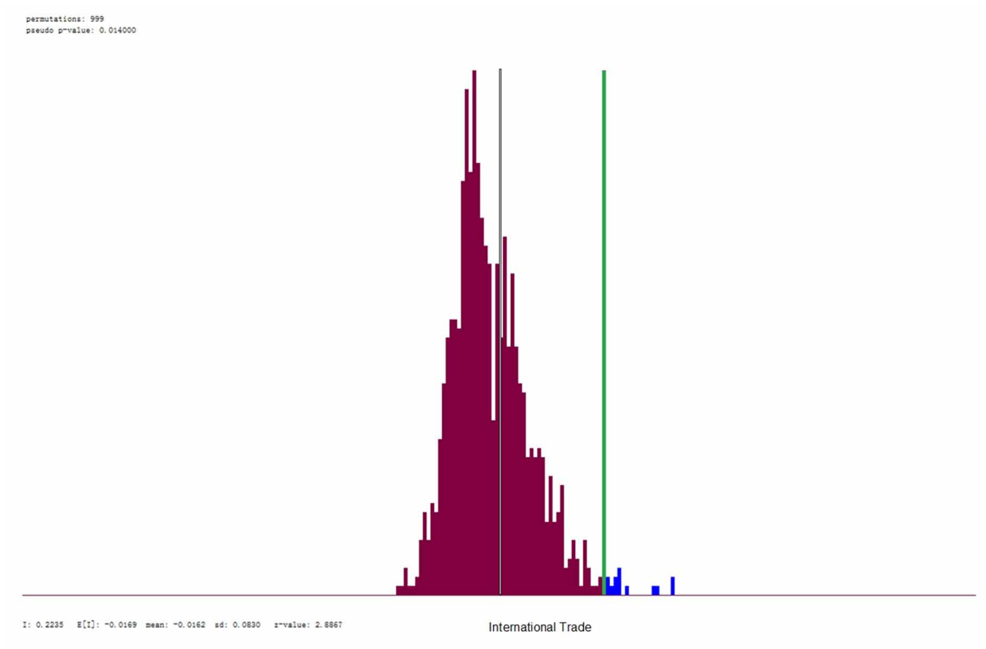


Figure 12. Randomization and CBE

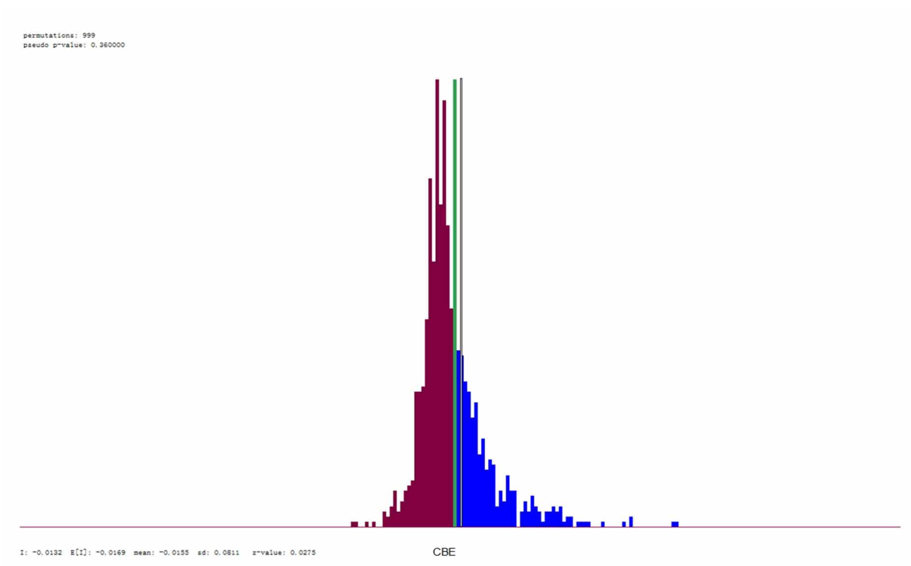


Table 2. The results of gravity models

Models	Classical Gravity Model		Multi-dimensional Distance Model	
Variables	International Trade (1)	CBE (2)	International Trade (3)	CBE (4)
(Intercept)	0.0001	0.0001	0.3921**	0.9258***
Y_{ij}	0.8846***	0.6257***	0.8585***	0.4958***
D_{ij}	-0.2261***	0.1481	-0.1871**	0.1136
ED_{ij}			0.0096	-0.1979
CD_{ij}			-0.0727	-0.5220***
PD_{ij}			-0.4859**	-1.1472***
ID_{ij}			-0.1498**	-0.2357**
Adjusted R2	0.7996	0.4046	0.8371	0.6123
F-statistic	112.7***	20.03***	48.98***	15.74***

*,**,***stand for statistical significance at the 5%, 1% and 0.1% level respectively

Table 3. The results of the spatial Durbin model

Models	Inverse distance (5)		Inverse distance (6)	
Dependent Variables	International Trade		CBE	
Independent Variables	Coefficient	Lag	Coefficient	Lag
(Intercept)	3.7660**		8.0634***	
Y_{ij}	0.8429***	3.8782*	0.6471***	4.7089*
D_{ij}	-0.2523***	-1.2056	0.2296	2.0993
ED_{ij}	-0.0879	-2.2308	0.0158	3.1302
CD_{ij}	-0.0809	-1.5556	-0.4979***	-2.1530
PD_{ij}	-0.5312***	-3.9640**	0.9024***	9.3133***
ID_{ij}	-0.1411**	-1.0631	-0.2176**	1.5787
AIC	65.50(71.66)		111.13 (115.94)	
Rho	-5.3469***		-4.6520***	

*,**,***stand for statistical significance at the 5%, 1% and 0.1% level respectively

column 2 to 0.6123 in column 4, representing a total increase of 0.2077. While the adjusted R^2 in column 3 only increased by 0.0375. The greater increase means that multi-dimensional distance has a stronger explanatory power for CBE than international trade. Therefore, CBE is not related to geographical distance, but it is suitable for interpretation by using multi-dimensional distance. The gravity model still applies to CBE, especially from the perspective of multi-dimensional distances, which is consistent with Lendle. et al., (2016).

In multi-dimensional distance models, Table 2 shows that international trade is significantly affected by GDP, distance, policy-, and institutional distance, while CBE is significantly affected by GDP, cultural-, policy- and institutional-distances. With the exception of GDP, all other distances are negatively correlated, which means the greater the distance is, the smaller the levels of international trade and CBE will be. In terms of the specific factors of influence, international trade is more affected by policy and institutional distances, while CBE is more likely affected by the cultural, policy, and institutional distances that exist between two countries. This is partially consistent with Nam (2019). Therefore, Hypothesis 2-b, Hypothesis 2-c and Hypothesis 2-d were approved while Hypothesis 2-a was rejected.

Although the Internet has greatly reduced some barriers to business, the cultural differences that exist between countries have not disappeared, which is different from international trade. It affects CBE, because cultural differences are not only reflected in communication, but also in product forms, and lifestyles, etc. The culture variable was found to be insignificant in terms of international trade flows, which was due to the existence of trade intermediaries that help to overcome cultural differences. Nonetheless, in CBE the effect of trade intermediaries has weakened and the influence of cultural distance has intensified. Such an influence needs to be carefully considered when establishing CBE opportunities, with more time taken to develop effective cross-cultural communication channels. In general, cultural distance is an important factor affecting CBE, and a comprehensive marketing system should be constructed based on the cultural environment of consumers in different countries. In terms of policy distance, the reduction of tariff rates and the development of more clearly understood non-tariff measures can act as an important driving force for promoting international trade and CBE between countries. The government can also implement specific policies that help to encourage the development of CBE. Furthermore, our study also showed that institutional distance is also significant for CBE. In this regard, countries with smaller institutional distances have certain advantages in the promotion of the CBE platform and websites. In particular, for CBE stores, it allows them to adapt more quickly to the changing consumer environment.

Based on the multi-dimension gravity model, the Spatial Durbin model was used to explore the spatial effects of the BR countries' CBE and international trade. Table 3 provides the regression results of the Spatial Durbin model of the inverse distance weight matrix (model 5 and 6). In model 5 and 6, the AICs of both international trade and CBE decreased, indicating that both have obvious spatial effects. Furthermore, the Rho values are significant at the 1% levels, which is consistent with the results expressed by the AIC.

The above results indicate that there are spatial spillover effects of international trade in the Spatial Durbin model, which means it is affected by import and export trade levels for the surrounding areas. Moreover, CBE has the same spatial spillover effect as international trade. It indicates that the CBE of one country can influence the CBE of nearby countries. This result was not in line with Hypothesis 4. This shows that in the process of promoting the development of CBE, the issue of CBE and the basic conditions of the countries surrounding the target country should also be considered.

In addition, the Spatial Durbin model tested the spatial lag terms of the independent variables. The results of the AIC test in model 5 and 6 mean the independent variables in the models also have spatial spillover effects. The results of the spatial lags of the independent variables show that the spatial lag of the economic scale and policy variables are significant. The two variables are major transmission routes among countries for international trade and CBE development. The transaction intensity of a country's international trade and CBE is affected by population size and the policy variables of other countries.

CONCLUSION AND CONTRIBUTONS

Since the BR initiative was launched in 2013, an increasing number of studies have examined the pattern of trade between China and the BR countries. Promoting regional economic integration is one of the main objectives of the BR initiative. As part of these developments, international trade flows and CBE have become particularly important. In order to assess these issues, our study uses spatial autocorrelation, the multi-dimension gravity model and the space Durbin Model to analyze trade and CBE flows between China and the countries along BR. Following our empirical analysis, some important conclusions are now drawn to provide the foundation for further trade facilitation and policy development.

Firstly, descriptive analysis shows that China's international trade with BR countries are mainly concentrated around the ASEAN and West Asian regions. In contrast, CBE is mainly concentrated in Central and Eastern Europe, and the Commonwealth of Independent States. In its trade with BR countries, most of China's trade occurs with its wealthier closely located neighbors, while the regions with higher levels of CBE are more widely dispersed from a geographic positioning perspective. Moreover, the Moran'I coefficient of international trade is significant at the 1% level, while the coefficient of CBE is not significant. This indicates that the spatial concentration of international trade is more visible than CBE. Meanwhile, the spatial correlation is weaker for the interpretation of CBE spatial agglomeration features.

Secondly, our study found that the geographical distance effects of trade and CBE between China and the BR countries were not consistent. In particular, while the geographical distance effect of international trade is significant, the finding in this regard for CBE is not significant. This is consistent with Peter Drucker's view that "The network is killing distance". The Internet therefore plays a pivotal role in weakening the negative influence of geographical distance.

Thirdly, international trade is also affected by policy- and institutional distance in addition to geographical distance. However, in contrast CBE is greatly influenced by cultural-, policy-, and institutional distance. The cultural distances are only negative and significant for the CBE, which is probably due to the lack of research on online trading needs and the lack of trade intermediaries.

Fourthly, the spatial spillover effects of trade and CBE between China and the BR countries are both significant under the inverse distance weight matrix. The spatial lags of economic scale and policy distance are both significant for international trade and CBE. This indicates that of the economic scale and policies implemented by neighboring countries have an influence on surrounding countries.

The results of this study provide several important theoretical contributions. Firstly, on the basis of the traditional distance effect, the multi-dimensional distances which have been included in the study (economic-, cultural-, policy- and institutional-distances effects) have enriched the research model. Secondly, by using publically available indicator data to characterize CBE strength for model analysis, this study is able to overcome the issue of data loss means that quantitative analysis was barely used in the field of CBE. Thirdly, the spatial Durbin model was used to incorporate spatial factors within the research framework. The use of such a model helps to analyze the spatial correlation and spillover effects of CBE when compared with international trade. Finally, another important theoretical contribution of this study is that the spatial Durbin model of multi-dimensional distance was built in a manner that allows it to be used in future research.

From a policy perspective, our study provides some important contributions. Firstly, when choosing countries to develop CBE and stronger economic ties along the BR, our study showed that geographical distance is not as significant an issue when compared with multi-dimension distances. As a consequence of this, policy makers need to play closer attention to cultural, policy, and institutional factors when attempting to grow CBE opportunities. Secondly, considering policy distance has a significant impact on the development of CBE, governments in the BR region should expand their respective economic development policies with a particular focus on growing CBE capabilities with other countries. This can be achieved by signing preferential agreements, and the establishment of related industrial parks, etc. to promote the development of CBE.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Despite many significant contributions, this study has some limitations. First, this research only analyzes the CBE environment for BR countries, which means the scope of coverage across regions is limited. Moreover, due to data availability concerns, cross-sectional data is used instead of panel data when the empirical testing was conducted. Such a limitation makes it more challenging to prove the significance test of the correlations that may exist. Second, our research only examines the distance effect of traditional geographical distance, economic-, cultural-, policy- and institutional-distances, other areas of distance, such as industrial, environment and trade openness were not involved.

Future research efforts can extend and improve on the approach used in this study. Firstly, the data sample size can be increased to obtain a broader, more persuasive set of empirical findings. Secondly, so as to obtain a more diverse set of results, the multi-dimensional distance aspect of the study can be expanded to examine new constructs.

ACKNOWLEDGMENT

We are grateful to the following funds in China for providing financial support for this paper: (1) Project of National Social Science Fundation “Study on Global Value Chain Upgrading of Labour Division Position for Chinese Manufacturing Industry via Foreign direct Investment in the context of ‘One Belt & One Road’”(20BJY189),(2) Project of National Science Fundation“Study on Mutual Embedded Mode, Matching Mechanism and Welfare Effects between Cross-border E-Commerce and International Trade Intermediaries”(71573233). The first author would like to thank Professor Wen-Lung Shiau, the Advanced Data Analysis Center (PLS-SEM of Zhejiang University of Technology), for his support on this research.

REFERENCES

Ai, W., Yang, J., & Wang, L. (2016). Revelation of cross-border logistics performance for the manufacturing industry development. *Inderscience Publishers*, *14*(6), 593–609. doi:10.1504/IJMC.2016.079302

Anderson, J. E., Milot, C. A., & Yotov, Y. V. (2014). How much does geography deflect services trade? canadian answers. *International Economic Review*, *55*(3), 791–818. doi:10.1111/iere.12071

Anselin, L. (1988). Spatial econometrics: methods and models. Springer Netherlands. doi:10.1007/978-94-015-7799-1

Anselin, L. (2010). Thirty Years of Spatial Econometrics. *Journal of Regional Science*, *89*(1), 3–25. doi:10.1111/j.1435-5957.2010.00279.x

Bergstrand, J. H. (1989). The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The Review of Economics and Statistics*, *71*(1), 143–153. doi:10.2307/1928061

Bieron, B., & Ahmed, U. (2012). Regulating e-commerce through international policy: Understanding the international trade law issues of e-commerce. *Pain*, *46*, 545–570.

Bodson, P., & Peeters, D. (1975). Estimation of the coefficients of a linear regression in the presence of spatial autocorrelation. an application to a belgian labour-demand function. *Environment & Planning A*, *7*(4), 455–472. doi:10.1068/a070455

Brewer, T. L., & Young, S. (1998). The multilateral investment system and multinational enterprises. *Oup Catalogue*, *36*(2), 202–202. doi:10.1093/acprof:oso/9780198293156.001.0001

Chaney, T. (2008). Distorted gravity: The intensive and extensive margins of international trade. *The American Economic Review*, *98*(4), 1707–1721. doi:10.1257/aer.98.4.1707

Chen, G. (2017). E-commerce business strategy analysis and inspiration: Taking Taobao as an example. *IEEE International Conference on Knowledge Engineering & Applications*, *9*, 72-77.

Cliff, A., & Ord, J. (1973). *Spatial Autocorrelation*. Pion.

Dacey, M. F. (1968). A review of measures of contiguity for two and K color maps. In Spatial analysis: A reader in statistical geography. Prentice-Hall.

David, F. B., & David, E. B. (1987). Spatial interaction, transportation, and interregional commodity flow models. In N. Peter (Ed.), *Handbook of Regional and Urban Economics* (Vol. 1, pp. 357–406). Elsevier.

Deardorff, A. (1998). Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World? *The Regionalization of the World Economy,* 7-32.

Diniz-Filho, J., Bini, L. M., & Hawkins, B. A. (2003). Spatial autocorrelation and red herrings in geographical ecology. *Global Ecology and Biogeography*, *12*(1), 53–64. doi:10.1046/j.1466-822X.2003.00322.x

Disdier, A. C., & Head, K. (2008). The puzzling persistence of the distance effect on bilateral trade. *The Review of Economics and Statistics*, *90*(1), 37–48. doi:10.1162/rest.90.1.37

Du, Q., & Deng, D. (2015). China's spatial distribution of direct investment in Africa and its influencing factors. *Dili Kexue*, *35*, 396–401.

Durbin, J. (1960). The fitting of time-series models. *Revue De Linstitut International De Statistique*, *28*(3), 233–244. doi:10.2307/1401322

Eaton, J., & Kortum, S. (2002). Technology, geography, and trade. *Econometrica*, *70*(5), 1741–1779. doi:10.1111/1468-0262.00352

Edwards, L., & Wilson, C. (2007). Redress and alternative dispute resolution in EU cross-border e-commerce transactions. *International Review of Law Computers & Technology*, *21*(3), 315–333. doi:10.1080/13600860701701603

Elhorst, J. P. (2010). Unconditional maximum likelihood estimation of linear and log-linear dynamic models for spatial panels. *Geographical Analysis*, *37*(1), 85–106. doi:10.1111/j.1538-4632.2005.00577.x

Evans, R. (2014). E-commerce, competitiveness and local and regional governance in greater Manchester and Merseyside: A Preliminary Assessment. *Urban Studies (Edinburgh, Scotland)*, *39*(5-6), 947–975. doi:10.1080/00420980220128390

Fotheringham, A., & O'Kelly, M. E. (1989). *Spatial interaction models: formulations and applications. Kluwer Academic Publishers*.

Gessner, G. H., & Snodgrass, C. R. (2015). Designing e-commerce cross-border distribution networks for small and medium-size enterprises incorporating Canadian and U.S. trade incentive programs. *Research in Transportation Business & Management*, *16*, 84–94. doi:10.1016/j.rtbm.2015.07.005

Gill, J., & Butler, R. J. (2003). Managing instability in cross-cultural alliances. *Long Range Planning*, *36*(6), 543–563. doi:10.1016/j.lrp.2003.08.008

Glass, A. J., Kenjegalieva, K., & Sickles, R. C. (2015). A spatial autoregressive stochastic frontier model for panel data with asymmetric efficiency spillovers. *Journal of Econometrics*, *190*(2), 289–300. doi:10.1016/j.jeconom.2015.06.011

Goldenberg, J., & Levy, M. (2009). *Distance Is Not Dead: Social Interaction and Geographical Distance in the Internet Era*. Acm Sigcas Computers & Society.

Gomez-Herrera, E., Martens, B., & Turlea, G. (2014). The drivers and impediments for cross-border e-commerce in the EU. *Information Economics and Policy*, *28*, 83–96. doi:10.1016/j.infoecopol.2014.05.002

Groenewold, N., Chen, A., & Lee, G. (2010). Inter-regional spillovers of policy shocks in china. *Regional Studies*, *44*(1), 87–101. doi:10.1080/00343400802360428

Han, J. H., & Kim, H. M. (2019). The role of information technology use for increasing consumer informedness in cross-border electronic commerce: An empirical study. *Electronic Commerce Research and Applications*, *34*, 1567–4223. doi:10.1016/j.elerap.2019.100826

Hoffman, D. L., Novak, T. P., & Peralta, M. A. (1999). Information privacy in the marketspace: Implications for the commercial uses of anonymity on the web. *The Information Society*, *15*(2), 129–139. doi:10.1080/019722499128583

Hofstede, G. J., Jonker, C. M., & Verwaart, D. (2008). Individualism and Collectivism in Trade Agents. *International Conference on Industrial*, *5027*, 492-501.

Hu, A. G., Ma, W., & Yan, Y. L. (2014). Silk Road Economic Belt: Strategic Connotation, Positioning and Realization Path. *Journal of Xinjiang Normal University*, *2*, 1–10.

Huy, L. V., Rowe, F., Truex, D., & Huynh, M. Q. (2012). An Empirical Study of Determinants of E-Commerce Adoption in SMEs in Vietnam: An Economy in Transition. *Journal of Global Information Management*, *20*(3), 23–54. doi:10.4018/jgim.2012070102

Kim, T. Y., Dekker, R., & Heij, C. (2017). Cross-border electronic commerce: Distance effects and express delivery in european union markets. *International Journal of Electronic Commerce*, *21*(2), 184–218. doi:10.1080/10864415.2016.1234283

Kirat, T., & Lung, Y. (1999). Innovation and Proximity-Territories as loci of collective learning processes. *European Urban and Regional Studies*, *6*(1), 27–38. doi:10.1177/096977649900600103

Kogut, B., & Nath, R. (1988). The effect of national culture on the choice of entry mode. *Journal of International Business Studies*, *19*(3), 411–432. doi:10.1057/palgrave.jibs.8490394

Kraemer, K. L., Gibbs, J., & Dedrick, J. (2002). Environment and policy factors shaping global e-commerce diffusion: A cross-country comparison. *The Information Society*, *19*(1), 5–18.

Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, *99*(3), 483–499. doi:10.1086/261763

Lankhuizen, M. B. M., De Graaff, T., & De Groot, H. L. F. (2015). Product heterogeneity, intangible barriers and distance decay: The effect of multiple dimensions of distance on trade across different product categories. *Spatial Economic Analysis*, *10*(2), 137–159. doi:10.1080/17421772.2015.1023338

Leamer, E. E., & Levinsohn, J. A. (1995). International trade theory: the evidence. Handbook of International Economics, 3,1339-1394.

Lendle, A., Olarreaga, M., Schropp, S., & Vézina, P.-L. (2016). There goes gravity: Ebay and the death of distance. *Economic Journal (London)*, *126*(591), 406–441. doi:10.1111/ecoj.12286

Linders, G. J., Hl Slangen, A., De Groot, H. L. F., & Beugelsdijk, S. (n.d.). *Cultural and institutional determinants of bilateral trade flows*. Social Science Electronic Publishing. doi:10.2139/ssrn.775504

Ma, S., Chao, F., & Zhang, H. (2019). Can Cross-border E-commerce Declare the Death of Distance [J]. *Finance & Trade Economics*, *40*(8), 116–131.

McKnight, D. H., Choudhury, V., & Kacmar, C. (2003). Developing and Validating Trust Measures for E-Commerce: *An Integrative Typology. Information Systems Research*, *13*(3), 334–359. doi:10.1287/isre.13.3.334.81

Meister, C., & Werker, C. (2004). Physical and organizational proximity in territorial innovation systems introduction to the special issue. *Journal of Economic Geography*, *4*(4), 1–2. doi:10.1093/jeg/4.1.1

Melitz, J., & Toubal, F. (2014). Native language, spoken language, translation and trade. *Social Science Electronic Publishing*, *93*(2), 351–363. doi:10.1016/j.jinteco.2014.04.004

Miranda, K., Martínez-Ibañez, O., & Manjón-Antolín, M. (2017). Estimating individual effects and their spatial spillovers in linear panel data models: Public capital spillovers after all? *Spatial Statistics*, *22*. doi:10.1016/j.spasta.2017.07.012

Mou, J., Cui, Y., & Kurcz, K. (2020). Trust, Risk and Alternative Website Quality in B-Buyer Acceptance of Cross-Border E-Commerce. *Journal of Global Information Management*, *28*(1), 167–188. doi:10.4018/JGIM.2020010109

Nam, T. (2019). Does E-Government Raise Effectiveness and Efficiency? Examining the Cross-National Effect. *Journal of Global Information Management*, *27*(3), 120–138. doi:10.4018/JGIM.2019070107

Oliveira, T., & Dhillon, G. (2015). From Adoption to Routinization of B2B e-Commerce: Understanding Patterns Across Europe. *Journal of Global Information Management*, *23*(1), 24–43. doi:10.4018/jgim.2015010102

Oxley, J. E., & Yeung, B. (2001). E-commerce readiness: Institutional environment and international competitiveness. *Journal of International Business Studies*, *32*(4), 705–723. doi:10.1057/palgrave.jibs.8490991

Paton, D., Siegel, D., & Williams, L. V. (2002). A policy response to the e-commerce revolution the case of betting taxation in the UK. *Economic Journal (London)*, *112*(480), 296–314. doi:10.1111/1468-0297.00045

Prashar, S., Tata, S. V., Parsad, C., Banerjee, A., Sahakari, N., & Chatterjee, S. (2019). Clustering E-Shoppers on the Basis of Shopping Values and Web Characteristics. *Journal of Global Information Management*, *27*(2), 24–38. doi:10.4018/JGIM.2019040102

Qi, J., Zheng, X., & Guo, H. (2018). The formation of Taobao villages in China. *China Economic Review*, *53*, 106–127. doi:10.1016/j.chieco.2018.08.010

Sempsey, J. J. (1998). The death of distance: How the communications revolution will change our lives. *Journal of the American Society for Information Science*, *49*(11), 1041–1042. doi:10.1002/(SICI)1097-4571(1998)49:11<1041::AID-ASI14>3.0.CO;2-9

Sohaib, O., Kang, K., & Miliszewska, I. (2019). Uncertainty Avoidance and Consumer Cognitive Innovativeness in E-Commerce. *Journal of Global Information Management*, *27*(2), 59–77. doi:10.4018/JGIM.2019040104

Song, B., Yan, W., & Zhang, T. (2019). Cross-border e-commerce commodity risk assessment using text mining and fuzzy rule-based reasoning. *Advanced Engineering Informatics*, *40*, 69–80. doi:10.1016/j.aei.2019.03.002

Stakhovych, S., & Bijmolt, T. H. A. (2009). Specification of spatial models: A simulation study on weights matrices. *Papers in Regional Science*, *88*(2), 389–408. doi:10.1111/j.1435-5957.2008.00213.x

Tan, Y. H., & Thoen, W. (2000). Toward a generic model of trust for electronic commerce. *International Journal of Electronic Commerce*, *5*(2), 61–74. doi:10.1080/10864415.2000.11044201

Terzi, N. (2011). The impact of e-commerce on international trade and employment. *Procedia: Social and Behavioral Sciences*, *24*, 745–753. doi:10.1016/j.sbspro.2011.09.010

Thomas, S., & Hu, Y. (2011). Collaborative knowledge production in china: Regional evidence from a gravity model approach. *Regional Studies*, *45*(6), 755–772. doi:10.1080/00343401003713373

Tian, R. G., & Lan, X. (2009). E-commerce Concerns: Cross-Cultural Factors in Internet Marketing. *Proceedings of the 2009 International Conference on Electronic Commerce and Business Intelligence*, *6*, 83-86. doi:10.1109/ECBI.2009.55

Tinbergen, J. (1962). An Analysis of World Trade Flows in Shaping the World Economy. New York Twentieth Century Fund, 5(1), 27-30.

Valarezo, A., Pérez-Amaral, T., Garín-Munoz, T., Herguera García, I., & López, R. (2018). Drivers and barriers to cross-border e-commerce: Evidence from Spanish individual behavior. *Telecommunications Policy*, *42*(6), 464–473. doi:10.1016/j.telpol.2018.03.006

Vasilaki, A. (2011). Culture distance and cross-border acquisition performance: The moderating effect of transformational leadership. *European Journal of International Management*, *5*(4), 394–412. doi:10.1504/EJIM.2011.040912

Wang, Q., & Xu, W. (2014). A research on Chinese inter-provincial trade based on spatial panel interaction model under multi-dimensional distances. *China Industrial Economics*, *3*, 31–43.

Weng, D. (2018). Research on the development strategy of third party cross border payment institutions. *Asia-Pacific Economic Review, 6*, 39-47.

Wood, J., Wu, J., Li, Y., & Jang, H. (2017a). The economic impact of SPS measures on agricultural exports to china: An empirical analysis using the PPML method. *Social Sciences*, *6*(2), 51–69. doi:10.3390/socsci6020051

Wood, J., Wu, J., Li, Y., & Kim, J. (2017b). TBT and SPS impacts on Korean exports to China: Empirical analysis using the PPML method. *Asian-Pacific Economic Literature*, *31*(2), 96–114. doi:10.1111/apel.12186

Wood, J., Wu, J., Li, Y., & Kim, J. (2019). The Impact of TBT and SPS Measures on Japanese and Korean Exports to China. *Sustainability*, *11*(21), 6141. doi:10.3390/su11216141

Yeganeh, H. (2011). A generic conceptualization of the cultural distance index: Application to schwartz's and hofstede's frameworks. *Journal of Strategy & Management*, *4*(4), 325–346. doi:10.1108/17554251111180990

Yotov, Y. V., Piermartini, R., Monteiro, J. A., & Larch, M. (2016). *Advanced guide to trade policy analysis: the structural gravity model*. Academic Press.

Zhao, S., Fang, Y., Zhang, W., & Jiang, H. (2020). Trust, Perceived Benefit, and Purchase Intention in C2C E-Commerce: An Empirical Examination in China. *Journal of Global Information Management*, *28*(1), 121–141. doi:10.4018/JGIM.2020010107

ENDNOTES

[1] The data was collected from2019 “Belt and Road” Cross-border E-commerce Consumption Report released by Jingdong Big Data Research Institute.

[2] 2019 global cross-border e-commerce market and development trend research report released by iiMedia Research

[3] The data was collected from PayPal Cross-Border Consumer Research 2018

[4] The data was collected from eWTP helps the construction of “One Belt One Road released by Ali Research Institute & DT Finance.

[5] Data from 57 of 64 countries was used in this part. Countries such as Palestine, Timor-Leste, Kuwait, Iran, Syria, Iraq, and Yemen were not included due to a lack of data.

Du Qunyang has received his PhD in economics from Zhejiang University in 2006. In 2010, he was employed as a professor and doctoral tutor by Zhejiang University of Technology. Currently he was served as the Deputy Dean of the School of Economics in Zhejiang University of Technology, and the Vice President of the Zhejiang Institute of International Economics and Trade. He has chaired 3 National Natural Science Foundations and published more than 50 papers, his monograph & a study on the connection between TNCs' R&D Resource Transferred and China & has won the Zhejiang Provincial Science and Technology Progress Award.

Deng Danqing received the master's degree from Zhejiang University of Technology in 2014. and is currently a researcher at the Institute of Science and Technology Information of Zhejiang Province. She began to study for a PhD at Zhejiang University of Technology from 2015. Her main research direction is cross-border investment, international innovation, and several articles were published in related fields. She is the corresponding author of this paper.

Jacob Wood is currently the Associate Dean of Research for the College of Business, Law and Governance in JCU Australia and the Associate Dean of Research for Business, IT, and Science at JCU Singapore. In addition to this, he is also the Director of the Centre for International Trade and Business in Asia (CITBA) and an Associate Professor of International Business at JCU Singapore. Prior to joining JCU, Dr. Wood spent more than 10 years' working in South Korea where he has held roles as an Assistant Professor at Korea University of Technology and Education and then more recently as an Assistant Professor of Asia Business at Chungnam National University. Dr. Wood specializes in the fields of international trade negotiation and the effect of non-tariff barriers on international trade flows. His research has been published in a range of prominent international journal publications including the Journal of Cleaner Production, Transportation Research Part D: Transport and Environment, the World Economy, the Journal of World Trade, Sustainability, the Singapore Economic Review, the Journal of Asia-Pacific Economic Literature, and the Scientometrics Journal, amongst others.