# Analysis of Chinese international trade potential under the background of the belt and road initiative

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# ANALYSIS OF

# CHINESE INTERNATIONAL TRADE POTENTIAL

# UNDER THE BACKGROUND OF

# THE BELT AND ROAD INITIATIVE

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## Abstract

The Belt and Road Initiative is a new globalization initiative to strengthen economic integration, which provides new opportunities for China's trade cooperation with countries along the Belt and Road. The research on the influencing factors of trade and the great potential of trade cooperation is of great practical significance for promoting the regional economic cooperation of the countries along the Belt and Road. Specifically, what is the potential for trade between China and the Belt and Road Initiative participating countries? What are the current influencing factors to the realization of trade potential? How significant is the impact? To this aim, this paper takes 80 countries which have signed the One Belt And One Road memorandum with China as the research object, collects the trade panel data of the decade from 2009 to 2018. Then empirically analyzes the trade influencing factors of the import and export trade between China and these countries by augmented gravity model. After that, the trade potential is further estimated. The results show that the GDP of the two countries, the size of their populations, telephone infrastructure, trade freedom, the quality of railroad infrastructure, and whether it borders China have an impact on both import and export. Level of government governance, investment freedom, air transportation and port infrastructure, whether it signs RTA with China has an impact on China's exports. RMB exchange rate, Internet communication infrastructure and geographical distance between the two countries only affect China's imports. Among the 80 markets along the route, 31 countries have great trade potential to be developed. More than half of these are Europe and Central Asia, sub-Saharan Africa and South Asia countries. Finally, based on the research results of this paper, policy enlightenment is obtained.



Keywords: The Belt And Road Initiative; Gravity Model; Trade Potential; China.

## Acknowledgment

Times flies, with the completion of the master thesis, the study life at the University of Liège is coming to an end.

The completion of this paper is meaningful to me. This is the first time I have completed a research thesis. This experience has exercised my ability to read literature and think logically. Moreover, I learned more about the gravity model and the use of Stata. This experience also made me faced and broke through the limits of my ability. Writing a paper is not easy. Here I want to thank the people who gave me guidance and support sincerely.

Thanks to my supervisor Joseph Tharakan. He provided me with reference articles and suggestions during the development stage of my thesis. The advice he gave me helped me find the research direction of the thesis.

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# CHAPTER 1: Introduction

## 1.1. Context

In 2013, China propose the Belt and Road Initiative. Xinhua News Agency, the nation news agency of China informs that *"The initiative aims to build a trade and infrastructure network connecting Asia with Europe and Africa along the ancient Silk Road trade routes to seek common development and prosperity." ("Xi Focus-Backgrounder: Belt and Road Initiative progress - Xinhua | English.news.cn", 2019).* By the end of January 2020, China had signed 200 cooperation documents with 138 countries and 30 international organizations to build the One Belt And One Road jointly ("Belt and Road Initiative", 2020). The report released by *the Office of the Leading Group for Promoting the Belt and Road Initiative*, indicated that *"The Belt and Road Initiative upholds the principles of extensive consultation, joint contribution, and shared benefits. It follows a Silk Road spirit featuring peace and cooperation, openness and inclusiveness, mutual learning and mutual benefit. It focuses on policy coordination, connectivity of infrastructure, unimpeded trade, financial integration, and closer people-to-people ties".* Connectivity of infrastructure is one of the core missions of the Belt and Road Initiative. China has conducted fruitful cooperation with countries along the Belt and Road in transportation and communication infrastructure construction. Efforts will be made to build complete, safer and more efficient infrastructure in areas along the Belt and Road, and form a higher level of railway, port and air transportation. It will also improve investment and trade facilitation and build a regional free trade network with high quality and high standards. It purposes to make the countries' economy closer, political mutual trust deeper, and culture exchange wider (Du, 2016). Most of the countries in the middle of B&R are developing countries and emerging market countries. They have the same advantages in abundant natural resources, but they also have the same disadvantage. The level of national economic development is generally low, leading to weak infrastructure and inadequate transportation. As a result, a huge gap in the level of economic development and the economic circle appears between both ends. By strengthening cooperation with the countries along the Belt and Road, China has made a substantial investment in its infrastructure constructions, which has effectively improved resource allocation and trade facilitation among countries. Unimpeded trade also is one of the most important goals of the initiative. From 2013 to 2018, China's trade with the Belt and Road countries exceeded us $6 trillion. However, regarding the "The Belt and Road Initiative" as an assignment or a mechanism, from a fundamental point of

view, this is actually not accurate. We can regard it as an important development concept that promotes a cooperative and win-win development model. Participation in The Belt and Road Initiative can be carried out by all countries, and there is no explicit scope limitation.

## 1.2. Research motivation

China and the countries along the Belt and Road have enormous trade potential. On the one hand, the good economic potential and willingness of the countries along the Belt and Road have laid a solid foundation for economic and trade cooperation. In 2017, 71 Belt and Road countries accounted for 47.6% of the world's population and create 27.8% trade value of the whole world trade volume. On the other hand, China and the countries along the route have strong economic complementarities, and the potential for trade cooperation is huge. China's industrial manufacturing production structure conforms to the needs of the economically backward countries along the Belt and Road in the large-scale development stage, which constitutes a unique advantage for China and these countries to build BRI jointly. At the same time, there are still many trade resistances in the trades between China and the countries along the B&R, mainly manifested in: uneven economic development level, imperfect infrastructure construction conditions, and imperfect trading system. B&R covers countries for thousands of kilometers, linking the Asia-pacific economic belt in the east with the developed European economic circle in the west. Except for the economic development level, countries along the B&R have various degrees of difference in the political system, cultural atmosphere, and living customs. There are also differences between China and these countries, such as resource endowment, technological level, economic standard, and industrial structure. Although China and the Belt and Road countries have excellent prospects for mutually beneficial as well as win-win cooperation, there are still many trade barriers. First, the economic size of countries along the Belt and Road vary greatly. This difference makes it difficult for the Belt and Road Initiative to form a unified coordination mechanism and hinders the development of multilateral trade. Secondly, the countries along the Belt and Road have weak infrastructure level, which reduces the level of trade efficiency. Because international trade involves transportation, supervision and other activities. The efficiency of transport, communications and other infrastructure affects the cost of international trade together. Third, most of the countries along the Belt and Road are developing countries, and some are underdeveloped. These countries have high tariff barriers and low trade freedom.

Trade facilitation faces challenges. Fourth, the system of trade rules is not perfect. The Belt and Road Initiative itself is not a compact and strict regional trade agreement. In addition to the observance of the world trade organization, most countries Belt and Road countries have signed other trade agreements, and their recognition and participation in the Belt and Road Initiative construction are relatively low.

Even though previous studies have analyzed the trade between China and the BRCS to a certain extent, the existing literature is still not sufficiently in-depth research on this issue. First, most of the literature only studies central countries along the Belt and Road and fails to cover the trade between China and all or most countries along the Belt and Road. Therefore, the conclusions drawn are only applicable to some countries. Secondly, most literature mainly studies the bilateral trade between China and the countries along the Belt and Road in terms of trade facilitation level, trade cost, institutional distance and trade efficiency. Little literature has revealed the influencing factors and the trade relationship between China and the BRCS, and they have rarely analyzed trade from the perspective of trade potential. Therefore, this research will take the import and export trade of 80 countries which have signed the One Belt And One Road memorandum with China from 2009 to 2018 as the research object. To expand the data coverage from the dimensions of the sample country scope; introduce the infrastructure level, cultural and institutional differences into the model.

## 1.3. Problem Statement

As a new concept of economic cooperation and a strategy of the international open market, the research on the influencing factors of trade growth and the great potential of trade cooperation between China and the Belt and Road partner countries is significant. This paper studies this topic and answers the following three questions: Is there any trade potential for Belt and Road Initiative? Which factors are the influencing factors affecting the realization of trade potential? What is the trade potential between China and the different BRC respectively?

## 1.4. Contribution

There are many pieces of research on China's trade problems, among which the research on the bilateral trade gravity model also is common. However, due to the relatively large difficulty in data sample collection, much literature mainly focuses on large trading partners. There is little literature on China and its trading partners along the Belt and Road, and even fewer of them use a gravity model to study the trade potential. This research uses a gravity model to measure the trade potential of China and 80 countries that have signed the One Belt And One Road memorandum. Further classifies the trade potential from two dimensions of whole volume and region, which has certain academic contribution.

This paper studies the trade influencing factors between China and 80 BRCS, which is helpful to find out more international trade development prospects brought by BRI. The research results are helpful to improve the internal mechanism from the traditional hard indicators. Through the discussion on the institutional level, this author finds a way to develop the trade potential and put forward suggestions on the implementation of BRI related strategies.

## 1.5. Approach

This thesis consists of six chapters.

Chapter 1 reveals the background to the topic of this thesis and the motivation and objective of this article.

Chapter 2 is a literature review. The theoretical and literature of the research are listed. The theoretical part mainly includes relevant economic theory, the gravity model of trade and trade potential. Then the research related to Belt And Road Initiative is summarized.

Chapter 3 will introduce the methodology used in this thesis. This author decided to do quantitative research by conducting gravity model. Then the variable selection is introduced, and the connotation is explained. This chapter also shows the sources of data required for the model.

Chapter 4 is the result of empirical analysis. Based on the gravity model constructed in chapter 3, this paper makes an empirical study on bilateral trade between China and 80 partner countries. The correlation is first analyzed. Then the F test and Hausman test are used to test the model. Lastly, the empirical results are presented.

Chapter 5 will analyze the trade potential. This part is the application part of the trade potential model. Through the results of chapter 4, the potential trades of China with BRC are calculated.

Chapter 6 is the analysis and discussion of the results. Firstly, this author analyzed the result of chapter 4. The influence of different factors on trade and their interpretation are discussed. Then the trade potential is compared from the perspective of total volume and regional classification.

Chapter 7 is the conclusion. This part first summarizes the research content of this paper. Moreover, relevant academic and managerial suggestions are suggested. Besides, the limitations and recommendations of the thesis will be clarified.

# CHAPTER 2: Literature review

## 2.1. Related theories

### 2.1.1. International trade theories

Over time, economists have developed theories to explain the mechanisms of international trade. To better study how countries traded with one another, it is essential to understand how international trade theory has evolved historically. *"These theories are referred to as modern and are firm-based or company-based. Both of these categories, classical and modern, consist of several international theories."* ("What Is International Trade Theory?", 2020) Classical international trade mainly includes a trade theory called absolute advantage proposed by Adam Smith at the end of the 18th century and the theory of comparative advantage raise by David Ricardo (Krugman, Melitz & Obstfeld, 2012).

Absolute advantage theory is concerned with the ability of one country to produce a good more efficiently than another. It basically means that a country only needs to produce products with absolute advantages in its own country instead of produce products with absolute disadvantages and improve resource utilization through exchange between countries. Smith also argued that in order to achieve trade efficiency, trade between countries should not be regulated or restricted by government policies or interventions (Meek, Raphael & Stein, 1978)

However, the blind spot of the absolute advantage theory is that some countries may be superior in both commodities, and therefore have absolute advantages in many fields. On the contrary, another country may not have any absolute useful advantage. Comparative advantage theory breaks the limitations of absolute advantage theory (Ricardo, Sraffa & Dobb, 1966). David Ricardo introduced the theory of comparative advantage in his book, *The Principles of Political Economy and Taxation* first published in 1817. He argues comparative advantage occurs when the opportunity cost paid by country A to carry a production is lower than that of country B, it means country A can produce this kind of product more efficiently than it produces other goods. This theory indicates that *"Trade between two countries can benefit both countries if which country exports the goods in which it has a comparative advantage"* (Krugman, Melitz & Obstfeld, 2012, p.26).

Smith and Ricardo's theories cannot help countries find the products they have advantage in real international trade, because countries have difference not only labor productivity but also resources(Krugman, Melitz & Obstfeld, 2012). In the early 1900s, Eli Heckscher and Bertil Ohlin justified a model focuses on differences between countries in their relative factor endowment and differences between countries in the use of these factor of various products(Shahriar, Qian, Kea & Abdullahi, 2019). It states that, when two countries have the same technical level, the cost mainly determined by the difference in the abundance of factors in the countries and the intensive of factors required by the products. Countries will export the goods using intensively the abundant factor and import goods using the scarce factor intensively(Shahriar, Qian, Kea & Abdullahi, 2019).

After World War II, the scale of trades in the same industry and between developed industrial countries increased significantly. International trades not only take place between countries with different labour productivity or factor endowments anymore. These trades cannot be explained by the classical, country-based theory like comparative advantage theory and factor proportions theory. The assumption of perfect competition in the market is also inconsistent with the reality of contemporary international trade. Under such an international environment, international trade has evolved new trade theories refers to trade between two countries of goods produced in the same industry. These modern, firm-based theories consider other product and service factors, including brand and customer loyalty, technology, and quality ("What Is International Trade Theory?", 2020).

One of the most important modern theories is the country similarity theory proposed by Staffan Linder(1961). He argues that consumers in countries at the same or similar stage of development have similar preferences, and companies often find that markets similar to their home markets are most likely to succeed in terms of customer preferences. Linder then stated that the trade flow of the two countries depends on the similarity of the two countries' preferences(Batra, 2006). The more similar the demand structure, the higher the trade value; and the average level of national income is the most important influencing factor of their demand structure(Armstrong, 2007).

### 2.1.2. Gravity Model of Trade

The Gravity Model of Trade is based on the law of universal gravitation raised by Isaac Newton in 1687. This law describes the relationship about the gravitational force between two objects and their distance(Roperto Jr & Edgardo, 2013), that is:

$$F_{ij} = G\frac{M_i M_j}{D_{ij}^2} \quad (1)$$

Where:

$F_{ij}$ is the gravitational attraction

$M_i, M_j$ are the mass of two objects

$D_{ij}$ is the distance

G is the gravitational constant

In 1962, Tinbergen first applied the Gravity Model to study international trade flows. After many case studies, he found that the economic scale of the two countries is their demand, can increase the trade flow, which is called the trade attraction. The distance between two countries can affect the trade cycle cost, is the critical factor affecting trade flow, which is the trade resistance. He then assumed the relationship as in equation 2:

$$X_{ij} = \alpha\frac{Y_i^{\beta_1} Y_j^{\beta_2}}{D_{ij}^{\beta_3}} \quad (2)$$

Where:

$X_{ij}$ is the total trade flow from country i to country j

$Y_i, Y_j$ are the economic size of two countries and usually GDP

$\beta_1, \beta_2, \beta_3$ are the elasticity of the exporting country's GDP, the importing country's GDP and distance respectively

$D_{ij}$ is the distance between two countries

α is a constant term

Later, Linnemannn(1966) first added population variables to the gravity model. When Linnemann attempt to adopt the complementarity in the form of a relative resource endowment variable into the gravity model, the result shows that the countries which are less similar and hence have a different comparative advantage, will have complementary trade structures and be expected to trade more. This result opposite to the Linder hypothesis. Thus, the use of a complementarity variable is limited in gravity models.(Armstrong, 2007) According to different research objects, different research purposes, scholars choose various explanatory variables. This makes the research method of trade problems based on the gravity model innovate and improve from multiple angles. In 1997, Frankel, Stein and Wei made a study on the effect of regional trading blocs groups by taking trade agreement as a dummy variable into the gravity model. Using this augmented model, Frankel, Stein and Wei(1997) quantify the increase of trade caused by various preferential trade agreements and regional agreements.(Armstrong, 2007) In order to study Mercosur-European Union trade relationship and evaluate the trade potential causing by the new agreements between two trade blocs, Martínez-Zarzoso and Nowak- Lehmann(2004) uses this gravity model. There are several variables added by their research result. As a result, infrastructure, income differences and exchange rates are found to be important influencing factors of bilateral trade flows (Dinh Thi Thanh, Viet Duong & Manh Cuong, 2013). As the theory becomes more and more complement, more and more literature use the Gravity Model to analyze trade flow between countries or regions (Bialynicka-Birula, 2015).

It can be seen that the gravity model of trade can be applied to the empirical analysis of international trade between two economies or two regions, so it has played a decisive role in the analysis of the measurement of international trade flow.

### 2.1.3. Trade potential

The concept of "potential" could be explained by the production potential, which is the maximum output that an economic individual can achieve with the given technology and input. From this perspective, Fan, Zhang, Liu & Pan(2016) indicate that if the actual output is running at the boundary level, the production process is considered to be fully efficient. Otherwise, the production process is technically inefficient, which means there is scope for improvement in production performance. The loss of production efficiency is represented by the ratio between actual output and production potential. Correspondingly, Potential trade refers to the ideal trade that can be achieved under the conditions of existing trade policy,

transportation quality and institutional technologies or practices under the most open and frictionless trade conditions (Roperto Jr & Edgardo, 2013).

Baldwin(1994), Nilsson(2000) and Egger(2002) studied trade potential as the expected trade volume between countries, which is the most representative example of using the gravity model to predict. They then measure how potential trade is much higher or lower than actual trade. Egger(2002) corrected the correlation as well. He used different panel data methods to find the best model and then did a simple calculation to figure out the ratio of actual transactions to potential trades. This is a measure of how actual trade flows perform relative to the model's predicted average (Armstrong, 2007).

In a large number of literature tasks to predict trade potential, the use of gravity model is very common. Rahman(2003) used the panel data method to estimate the trade potential of Bangladesh, using economic factors such as degree of openness and exchange rate instead of natural factors such as geographical distance. Christie(2002) also use the gravity model to estimate the trade potential of south-eastern Europe. The difference is Christie(2002) use the cross-section data instead of panel data. Kalbasi(2001) analyzed the trade volume and direction of Iran with 76 countries as samples. What these countries have in common is that they are both developing and industrial countries. The model was used to examine trade flows by group, in order to determine the impact of developmental stages on bilateral trade (Batra, 2006).

Some studies have estimated the positive effects of preferential trade arrangements on trade. Batra(2006) conclude the results of these studies suggest that economic integration across a range of economies will lead to additional bilateral trade. In terms of research methods, these studies used cross-session data or panel data approach. The cross-section data and panel data methods are both referring to long-term relationships. Frankel and Wei(1993) used the gravity model to study bilateral trade patterns around the world and analyzed the influence of currency blocs and exchange rates on trade. Later, Cooper and Frankel(1997) used the gravity model to study the influence of regional trading blocs and the role of currency connection. UNCTAD - WTO Trade Centre has also developed gravity models to estimate the trade potential of countries with limited trade relations in the past, particularly countries with economies in transition. The model is generally used to analyze bilateral trade flows between developing countries and their trading partners(Batra,2006).

## 2.2. International trade between China and BRCS

### 2.2.1. Current progress

Baniya, Rocha & Ruta(2020) researches on the impact of the Belt and Road Initiative on trade among the 71 major participating countries. They pointed out that the initiative increased trade flows among participating countries by 4.1%(Baniya, Rocha & Ruta, 2020). In 2018, China's trade in goods with the countries along the Belt and Road reached $1.3 trillion, up 16.4% than last year. China's trade in services with other Belt and Road countries also grew steadily, reaching $97.76 billion in 2017, up 18.4%over 2016. This figure accounts for 14.1%of China's total trade in services, 1.6 percentage points higher than in 2016("The Belt and Road Initiative: Progress, Contributions and Prospects", 2019).

According to *Big Data Report On Trade Cooperation Under The Belt And Road Initiative*(2018), port transportation still is the most usual transportation way be used by the trade between China and BRCS. The use of air transportation is steadily increasing both for import and export. However, rail transportation covers the least trade and keeps a decline in China’s import since 2013.

*Source: Big Data Report On Trade Cooperation Under The Belt And Road*

| Transportation mode | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Port | 5267.2 | 5761 | 5701.5 | 5408.9 | 5679.3 |
| Air | 668.4 | 774 | 808.7 | 770.8 | 954.3 |
| Railway | 883.8 | 1042.8 | 865.4 | 799.6 | 917.7 |
| road | 128.2 | 129.9 | 107 | 115.8 | 155.7 |
| Others | 31.7 | 27.6 | 30 | 31.3 | 30.3 |
| mail | 0.8 | 2.1 | 8.2 | 7.8 | 5.4 |

**Table 1** China's export volume to Belt and Road countries from 2013 to 2017 by transportation modes

*Source: Big Data Report On Trade Cooperation Under The Belt And Road*

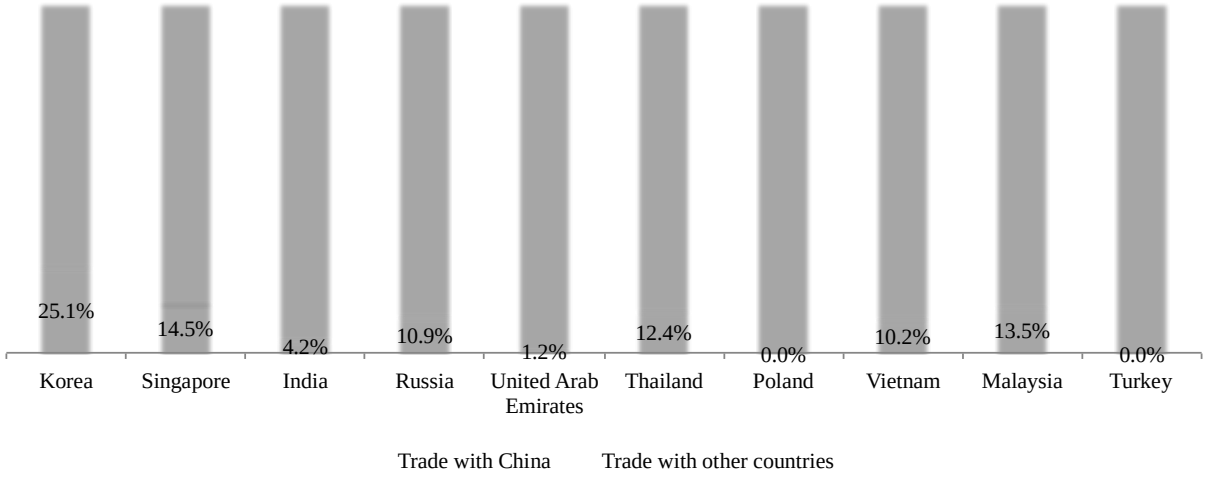
| Transportation mode | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Maritime | 4442.6 | 4422.5 | 3469.8 | 3148.2 | 3841.9 |
| Air | 1112.1 | 1279.1 | 1211.6 | 1094.8 | 1325,5 |
| Railway | 1059.8 | 1043.7 | 866.8 | 882.2 | 1004.9 |
| road | 339 | 367.4 | 317.6 | 294.3 | 349.8 |
| Others | 169.3 | 176.8 | 141.1 | 141.7 | 138 |

| | | | | | |
|---|---|---|---|---|---|
| mail | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 |

**Table 2** China's import volume to Belt and Road countries from 2013 to 2017 by transportation modes

This report also analyzes the trade status of the Belt and Road from a national perspective. Taking the Belt and Road countries in 2017 as the research object, the top 10 countries in terms of foreign trade volume are shown in the figure below. It links the trade volume of countries and their trade with China to the following results. From the perspective of Belt and Road countries: in terms of exports, China is the number one exporter of South Korea, Singapore, Russia and Thailand. Among them, South Korea's exports to China accounted for more than 20%.

*Source: Big Data Report On Trade Cooperation Under The Belt And Road*

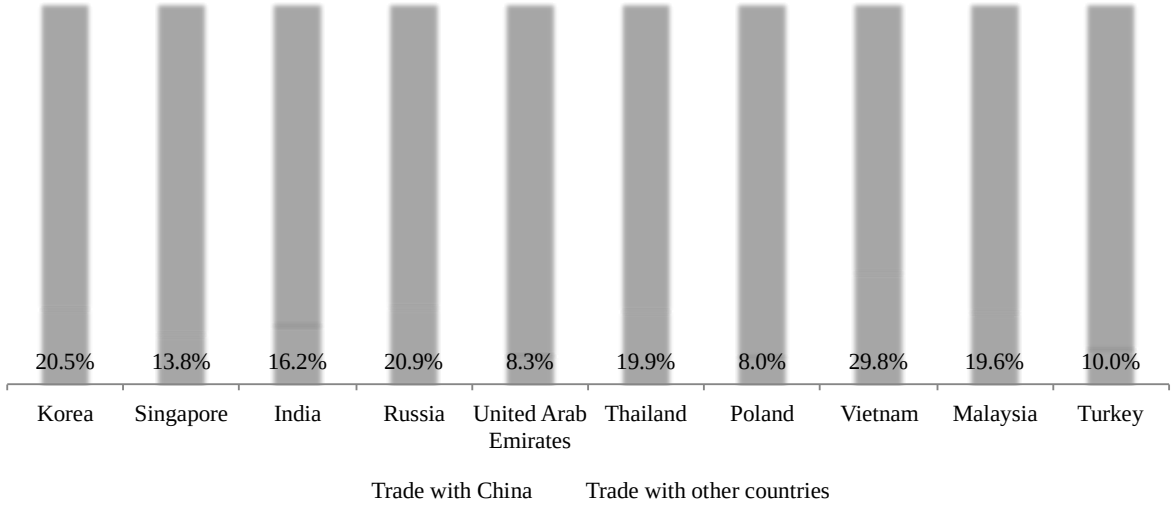



*0% means China is not a top 10 export trading partner for these 10 countries.
**The UAE's import data is for 2016; Vietnam's export data is for 2015.

**Table 3** Export trade of Top 10 trade volume countries and their export trade with China

In terms of imports, except Poland, China is the largest source of imports for the other nine countries. South Korea, Russia, Thailand and Malaysia are all around 20% and Vietnam up to 30%.

*Source: Big Data Report On Trade Cooperation Under The Belt And Road*




*The UAE's import data is for 2016; Vietnam's export data is for 2015.

**Table 4** Export trade of Top 10 trade volume countries and their export trade with China

### 2.2.2. Trade potential

So far, the Belt and Road Initiative is still a flexible conceptual initiative instead of a well-defined action plan(Zhai, 2018). The vagueness of BRI leads to difficulties in quantitatively evaluating its economic impact. With the deepening of strategy, scholars have conducted fruitful research on the trade potential of China and BRCS. The scope of the research target is different, including China's trade potential with countries on the Silk Road Economic Belt, with countries on the Maritime Silk Road, and with all countries along the Belt and Road.

The literature on trade potential research between China and the Silk Road Economic Belt mainly takes the five Central Asian countries as the research object. Through empirical studies, most of them generally concluded that the trade potential between China and BRC are enormous, but there are differences in the trade potential of various countries. Li, Bolton and Westphal (2018) prove that the railways increase the trade flow between China and its trading partners along the 'New Silk Road' using the Gravity Model. Bi & Shi(2010) calculated China's export trade potential to five Central Asian countries from 1998 to 2006. According to the calculation, it is found that China's trade potential with Kazakhstan is huge, and the bilateral trade potential with Kyrgyzstan is nearly saturated. Gao and Liu (2015) updated the

time of the calculated data to 2012 and found that China and Uzbekistan have almost always had great potential during the sample period, while export trade to other four countries has shifted from huge potential to excessive trade in 2010. Yang, Liu and Yu (2015) further researched the trade complementarity between China and Central Asian countries and found that bilateral and intra-industry trade complementarities are both strong and have great trade potential. Gong, Qiao and Hu (2016) used bilateral trade data between China and the Silk Road Economic Belt from 1992 to 2014 and calculated that the average trade efficiency was 0.35. Due to different sample selections and different model settings, Wang and Wu (2016) obtained an average trade efficiency of 0.25 within the same time and area. Although the results of trade efficiency are different, they all show that there is a significant trade potential between China and the Silk Road Economic Belt.

The literature on the trade potential between China and 21st-Century Maritime Silk Road mainly focuses on the research of ASEAN countries. Due to the different research methods, the study concluded that the relative trade potential of some countries is inconsistent, but most of the literature shows that China and ASEAN countries have huge trade potential. Jiang and Huo (2015) used the gravity model to obtain the trade creation effect of the China-ASEAN Free Trade Area from 2001 to 2012, showing a decreasing trend, and the trade potential is still huge. Liao and Ning(2015) specifically analyzed the trade potential between China and 10 ASEAN countries. The literature shows that Brunei, Philippines and Thailand have more significant trade potential, while Myanmar, Malaysia and Vietnam are relatively trade saturated. Tan and Zhou (2015) used the stochastic frontier gravity model to obtain an average export efficiency of 0.34 from 2005 to 2013 between China and the Maritime Silk Road countries. China has great export potential to South Asia and Gulf countries.

In a study of the overall trade potential of China and the countries along the One Belt and One Road, Sun and Liu (2016) found that China's export efficiency and total trade efficiency to Southeast Asia were the highest, and West Asia was the lowest. Zhang (2017) used a stochastic frontier gravity model with real effects to estimate the trade potential and efficiency of China and 62 countries along the route from 2002 to 2015. The results show that the efficiency of export and import trade (0.71) is lower than that of export trade (0 .83), of which the import and export efficiency with Southeast Asia and Central and Eastern Europe has maintained a high level, and the efficiency with Central Asia is relatively low. Tang, Shao, Li and Wang(2018) used the data of export trade from 2005 to 2016 and covered 61 countries along the route, it concluded that the trade efficiency of European countries is generally

higher, and China has very limited potential for its export trade. Li, Bolton and Westphal(2018) found that the impact of train construction on European exports to China was not significant compared to the import of Chinese goods. The reason for this result may be that many BRI trains now transport goods from China to other markets but return to China empty or with little cargo on board. From this perspective, it can be expected that the train has great potential for exporting products from Europe to China. Using the Gravity Model of trade with specific treatment of three transportation modes (i.e., railway, air, and maritime), Herrero and Xu(2016) use the trade gravity model to estimate the effect of BRI on trade, especially on Europe, with three transport modes were specifically treated to . They found that improved transport infrastructure under the Belt and Road Initiative would greatly boost trade among EU countries, especially landlocked ones. Eastern Europe, Central Asia, and Southeast Asia would also expand their trade as a result of the BRI (Zhai, 2018). The potential of countries in Russia, Central and Eastern Europe and the Middle East for trade efficiency is yet to be exploited, while countries mainly in Central Asia and South Asia have great potential, and these countries still have a lot of potential market space. Ye and Li(2018) compared the trade efficiency of the "Maritime Silk Road" and "Silk Road Economic Belt" and found that China has higher import trade potential with "Maritime Silk Road", while having higher export trade potential with "Silk Road Economic Belt".

### 2.2.3. Influencing factors

Obstfeld and Rogoff claim that cost of international trade is the key to discover the dynamic international macroeconomics. Broadly defined, trade costs include policy barriers (tariffs and non- tariff barriers), transportation costs, local distribution costs and other costs that could be estimated (Zhai, 2018). Information costs, language difference, culture gap is ignored in most of the time. Although these factors are difficult to quantify, they are also an essential part of trade cost. From the perspective of trade cost, these factors can be divided into hard costs and soft costs. The former is represented by the infrastructure, while the latter includes tariffs, regional trade agreements, and institutional environment.

Apparently, the Belt and Road Initiative refers to two routes. The most significant action of the initiative is the investment and construction of infrastructure in the countries along these two economic belts. Therefore, most of the literature on the Belt and Road Initiative research is related to the infrastructure. Many of them believe the construction of facilities reduces transaction costs for the countries along the B&R or even the whole world.

As the representative of the hard cost in international trade, the level of infrastructure construction mainly includes transportation infrastructure and communication infrastructure. The empirical studies of Bougheas et al. (1999) and Wilson et al. (2000) show that raising the level of infrastructure can reduce trade costs and increase transaction efficiency, which is positively correlated with trade flows. Francois, Manchin, and Pelkmans-Balaoing (2009) estimated the relationship between the elasticities of trade costs and the quality of infrastructure for 16 Asian countries. Their findings show that the impacts of transportation, as well as communication infrastructure on trade costs, are very closely related to the country's income level. Specifically, for Asia, transportation infrastructure would have a more significant contribution to reducing trade costs than communication infrastructure. In contrast, communication infrastructure has a more significant impact on the cost of trade in high-income countries (Zhai, 2018).

The study on the impact of the One Belt and One Road national infrastructure level on China's import and export trade is in its infancy. Cui & Yu (2017) proposed that the improvement of transportation infrastructure of countries along the route can have an impact on China's exports of goods through the trade creation effect, trade diversion effect and trade substitution effect. The creation effect has a positive impact on trade, while the transfer effect and substitution effect have a negative effect; the final effect depends on the joint effect of the three effects (Cui& Yu, 2017). Empirical studies mostly use gravity models and find that improvements in the infrastructure of countries along the route are conducive to the growth of China's goods exports. However, for trading partners with different economic characteristics, the impact of transportation infrastructure on bilateral trade is different. Zhang(2018) proposed that the level of infrastructure promotion for trade will vary with the income levels of exporting and importing countries. The lower the per capita GDP level of importing countries, the more obvious the improvement of transportation infrastructure will promote China's export trade. ). Cui& Yu(2017) found that the improvement of transportation infrastructure has a positive impact on China's exports to the Mongolia-Russia, China-Singapore, China-Iceland, and New Asia-Europe Continental Bridge Economic Corridors. However, the impact on the Bangladesh-China-India-Myanmar Economic Corridor is not apparent.

The impact of communication infrastructure on trade in goods is mainly reflected in the cost effect and network effect. Limao(2001) pointed out that communication infrastructure can reduce trade costs by increasing the transparency of market information, reducing search,

matching and communication costs, and saving transit time to reduce transportation costs. This theory is supported by empirical research. Freund & Weinhold (2002) found that increasing the use of bilateral Internet and fixed telephone coverage has the effect of reducing trade costs. The network effect refers to the higher the level of development of the communication infrastructure of both trading partner countries, the more significant the role of communication infrastructure in promoting trade between the two parties (Katz& Shapiro, 1985). Therefore, Francois & Manchin (2013) proved that communication infrastructure has a more visible role in promoting trade in developed countries. There is only a few of literature that analyzes the impact of communication infrastructure on trade between China and BRCS, and most of these studies have shown that the improvement of trading partners' communication infrastructure will promote bilateral trade. Gong, Qiao &Hu (2016) and Wang &Wu (2016) using stochastic frontier gravity model to prove that communication infrastructure is a significant factor affecting the trade efficiency of the "Silk Road Economic Belt". An empirical analysis of trade data between China and 64 countries along the Belt and Road by Zhang and Yin (2018) shows that mobile phones significantly promote trade development. Zhang's (2018) empirical analysis found that after a country's transportation infrastructure has already developed to a certain level, the role of communication infrastructure will become more and more significant. Especially in ASEAN and silk Road Economic Belt countries, the impact of transport infrastructure on bilateral trade is higher than that of communication infrastructure (Yang& Ning, 2018).

Sun, Zhang et al. questioned the ability of sustainable development of the Belt and Road Initiative in their thesis in 2019. They suppose that BRI can only affect the world economy in the short term by improving infrastructure, and the benefits of these infrastructures will gradually disappear over time. According to economic theory, Sun et al(2019) indicate that infrastructure as a factor of production can reflect the level of productivity, thus the improvement of infrastructure has played a positive role in the rapid development of economy. What’s more, international trade plays an important role in the global economic system, developing countries can improve their production efficiency through trade(Sun et al., 2019). However, the above-average economic growth rate is not apparent enough to explain the apparent effects of its policies sufficiently, Sun et al. (2019) give the reasons are as follows: (1) According to the neoclassical growth theory, due to the diminishing law of marginal products, economies with a low initial per capita output level Body would grow faster with time. Before the implementation of the Belt and Road Initiative, most of the

participating countries were developing countries, and their economic development was lagging relatively. Since the implementation of the Belt and Road Initiative, the economic level of these participating countries has improved, which is directly related to the previous level of economic development. It cannot only be regarded as the result of BRI. (2) The benefits of policy implementation have a positive effect on economic growth, but this positive effect will continually weaken over time . Sun, Zhang et al.(2019) use the DID model to design experiments to analyze the effect on BRI countries. PSM-DID method proposed by Heckman(1997) was used to correct the DID model results. By comparing the control group's observable variables with processing group's, they find the ones which are as similar as possible between two groups. What Sun, Zhang et al.(2019) find proves that the implementation of BRU has a positive impact on the GDP of participating countries but has no significant impact on per capita GDP. According to the regression results, the authors suggest that we could expect the BRI has a positive impact on the participating countries' international trade. However, its impact on the other types of economic factors is either not noticeable or has an extrusion effect(Sun, Zhang, Xu, Yang & Wang, 2019).

In addition to the hard cost such as infrastructure, tariffs are also included in the analysis of factors affecting international trade as soft cost. Tariffs have the effect of increasing fiscal revenue and protecting domestic production. Krugman(1991) proposed that countries which are in an advantageous position in international competition generally pursue free trade policies and adopt low tariffs to increase the rate of resource allocation. On the contrary, countries with backward economic development implement trade protectionism policies and use tariffs to raise the prices of imported goods to protect domestic manufacturers (Krugman, 1991). Sun and Liu (2016) indicated that tariff barriers still exist because of the low economic level of most countries, but the impact on different regions is different. Zhang et al. (2015) pointed out that the bilateral tariff reduction and exemption dividends between China and Southeast Asian countries have approached the threshold. The impact on trade flows is not as great as that of European and Central Asian countries. With the decline of global tariff level, the emergence of anti-globalization trends such as Brexit and deglobalization in the United States, non-tariff barriers have gradually become an essential means of trade protection. At present, Technical Barriers to Trades(TBTs) are the main component of non-tariff barriers to trade, accounting for 85% of them in 2017. The quantitative suppression effect and price control effect of technical barriers have an inhibitory effect on export trade. In 2017, TBT and SPS notifications submitted by accounted for 41% of the total number of WTO members

submitted that year. New regulations about TBT in the countries along the route are becoming more frequent, and the coverage is expanding. (Gao et al., 2015) The impact on the bilateral trade between countries cannot be ignored. Wang' s(2018) empirical analysis shows that under the condition that the technical standards are not much different, reducing technical barriers will have a positive effect on the scale of trade between China and the countries along the route. Fan, Guo, and Wei (2018) found that for high-tech products, TBT would inhibit China's intensive margin of exporting products to countries along the route and promote the expansion margin of export products.

Regional trading agreements refer to a treaty that is signed by two or more countries to eliminate tariff or non-tariff trade barriers, encourage free movement of goods and services across the borders of its members. According to the data of the World Trade Organization, the countries currently signing regional trade agreements with China include New Zealand, South Korea, Bangladesh, Sri Lanka, Georgia and 11 countries in Southeast Asia. Eastern Europe is currently a blank area for China's RTA partner. Empirical research by Xu and Zhang (2017) shows that China's promotion of regional trade agreement negotiations can help improve trade efficiency and realize trade potential, but signing an RTA is not the main factor affecting trade potential. On the one hand, the countries that established FTA with China accounted for a relatively low proportion of China's total trade (Sun and Liu, 2016), and the degree of integration was not high (Zhu and Han, 2015). On the other hand, almost all Central and Eastern European countries along the route have signed intra-EU integration agreements. The RTAs involved in West Asia and North Africa also have a tendency to Europeanization. Multiple trade agreements have diluted the role of RTAs (Ye and Li, 2018; Hou and Deng, 2017).

Institutional environment is also a factor affecting soft cost. First, a pleasant institutional environment can reduce transaction uncertainty caused by information asymmetry in trading activities (Pan, 2006). on the contrary, the unsound political and legal system of trading partners will significantly increase the risk of transactions (Hu and Wang, 2012). Moreover, the improvement of domestic institutional environment will promote the competitiveness of domestic commodities and hinder the entry of foreign commodities. The institutional environment has both positive and negative effects on trade, and the final effect depends on the relative magnitude of these two forces. According to the definition of North(1994), the institution includes formal institution such as politics, the rule of law and the economy, as well as informal institution represented by cultural cognition. The institutional system of most

of BRCS is not perfect, and their economic level is not high. Most existing empirical studies show that the institutional environment of the BRCS has a positive impact on China's import and export trade. Gong et al. (2016), Sun et al. (2016) and Zhang (2016) believe that an open and free economic environment and efficient government work levels provide a good domestic environment for foreign trade in countries along the route, reduce trade barriers, and benefit trade potential. A little literature has also shown that the improvement of the institutional environment of countries along the route has a negative effect on China's export trade. Empirical results of Wang(2018), Ye, and Li (2018) found that the improvement of government efficiency significantly limits the increase in bilateral trade efficiency.

Besides, the impact of the trading partner's institutional environment on bilateral trade also depends on the institutional distance between the two parties. Kostova first proposed the concept of institutional distance in 1996 (Xu & Shenkar, 2002). Institutional distance refers to the differences in control, regulation, and cognition between trade parties (Kostova, 1999). Kostova(1999) proposed the bigger the institutional distance, the higher the negotiation and transaction costs between the two parties, which hinders the development of trade. Since then, a large number of scholars have conducted in-depth research on the relationship between international trade and the measurement of institutional distance. Among them, Wei and Schleifer (2000) found that the existence of institutional distance between countries is an essential reason for the trade imbalance among OECD member countries. Further, Angkinand and Chiu (2011) analyzed the impact of institutional distance on bilateral trade from the perspective of institutional convergence. The study found that institutional distance is not conducive to the expansion of bilateral trade, and the impact of different types of institutional distance on international trade is significantly different. Hu Chao and Wang Xinzhe (2012) introduced the Neighboring Effects into the analysis framework of institutional distance and trade relations when studying the trade relations of countries along the Belt and Road. By establishing an empirical model of the institutional distance and adjacent effects on bilateral trade interaction, they found that the gap in the institutional environment between China and the seven ASEAN countries will hinder bilateral trade. Xu, Zhou and Hu(2018) found that the institutional distance between China and BRCS has strengthened the "competitive" effect of adjacent effects. Which means the neighbouring effect will negatively impact the bilateral trade between China and BRCS. Because the greater institutional distance strengthens the substitutability of imported products between China and other countries, and this effect will

be affected by regional differences. Among them, Eastern European countries show the most apparent institutional neighbouring effect (Xu, Zhou & Hu, 2018).

At the same time, how much will BRI reduce trade cost and how much will various countries gain are also issuing in this argument. Therefore, there is literature that measured the potential reduction in trade costs of the countries along the Belt and Road. Some of them have also studied the influencing factors on this basis.

Some researchers delve into this subject. In their paper in 2019, de Soyres, Mulabdic, Murray, Rocha & Ruta (2019) firstly use Geographic Information System to estimate the reduction shipment time, assuming average speed for different transportation modes as well as data for the processing times at ports of arrival or transit. The result shows that by increasing the amount of rail and port transportation infrastructure and improving the speed and processing times for improved rail segments and ports, BRI can significantly decreases shipping times and trade costs between a large number of city-pairs in Belt and Road countries, even in many other countries(de Soyres, Mulabdic, Murray, Rocha & Ruta, 2019). Furthermore, in this literature they calculate a lower bound and an upper bound based on whether it is feasible to switch transport modes( like moving from maritime links to rail-based links) after the completion of BRI infrastructure projects. Under this consideration, this literature come to the result that transport times in the BRI economies have fallen ranging between 1.7% and 3.2% on average(de Soyres, Mulabdic, Murray, Rocha & Ruta, 2019). What's more, the result also shows the largest estimated gains are for the trade routes connecting East and South Asia. To compute the reduction of trade cost, they then use Hummels and Schaur (2013) sectoral estimates of "value of time" to transform reductions in shipping time into a reduction in ad-valorem trade costs. For the BRI economies, the change in trade costs will vary between 1.5% and 2.8%. The largest trade cost reduction gains along the B&R, are 2.4%for the China-Mongolia-Russia Economic Corridor (CMREC) and 10.2% for the China-Central Asia- West Asia Economic Corridor (CCWAEC)(de Soyres, Mulabdic, Murray, Rocha & Ruta, 2019).

Furthermore, de Soyres, Mulabdic, & Ruta (2020) argues that common transport infrastructure still creates challenges for the Belt and Road Initiative participated countries as it has large implications for public finances. This raises the possibility that the countries which will carry out construction projects and bear most of its cost may not be the ones that will gain from it the most. To quantity the consequence of transport infrastructure, de Soyres, Mulabdic, & Ruta (2020) consider not only the trade cost but also the GDP and welfare. They

estimated the costs of BRI transport infrastructure in each country according to the project and the country. In order to be able to be compared with the annualized welfare and GDP, de Soyres, Mulabdic, & Ruta (2020) simply assume that the costs are paid through perpetuity with an interest rate of 2.5% to get the total annual cost for each country. They use the estimated reduction in trade costs de Soyres, Mulabdic, Murray, Rocha & Ruta (2019) did before as the effect on trade. Based on trade cost reduction expectations and infrastructure costs related to BRI transportation investment, de Soyres, Mulabdic, & Ruta (2020) compute a counterfactual equilibrium of the model to predict the change of GDP and welfare bring by BRI transport investment. Results show that benefits from the BRI are generally positive, but unevenly distributed across countries, with some countries likely to suffer as a result of investment in infrastructure (de Soyres, Mulabdic & Ruta, 2020).

# CHAPTER 3: Methodology

## 3.1. Methodology

In order to estimate the trade between China and the partner countries under the BRI background, this research uses the gravity model of trade. The gravity model of trade has been used extensively in analyzing trade and has succeeded to a high degree in explaining trade. Based on the basic gravity model equation(1), this author constructed an augmented gravity model equation. The aim is to analyze international trade flows and then estimate China's trade potential with its trading partners. The model augmented by including several independent variables in addition to GDP and geographical distance. The idea of "augmented" is finding other factors that may affect trade(Batra, 2006).

In the empirical test, the gravity model is usually expressed as multiple linear forms. Taking natural logarithms of the gravity model equation as in (2), the linear form of the model is obtained. The equation as follow:

$$\ln(X_{ij}) = \alpha + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + u_{ij} \quad (3)$$

Where:

$\beta_1, \beta_2, \beta_3$ are coefficients to be estimated

$u_{ij}$ is the error term captures any other shocks and chance events that may affect bilateral trade between the two countries

Panel data has advantages in terms of being able to capture the relevant relationships over time and panels monitor unobservable trading-partner-pairs' individual effects(Batra,2006). Therefore, we also use penal data for estimation to follow the previous study. The panel data during the ten years from 2009 to 2018 of 80 countries that have joined BRI were mainly used for empirical analysis.

Firstly, collect and process the data. Preliminarily investigate the correlation of all variables is by using a correlation matrix. This result can provide the direction of influence between variables. In the second stage, the F test and Hausman test are used to test the Pooled model, Random effects model (REM) and Fixed effects model (FEM). Finally, estimate the regression result of the argument gravity model equation.

## 3.2. Variables and data collection

Since the use of gravity models to study international trade, many new explanatory variables have been added. Therefore, in order to accurately analyze the trade influencing factors and determine variables, choosing the suitable explanatory variables to avoid affecting the final empirical analysis results. This research considered the background when constructing the model and added variables such as trade costs and transaction environment after referring to plenty of literature.

$Export_{ij}$ and $Import_{ij}$are used to illustrate respectively the levels of exports and imports of i to country J. According to the content of the trade gravity model, it can be concluded that $Export_{ij}$ and $Import_{ij}$ affected by various factors. In particular, its decisive factors mainly include: (1) The level of production shown by the exporting country($Y_i$), (2) the potential demand of the importing country for products in bilateral trade($Y_j$), (3) the relative price of traded products($R_{ij}$), (4) the transaction cost in bilateral trade($TC_{ij}$), (5) Institutional environment in bilateral trade fairs($In_{ij}$). According to the above analysis, formulas 4-1 and 4-2 can be used to represent $Export_{ij}$ and Importij in the model, in general:

$$\ln Export_{ijt} = \alpha + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln R_{ijt} + \beta_4 \ln TC_{ijt} + \beta_5 \ln In_{ijt} + u_{ijt} \quad (4-1)$$

$$\ln Import_{ijt} = \alpha + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln R_{ijt} + \beta_4 \ln TC_{ijt} + \beta_5 \ln In_{ijt} + u_{ijt} \quad (4-2)$$

Where:

$Export_{ij}$ is the total export trade flow from origin country i to destination country j

$Import_{ij}$ is the total import trade flow from destination country j from origin country i

t is the year referring to the data

In combination with the research background, the decisive factors are analyzed separately, and appropriate indicators are selected to represent.

*GDP:* GDP is the Gross domestic product of the two countries. As the representative of economic size, the GDP of China and partner countries are used as a measure of the core variable of the standard Gravity Model of trade. These two variables are expected to have a positive impact on trade promotion. Generally, the GPD of the exporting countries can be

used to measure the production level and supply capacity of its own country. Therefore, the GDP of the exporting country has a specific correlation with the growth of its international trade. The GDP of importing countries was used in the original gravity model to measure and represent the demand of importing countries in bilateral trade. So, the bigger the GDP of the importing country, the bigger the corresponding expenditure and the higher the demand.

*DIS:* Distance is also a standard gravity model variable, which was used as a substitute for trade transportation costs in the early days and is still an essential part of trade resistance in the later studies. Distance is usually measured as the crow flies between the two capitals. Some documents, especially those on the development of maritime trade, also use the route distances of two important ports and days. In other literature, the variation of oil price is considered based on the distance to realize the economic significance of distance better. Because this research covers many countries (such as the most countries of the Middle East, west Asia, central Asia) is located in the inland without a port. Most countries in the area are not large, even if there is a difference between the port and the capital, the distance doesn't matter much. Therefore, this research calculated the geographical distance in kilometers from Beijing, the capital of China, to the capitals of other bilateral trade partners as the value of D.

*POP:* POP is the population size of the two countries. Generally, the population is used to estimate the market size of each country which is a factor affecting international trade(Dinh Thi Thanh, Viet Duong & Manh Cuong, 2013). The population of the two countries will also affect the bilateral trade volume, but the direction of the influence of the population on the trade volume is uncertain. On the one hand, it is believed that the increase in the population of the importing country will increase the consumption demand, which will increase the import volume of the country. Meanwhile, the increase of the population of the exporting country will enhance the supply capacity, thus increasing the export volume of the country. On the other hand, it is also believed that the increasing population in the importing country will create complex and diverse demand, thus promoting the improvement of the domestic production system and avoiding excessive dependence on imports. At the same time, the increase in the population of exporting countries indicates the expansion of the domestic market scale, and the productivity will give priority to meeting domestic demand, reducing export opportunities. Based on the expectation of most viewpoints, this research holds that population size is positively correlated with bilateral trade size.

*ER:* ER calculated by(5):

$$ER_{jt} = \frac{\text{Annual average of the national currency unit of country j per US dollar}}{\text{Annual average of the national currency unit of China per US dollar}} \quad (5)$$

According to (4), the higher the ER, the greater the value of the RMB. Therefore, the increase of ER is positive, indicating the appreciation of RMB. A decrease in the exchange rate means that Chinese currency devalued. As a result, imports price would be higher, and exports would be cheaper.

In the context of Belt And One Road, the level of infrastructure construction is one of the most significant variables. As an essential part of the cost of international trade, the level of infrastructure construction can increase the total volume of trade by reducing the cost of trade and improving the efficiency and facilitation of trade. This research investigates the two aspects of transportation infrastructure and communication infrastructure.

*TRANS:* The transportation infrastructure mainly includes air transport, port and railway, while the communication infrastructure mainly refers to the telephone and internet. As mentioned above, BRCS covers a wide range of countries with big differences, which is also reflected in the mode of trade transportation. For example, Singapore, South Korea, the United Arab Emirates and other coastal countries are mainly maritime, while the railway infrastructure construction is weak. On the county, Kazakhstan, Uzbekistan and other landlocked countries are mainly rail transport. Therefore, in order to minimize the information loss as far as possible and comprehensively reflect the construction level of transportation infrastructure, this research constructs indicators of railway, port and air transportation infrastructure respectively. Quality of Railroad Infrastructure, Quality of port infrastructure, and Quality of Air Transport Infrastructure according to World Economic Forum - UNECE are selected as the indicators to measure the level of transportation infrastructure.

*COM:* Communication infrastructure level reflects the extent to which the country is connected to the world. This research uses Internet users per 100 people and Mobile phone subscribers per 100 people provided by the World Bank to reflect the Internet and telephone infrastructure levels. On the one hand, the Internet infrastructure allows domestic consumers to easily access foreign products and increase the import demand for foreign substitute products. On the one hand, the Internet can be used to improve the level of information and reduce information costs. At the same time, the improvement of communication facilities will

increase the transparency of information that can be conducive to promoting import and export.

Anderson (2001) believed that the institution shaped the market to a certain extent. International trade is carried out under the established internal institutional framework, the design of which will influence individual business interests and business decisions, thus shaping the overall trade environment. A sound system guarantees the development of a country's economic and trade, which means the institution has an impact on international trade. In this research, the institutional environment is selected as the variable of the model to explain trade. There is no uniform standard on the conceptual category and measurement index of the institution. According to North(1994), institutions are usually divided into formal institutions, including politics, law and economy, and informal institutions represented by cultural cognition. Considering the research topics related to economy and trade, this author focuses on the impact of the political and economic systems on China's import and export trade with those target countries. The most mainstream indicator system to measure the level of political and economic institutions is the Worldwide Governance Indicators(WGI ) provided by the World Bank and Index of Economic Freedom (IEF) provided by The Heritage Foundation.

*WGI:* Anderson and Marcouiller (2011) believed that poor government governance would greatly increase trade costs in bilateral trade. The improvement of the institutional environment of BRCS will have both positive and negative effects on trade. An excellent institutional environment will increase the possibility of trades by reducing the uncertainty of trade, and at the same time, promote the competitiveness of domestic commodities, thus hindering import. On the other hand, too high or too low institutional level of the BRCS will increase the institutional distance from China, thus resulting in negotiation costs and transaction costs, hindering the development of trade. This research takes WGI as an indicator to measure government effectiveness. WGI score reflects the administrative barriers for a country to participate in international trade. The higher the score, the simpler the administrative examination and approval procedure and the higher the efficiency of government. Data from the World Bank, score between 2.5 and 2.5. WGI is divided into six dimensions. From the perspective of the meaning of each subdivision, WGI mainly describes the implementation ability and effect of the government in Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption ("WGI-Home", 2020). It reflects the efficiency level of the

government in daily operations. Therefore, WGI can be summarized as "government effectiveness" and become one of the indicators to measure the level of a country's system.

Economic freedom reflects the institutional environment in which a country conducts trade. The Economic Freedom Index is an annual index and ranking compiled by the Heritage Foundation and the Wall Street Journal to measure the economic freedom of countries around the world. The index covers 12 freedom. Considering that the research topic mainly examines indicators related to international trade, and trade and investment are two approaches to bringing about cross-border flows of products and factors in the open market. Therefore, Trade Freedom Index(TFI) and Investment Freedom Index(IFI) are selected as the external manifestations of the economic institution("Index of Economic Freedom: Promoting Economic Opportunity and Prosperity by Country", 2020).

*TFI*: The Heritage Foundation defines Trade freedom as *"a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services"*. The TFI of each partner country j is a number between 0 and 100. The higher the score means lesser barriers deterring trade. As a soft cost, the tariff will increase the cost of import and export goods, forming trade barriers. TFI calculate the degree of trade openness through tariff and non-tariff barriers. The effect of trade tariffs is taken into account.

*IFI:* Investment freedom index measures how free the investment capital flow between importers and exporters. IFI considers a variety of investment restrictions. The higher score, the more freedom there is to invest in and out of specific activities, both domestically and internationally. The IFI score is a number between 0 and 100, and 100 as the freest in terms of investment.

*RTA*: The signing of regional trade agreements could reduce trade resistance and promote import and export trade through preferential policies. To promote bilateral trade, countries often sign regional trade agreements. According to the statistical results of WTO RTA-IS, the dummy variable is equal to one when the countries belong to the same regional trading assignment group as China, and 0 otherwise. The estimated coefficients will tell us how trade will be attributed to specific regional effects. A study by Frankel and Rose(2000) found that the average impact of FTAs on trade is positive. The study also shows that trade between partners has tripled as a result of participation in RTAs(Batra, 2006). Therefore, it is expected

that the signing of trade agreements will reduce the resistance to import and export trade between China and countries along the routes.

*Border:* Border is a dummy variable to measure whether the two trading parties share a border. The dummy variable is one if countries i and j share a common border and 0 when they do not. Many studies believed that neighbouring countries trade more easily. Therefore, neighbouring countries are expected more trade. However, with the improvement of transportation infrastructure, the convenience and diversification of transportation modes, and the influence of geographical location on the development of trade gradually weakened, there may be a situation of an insignificant coefficient.

In order to avoid too large difference in the value of variables, this research only takes natural logarithms of China's export value, China's import value, trading country's GDP, China's GDP, trading country's population, China's population, and Geographical distance between China and trading countries.

Augmented gravity model equation(6-1)(6-2) are constructed by including all the above variables:

$$\ln Export_{ijt} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln DIS_{jt} + \beta_4 \ln POP_{it} + \beta_5 \ln POP_{jt} + \beta_6 CEX_{jt} + \beta_7 Rail_{jt} + \beta_8 Port_{jt} + \beta_9 Air_{jt} + \beta_{10} Net_{jt} + \beta_{11} Ph_{jt} + \beta_{13} WGI_{jt} + \beta_{13} IFI_{jt} + \beta_{14} TFI_{jt} + \beta_{15} BORD_{jt} + \beta_{16} RTA_{jt} + u_{ijt} \quad (6-1)$$

$$\ln Import_{ijt} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln DIS_{jt} + \beta_4 \ln POP_{it} + \beta_5 \ln POP_{jt} + \beta_6 CEX_{jt} + \beta_7 Rail_{jt} + \beta_8 Port_{jt} + \beta_9 Air_{jt} + \beta_{10} Net_{jt} + \beta_{11} Ph_{jt} + \beta_{13} WGI_{jt} + \beta_{13} IFI_{jt} + \beta_{14} TFI_{jt} + \beta_{15} BORD_{jt} + \beta_{16} RTA_{jt} + u_{ijt} \quad (6-2)$$

Table 5 presents the information of variables used in the study.

| Variables | Definition | Data Sources | Hypothesis influence |
|---|---|---|---|
| $Export_{ijt}$ | export value of China to country j | UN COMTRADE | / |
| $Import_{ijt}$ | import value of China from country j | UN COMTRADE | / |
| $GDP_{it}$ | GDP of China | World Bank | + |
| $GDP_{jt}$ | GDP of country j | World Bank | + |
| $POP_{it}$ | Population of China | World Bank | + |
| $POP_{jt}$ | Population of country j | World Bank | + |

| | | | |
|---|---|---|---|
| $EX_{jt}$ | Exchange rate between China and country j | World Bank | + |
| $Net_{jt}$ | Internet users per 100 people in country j | World Bank | + |
| $Ph_{jt}$ | Mobile phone subscribers per 100 people in country j | World Bank | + |
| $WGI_{jt}$ | The Worldwide Governance Indicators of country j | World Bank | +/- |
| $Rail_{jt}$ | Quality of Railroad Infrastructure of country j | World Economic Forum | +/- |
| $Port_{jt}$ | Quality of Port Infrastructure of country j | World Economic Forum | +/- |
| $Air_{jt}$ | Quality of Air Transport Infrastructure of country j | World Economic Forum | +/- |
| $IFI_{jt}$ | Investment Freedom Index of country j | The Heritage Foundation | +/- |
| $TFI_{jt}$ | Trade Freedom Index of country j | The Heritage Foundation | +/- |
| $DIS_{jt}$ | Distance between China and country j | CEPII | - |
| $BORD_{jt}$ | Dummy variable indicating whether the country j share a border with China | CEPII | + |
| $RTA_{jt}$ | Dummy variable indicating whether the country j signs the same RTA as China | WTO RTA-IS | + |

**Table 5** Gravity variables illustrations, data sources and symbol expectation of regression coefficients

The research topic of this research is the potential of trade development between China and other countries under the background of Belt and Road Initiative. Therefore, the research target is preliminarily determined as 138 countries that have joined the BRI by signing a Memorandum of Understanding with China. However, due to the lack of data, especially the data of infrastructure level, some countries were finally removed in this empirical study. In the end, 80 countries were selected for the study.

# CHAPTER 4: Empirical Results

## 4.1. Correlation Analysis

In order to show the data characteristics of samples, the sample size, mean value, standard deviation, minimum value and maximum value of independent variables are given in Table 6. The data are used to analyze the correlation.

| VI | N. | mean | Sd. | Min. | Max. |
|---|---|---|---|---|---|
| $\ln Export_{ijt}$ | 800 | 5.385 | 1.76 | -4.962 | 9.294 |
| $\ln Import_{ijt}$ | 795 | 4.216 | 2.591 | -6.908 | 9.926 |
| $\ln GDP_{jt}$ | 800 | 4.05 | 1.637 | 0.47 | 7.739 |
| $\ln GDP_{it}$ | 800 | 9.12 | 0.297 | 8.537 | 9.518 |
| $\ln GDP_{jt}$ | 800 | 2.412 | 1.513 | -1.273 | 5.59 |
| $\ln POP_{it}$ | 800 | 7.216 | 0.015 | 7.194 | 7.239 |
| $EX_{jt}$ | 796 | 1.074 | 0.54 | 0.034 | 12.15 |
| $Net_{jt}$ | 796 | 43.95 | 28.67 | 0.53 | 104 |
| $Ph_{jt}$ | 800 | 106.8 | 37.65 | 4.75 | 212.6 |
| $WGI_{jt}$ | 800 | -0.04 | 0.763 | -1.433 | 1.755 |
| $TFI_{jt}$ | 800 | 76.6 | 9.539 | 40 | 90 |
| $IFI_{jt}$ | 800 | 55.7 | 19.81 | 5 | 95 |
| $Rail_{jt}$ | 788 | 2.448 | 1.592 | 0 | 5.9 |
| $Port_{jt}$ | 798 | 3.906 | 1.314 | 0 | 6.78 |
| $Air_{jt}$ | 798 | 4.303 | 1.311 | 0 | 6.9 |
| $\ln DIS_{jt}$ | 800 | 8.921 | 0.56 | 6.862 | 9.861 |
| $RTA_{jt}$ | 800 | 0.16 | 0.367 | 0 | 1 |
| $BORD_{jt}$ | 800 | 0.087 | 0.283 | 0 | 1 |

**Table 6** Descriptive Statistic

This research mainly investigates the influencing factors of China's export and import to BRC and estimates the trade potential on this basis. Before analyzing the impact factor, the correlation coefficient matrix was first used to investigate the relationship between

independent variables and dependent variables preliminarily. The results of the correlation matrix are shown in Table 7.

| | $\ln Export_{ijt}$ | $\ln Import_{ijt}$ | $\ln GDP_{jt}$ | $\ln GDP_{it}$ | $\ln POP_{jt}$ | $\ln POP_{it}$ | $EX_{jt}$ | $Net_{jt}$ | $Ph_{jt}$ | $WGI_{jt}$ | $TFI_{jt}$ | $IFI_{jt}$ | $Rail_{jt}$ | $Port_{jt}$ | $Air_{jt}$ | $\ln DIS_{ijt}$ | $RTA_{jt}$ | $BORD_{jt}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\ln Export_{ijt}$ | 1 | | | | | | | | | | | | | | | | | |
| $\ln Import_{ijt}$ | 0.777*** | 1 | | | | | | | | | | | | | | | | |
| $\ln GDP_{jt}$ | 0.833*** | 0.782*** | 1 | | | | | | | | | | | | | | | |
| $\ln GDP_{it}$ | 0.136*** | 0.114*** | 0.071** | 1 | | | | | | | | | | | | | | |
| $\ln POP_{jt}$ | 0.582*** | 0.467*** | 0.595*** | 0.0290 | 1 | | | | | | | | | | | | | |
| $\ln POP_{it}$ | 0.116*** | 0.097*** | 0.063* | 0.961*** | 0.0300 | 1 | | | | | | | | | | | | |
| $EX_{jt}$ | 0.0200 | 0.0200 | 0.0120 | -0.0340 | -0.0260 | -0.0210 | 1 | | | | | | | | | | | |
| $Net_{jt}$ | 0.288*** | 0.302*** | 0.425*** | 0.308*** | -0.360*** | 0.318*** | 0.0270 | 1 | | | | | | | | | | |
| $Ph_{jt}$ | 0.396*** | 0.393*** | 0.433*** | 0.238*** | -0.226*** | 0.213*** | 0.0440 | 0.727*** | 1 | | | | | | | | | |
| $WGI_{jt}$ | 0.135*** | 0.170*** | 0.224*** | 0.00300 | -0.500*** | 0.00200 | 0.0360 | 0.724*** | 0.560*** | 1 | | | | | | | | |
| $TFI_{jt}$ | 0.177*** | 0.272*** | 0.334*** | 0.0260 | -0.268*** | 0.0220 | 0.0180 | 0.644*** | 0.548*** | 0.652*** | 1 | | | | | | | |
| $IFI_{jt}$ | -0.0150 | -0.0200 | 0.077** | 0.154*** | -0.408*** | 0.153*** | 0 | 0.534*** | 0.343*** | 0.690*** | 0.517*** | 1 | | | | | | |
| $Rail_{jt}$ | 0.489*** | 0.408*** | 0.508*** | 0.093*** | 0.240*** | 0.101*** | -0.0560 | 0.352*** | 0.331*** | 0.332*** | 0.409*** | 0.219*** | 1 | | | | | |
| $Port_{jt}$ | 0.316*** | 0.224*** | 0.355*** | -0.0330 | -0.185*** | -0.060* | 0.0410 | 0.551*** | 0.513*** | 0.597*** | 0.469*** | 0.447*** | 0.376*** | 1 | | | | |
| $Air_{jt}$ | 0.322*** | 0.261*** | 0.420*** | -0.0310 | -0.116*** | -0.0440 | 0.0230 | 0.564*** | 0.479*** | 0.561*** | 0.496*** | 0.384*** | 0.422*** | 0.875*** | 1 | | | |
| $\ln DIS_{ijt}$ | -0.387*** | -0.325*** | -0.269*** | 0 | -0.219*** | 0 | 0.0380 | -0.127*** | -0.135*** | 0.0520 | -0.0470 | 0.182*** | -0.275*** | -0.00600 | -0.084** | 1 | | |
| $RTA_{jt}$ | 0.442*** | 0.378*** | 0.290*** | 0.0130 | 0.369*** | 0.0100 | -0.0430 | -0.065* | 0.0180 | -0.0260 | -0.080** | -0.093*** | 0.177*** | 0.070** | 0.0510 | -0.473*** | 1 | |
| $BORD_{jt}$ | 0.135*** | 0.107*** | -0.0250 | 0 | 0.111*** | 0 | 0.0110 | -0.111*** | 0.0430 | -0.246*** | -0.134*** | -0.433*** | 0.0330 | -0.297*** | -0.178*** | -0.519*** | 0.106*** | 1 |

Note: ***, **, and * are statistically significant at 1%, 5% and 10% levels, respectively.

**Table 7** Simple Correlations

According to Table 7, the correlation coefficients between China's exports imports and the following variables are all positive and pass the statistical significance test at the significance level of 0.01: GDP of China, GDP of BRC, Population of China, Population of BRC, Internet users per 100 people in BRC, Mobile phone subscribers per 100 people in BRC, The Worldwide Governance Indicators of BRC, Trade Freedom Index of BRC, Quality of Railroad Infrastructure, Quality of Air Transport Infrastructure of BRC, Quality of Port Infrastructure of BRC, whether the BRC shares a border with China, whether the country j signs the same RTA as China. It shows that these variables have a significant positive impact on China's exports and imports. In contrast, the correlation coefficient between China's exports and the geographical distance was negative, and it could pass the statistical significance test at the same level as well. Which means geographical distance has a negative impact on China's export to BRC. However, the correlation coefficient between China's

exports and the RMB exchange rate and the Investment Freedom Index do not pass the statistical significance test.

## 4.2. Model examination

The correlation matrix only gives the correlation between two variables. Therefore, to provide reliable evidence for the conclusion, this research using a panel data model to test further. There are three main models for estimating panel data: the pooled model, the random-effects model (REM) and fixed effects model (FEM). To decide which model to choose, first consider the properties of the data and the results based on the tests(Dinh Thi Thanh, Viet Duong & Manh Cuong, 2013).

First, the F test is used to determine whether the mixed-effects model should be used. Each entity has some unique characteristics that affect its independent variables, which called individual effects. If no hypothesis is made about such individual effects, the pooled model is preferred. Otherwise, FEM and REM will be more preferred(Dinh Thi Thanh, Viet Duong & Manh Cuong, 2013). The null hypothesis of F test supports pooled effects model. Table 8 presents the result of F test. According to Table 8, P values were 0.000. The test result shows the hypothesis has been rejected, which indicates the low effectiveness of pooled model. Thus, FEM and REM are more preferred.

| Model | F.Statistic | P-value | $H_0$ |
|---|---|---|---|
| Export model | 34.94 | 0.0000 | Reject |
| Import model | 86.11 | 0.0000 | Reject |

**Table 8** F test result

Hausman test is further used to select between the REM and the FEM. According to the theory of Gujarati (2003), when correlation exists between individual effect and independent variable, FEM is preferred. At the same time, the regression model can estimate the net influence of independent variables on dependent variables by separating the influence of individual effects in independent variables. Otherwise, REM will be more preferred when the individual effects of the entity are random and not correlated with independent variables(Dinh Thi Thanh, Viet Duong & Manh Cuong, 2013). The null hypothesis tested by Hausman is There is no correlation between individual influence and independent variables in REM. Test

results are shown in Table 9. According to Table9, the chi-square statistical values obtained by the Hausman test are 16.80 and 61.92 respectively in the export model and the import model, and the P values are 0.157 and 0.000 respectively. Therefore, the export model cannot reject the null hypothesis at the significance level of 10%. The export model in this research is suitable for the use of REM. For the import model, the null hypothesis is rejected at the significance level of 1%, so the import model is suitable for the use of FEM.

| Model | Chi-square | Prob. | $H_0$ |
|---|---|---|---|
| Export model | 16.8 | 0.157 | |
| Import model | 61.92 | 0 | Reject |

**Table 9** Hausman test result

## 4.3. Regression result

### 4.3.1. Regression result of Export model

According to the F test and Hausman test, the export and import models of this article use the panel random-effects model and the panel fixed-effects model respectively. At the same time, for the import model and the export model, this article also gives the estimated results of the other two models of panel data. The estimated results of the export model are shown in Table 10, column (1), column (2) and column (3) are the regression results of the pooled model, random-effects model and fixed effects model, respectively. Comparing the estimation results of the three types of models, this author finds there are certain differences in the estimated coefficients and statistical significance of each variable. From the perspective of the number of significant variables, the estimated results of the pooled model and the random-effects model are better than those of the fixed-effects model. Considering that the results of the F test and Hausman test support the use of the panel random-effects model, the subsequent analysis is based on the estimated results of the random-effects model.

| | (1) | (2) | (3) |
|---|---|---|---|
| | PM | RE | FE |
| $\ln GDP_{jt}$ | 0.6784*** | 0.6861*** | 0.7660*** |
| | (0.0534) | (0.0761) | (0.1153) |
| $\ln GDP_{it}$ | 0.6707* | 1.1583*** | 1.1576*** |
| | (0.3497) | (0.1884) | (0.2028) |

| | | | |
|---|---|---|---|
| $\ln POP_{jt}$ | 0.2160*** | 0.2495*** | 0.2455 |
| | (0.0607) | (0.0941) | (0.3599) |
| $\ln POP_{it}$ | -3.4941 | -14.7172*** | -15.8211*** |
| | (7.3657) | (4.0462) | (4.1904) |
| $EX_{jt}$ | 0.0645 | -0.0045 | -0.0070 |
| | (0.0518) | (0.0269) | (0.0269) |
| $Net_{jt}$ | -0.0056** | -0.0000 | 0.0016 |
| | (0.0026) | (0.0022) | (0.0024) |
| $Ph_{jt}$ | 0.0061*** | 0.0028*** | 0.0023** |
| | (0.0013) | (0.0011) | (0.0011) |
| $WGI_{jt}$ | 0.2404*** | 0.3901*** | 0.4411*** |
| | (0.0801) | (0.1294) | (0.1702) |
| $TFI_{jt}$ | -0.0195*** | -0.0109*** | -0.0092** |
| | (0.0044) | (0.0042) | (0.0044) |
| $IFI_{jt}$ | -0.0006 | -0.0050** | -0.0057** |
| | (0.0022) | (0.0024) | (0.0026) |
| $Rail_{jt}$ | 0.0680*** | 0.0207 | 0.0102 |
| | (0.0233) | (0.0265) | (0.0289) |
| $Port_{jt}$ | 0.3269*** | 0.1008** | 0.0803* |
| | (0.0498) | (0.0409) | (0.0423) |
| $Air_{jt}$ | -0.2423*** | -0.1089*** | -0.0953** |
| | (0.0476) | (0.0390) | (0.0404) |
| $DIS_{ijt}$ | -0.1904*** | -0.2223 | 6.7183 |
| | (0.0727) | (0.1905) | (4.6154) |
| $RTA_{jt}$ | 0.5750*** | 0.4397** | 0.1582 |
| | (0.0980) | (0.1994) | (0.2893) |
| $BORD_{jt}$ | 0.7405*** | 0.6031* | 12.3393 |
| | (0.1392) | (0.3546) | (7.5765) |
| _cons | 23.3853 | 100.3602*** | 43.0919 |
| | (50.1476) | (27.6954) | (49.8859) |
| N | 780 | 780 | 780 |
| r2_a | 0.81 | | |
| r2_w | | 0.39 | 0.40 |

Note: ***, **, and * are statistically significant at 1%, 5% and 10% levels, respectively. The value in the bracket is the standard deviations of the regression coefficient of export equation.

**Table 10** Regression estimation results of export model

According to Table 10 column (2), the variables which have an significant influence on China's export trade with BRC are GDP of China, GDP of BRC, Population of China, Population of BRC, Mobile phone subscribers per 100 people in BRC, The Worldwide Governance Indicators of BRC, Trade Freedom Index of BRC, Investment Freedom Index of

BRC, Quality of Air Transport Infrastructure of BRC, Quality of Port Infrastructure of BRC, whether the BRC share a border with China, whether the country j signs the same RTA as China.

The estimation results of each explanatory variable are interpreted as follows:

Growth in the GDP of China and its partners will help boost China's exports. The estimated coefficients of these two variables both are statistically significant with a positive direction influence. An increase in the GDP of BRC would increase the value of trade by about 0.68%, and a similar increase in China's GDP as 1.15%. It also suggests that the size of foreign economies matters less than China's to China's export. Thus, the hypothetical positive effect of economic size on China's exports is strongly supported.

The size of both China's and BRC's market size affects China's export volume. The difference is that the expansion of China's market size has a negative impact on China's exports, while foreign market size has a positive impact. Moreover, the impact of China's market size is far greater than that of partner countries. If the population of China increases by 1%, the export trade value will step up by 14.7%. Thus, the hypothesis Population of China has positive effects on bilateral trade is rejected while the population of BRC is accepted.

The coefficient of the exchange rate and the geographical distance are both negative. However, it doesn't pass the significance test. These indicate that the impact of the RMB exchange rate and the geographical distance between the two countries on China's export volume is no longer significant.

From the aspect of the institution, WGI, the indicator of the political environment, passed the statistical significance test. Which suggests that as the BRC improve government effectiveness, China's exports to this country will continue to expand.

On the other hand, trade freedom and investment freedom, which represent the economic environment, also pass the statistical significance test. However, both variables have negative coefficients. A high degree of trade and investment openness could have a negative effect on China's export.

In terms of transportation infrastructure, two variables pass the statistical significance test. Air Transportation infrastructure has a negative impact on China's exports to partner countries, while port infrastructure has a positive impact.

In terms of communication infrastructure, the results show that the amount of Internet users has no significant impact on China's exports. On the contrary, variable "Mobile phone subscribers per 100 people in BRC" pass the significance test, indicating that China's exports to this country will continue to expand as the subscribers of mobile phones increases.

Both dummy variables have significant and positive effects on China's export. Results indicate that compared with the no RTA and no common border countries, China exports more to a country with RTA and the common border.

### 4.3.2. Regression result of Import model

According to the F test and the Hausman test, the import model is suitable for the fixed-effects model. The estimation results are shown in Table 11. Column (1), column (2) and column (3) of Table 11 are the regression results of the pooled model, random-effects model and fixed effects model, respectively. Comparing the estimation results of the three types of models, this author finds there are certain differences in the estimated coefficients and statistical significance of each variable. From the perspective of the number of significant variables, the estimated results of the fixed-effects model are better than those of the pooled model and the random-effects model. Consistent with the results from the F test and the Hausman test. So, the subsequent analysis is based on the estimated results of the fixed-effects model.

| | (1) | (2) | (3) |
|---|---|---|---|
| | PM | RE | FE |
| $\ln GDP_{jt}$ | 1.4817*** | 0.8235*** | 0.7124*** |
| | (0.1005) | (0.1173) | (0.1423) |
| $\ln GDP_{it}$ | 0.8640 | 1.3161*** | 1.4142*** |
| | (0.6612) | (0.2468) | (0.2501) |
| $\ln POP_{jt}$ | -0.3735*** | 0.1486 | -2.5528*** |
| | (0.1143) | (0.1595) | (0.4425) |
| $\ln POP_{it}$ | 6.3912 | -15.3957*** | -11.3724** |
| | (13.8970) | (5.2047) | (5.1603) |
| $EX_{jt}$ | 0.0887 | -0.0456 | 0.0611* |
| | (0.0973) | (0.0341) | (0.0330) |
| $Net_{jt}$ | -0.0243*** | 0.0025 | 0.0052* |
| | (0.0049) | (0.0029) | (0.0030) |
| $Ph_{jt}$ | 0.0053** | 0.0012 | 0.0029** |
| | (0.0024) | (0.0014) | (0.0014) |
| $WGI_{jt}$ | 0.1862 | 0.1089 | 0.0330 |

| | | | |
|---|---|---|---|
| | (0.1512) | (0.1909) | (0.2093) |
| $TFI_{jt}$ | 0.0267*** | 0.0288*** | 0.0250*** |
| | (0.0083) | (0.0055) | (0.0054) |
| $IFI_{jt}$ | -0.0153*** | -0.0041 | -0.0016 |
| | (0.0042) | (0.0032) | (0.0032) |
| $Rail_{jt}$ | 0.0306 | 0.0634* | 0.0934*** |
| | (0.0438) | (0.0355) | (0.0357) |
| $Port_{jt}$ | 0.0274 | -0.0117 | -0.0294 |
| | (0.0937) | (0.0531) | (0.0521) |
| $Air_{jt}$ | -0.2013** | 0.0232 | 0.0356 |
| | (0.0897) | (0.0508) | (0.0499) |
| $DIS_{ijt}$ | -0.1534 | -0.5370 | 42.4248*** |
| | (0.1369) | (0.3977) | (5.6864) |
| $RTA_{jt}$ | 1.0704*** | 0.1172 | -0.4671 |
| | (0.1844) | (0.3118) | (0.3554) |
| $BORD_{jt}$ | 0.4936* | 0.6058 | 70.9522*** |
| | (0.2617) | (0.7556) | (9.3333) |
| _cons | -53.8554 | 101.8944*** | -317.5680*** |
| | (94.6076) | (35.7407) | (61.4966) |
| N | 775 | 775 | 775 |
| r2_a | 0.68 | | |
| r2_w | | 0.37 | 0.41 |

Note: ***, **, and * are statistically significant at 1%, 5% and 10% levels, respectively. The value in the bracket is the standard deviations of the regression coefficient of export equation.

**Table 11** Regression estimation results of import model

According to Table 11 column (3), the variables which have an influence on China's import from BRC, also BRC export to China, are: GDP of China, GDP of BRC, Population of China, Population of BRC, RMB exchange rate, Internet users per 100 people in BRC, Mobile phone subscribers per 100 people in BRC, Trade Freedom Index of BRC, Quality of Railroad Infrastructure, Geographical distance between China and BRC, whether the BRC share a border with China.

Growth in the GDP of China and BRC will help boost BRC exports to China. The estimated coefficients of these two variables both are statistically significant with a positive direction influence. An increase in the GDP of BRC would increase the value of trade by about 0.71%, and a similar increase in China's GDP as 1.41%. It also suggests that the size of foreign economies matters less than China's to China's import.

The size of both China's and BRC's market size affects China's imports. Which need to pay attention is that the influence is both negative. Moreover, the size of China's market matters far more than that of BRC. For every 1% increase in China's population, imports fall by 11.3%.

The coefficient of the RMB exchange rate and the geographical distance are both positive. They pass the significance test as well. It shows that with the appreciation of the RMB, China's imports will continue to increase. The further distance the country is geographically from China, the more China imports from it.

From the institutional perspective, the political environment indicator WGI failed the statistical significance test. Among the economic index of freedom, only Trade Freedom Index passed the significance test. Suggest that a high degree of trade openness could have a positive impact on China's import from the country. Government efficiency and freedom of investment have no significant impact on this trade volume.

In terms of transportation infrastructure, except for the quality of railway infrastructure, the other two variables failed to pass the statistical significance test, which shows that the improvement of railway infrastructure in trading countries is conducive to promoting China's import of its products.

In terms of communication infrastructure, the results show that the amount of both Internet users and mobile phone subscribers in the BRC have a significant impact on China's import. Which indicates that the improvement of the country's communication infrastructure is conducive to China's import from this country.

Variable $RTA_{jt}$ failed to pass the significant test, while whether they share a common border with China will have a significant impact on China's imports from that country. In addition, the variable $BORD_{jt}$ has an estimated coefficient of about 70.9.

# CHAPTER 5: Trade potential

## 5.1. Measurement method

Having estimated the gravity model of trade flows, we proceeded to estimate trade potential. According to Cheikbossianand Maurel (1998), the estimated result of coefficients from the gravity model had been used measure potential trade with data of independent variables (Dinh Thi Thanh et al., 2013). Baldwin (1994), Nilsson (2000) and Egger (2002) use the term potential trade as the expected volume of trade between countries that the gravity model predicts. They then measure how potential trade far above or below actual trade is. Egger finds the ratio of actual to potential trade can give a measure of how well bilateral trade flows behave compare with the model's predicted average (Armstrong, 2007).

The actual data of each variable is multiplied with the coefficient estimated by the gravity model to obtain the corresponding potential trade every year. This represents the expected volume of trade that can be achieved when the country fully realizes the level of trade represented by variables of its own situation. In order to make better analyses and reduce the effect of extreme value, the author takes the average value of each country's annual potential trade volume to represent the potential trade(P) of each country in this ten year. Similarly, the actual value of trade(A) is derived by averaging over ten years.

Because A represents the actual volume of trade realized by the country, and P represents the volume of trade that should be realized by the trade level of the country. Therefore, we use A/P to indicate the extent of the country's trade realization, which is also the potential trade possibility. When A/P is equal to 1, it means that the country has fully realized the author's estimated trade volume based on the selected variables and their estimation. On the other hand, it can also support the accuracy of variable measurement in this research. When A/P is less than 1, it indicates that the actual trade volume is less than the potential trade volume. This suggests that judging by the country's trading capacity, there is still potential to trade. It also suggests that, apart from the considerations if variables mentioned in the gravity model, other individual factors are impeding the country's trade. When A/P is greater than 1, it indicates that the actual trade volume is higher than the potential trade volume. Which means that judging by the trade capacity shown by the country, it has achieved more trade than expected. It also suggests that there are special reasons beyond specific considerations that promote trade between the two countries.

In this chapter, the results from chapter 4 are used to predict China's potential trade(P) with all the countries in our sample. After calculating A/P, these 80 BRC are divided into three groups according to the comprehending of A/P value ratios. If trade potential value is smaller than 0.8, then the trading partner belongs to the type of huge potential, there is a relatively big place for developing export/import trade with China. Also indicate trade with these countries is seriously deficient. If trade potential value is between 0.8 and 1.2, then the trading partner is a potential type of to be further explored, which means that China's export/import potential to that country has not been fully developed and needs to be further explored(Zhang & Wang, 2015). The Trade development process has a great development prospect in the future. If the trade potential value is greater than 1.2, the trading partner belongs to the potential type to be fully developed, which means that the country has made full use of the trade potential with China and has formed a relatively stable and mature trade relationship. Further analysis of trade structure and relationships between the two countries is needed to develop new prospects(Zhang & Wang, 2015).

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## 5.2. Evaluation of trade potential

### 5.2.1. Trade potential of export

Results of average export trade potential from 2009-1018 between China and 80 BRC are shown in Table 12. The countries are grouping by potential.

| A/P < 0.8 | | 0.8< A/P < 1.2 | | A/P>1.2 | |
|---|---|---|---|---|---|
| Country | A/P | Country | A/P | Country | A/P |
| Austria | 0.21 | Pakistan | 0.84 | Algeria | 1.21 |
| Rwanda | 0.28 | Kuwait | 0.87 | Cyprus | 1.21 |
| Moldova | 0.32 | Oman | 0.88 | Chile | 1.23 |
| Burundi | 0.4 | Poland | 0.88 | Bahrain | 1.28 |
| Armenia | 0.41 | Morocco | 0.89 | Angola | 1.3 |
| Barbados | 0.43 | New Zealand | 0.89 | Uruguay | 1.31 |
| Qatar | 0.46 | Estonia | 0.94 | Slovenia | 1.33 |
| Azerbaijan | 0.47 | Cameroon | 0.95 | South Africa | 1.33 |
| Bolivia | 0.47 | Ethiopia | 1.01 | Tanzania | 1.43 |
| Russia | 0.48 | Peru | 1.02 | Senegal | 1.45 |
| Lesotho | 0.49 | Nigeria | 1.05 | Czech Republic | 1.49 |

| | | | | | |
|---|---|---|---|---|---|
| Nepal | 0.49 | Kazakhstan | 1.06 | Vietnam | 1.63 |
| Portugal | 0.49 | South Korea | 1.07 | Mongolia | 1.66 |
| Chad | 0.5 | Saudi Arabia | 1.08 | Hungary | 1.7 |
| Mali | 0.53 | Turkey | 1.1 | Mozambique | 1.73 |
| Uganda | 0.53 | Jamaica | 1.15 | Ghana | 1.76 |
| Bulgaria | 0.57 | Luxembourg | 1.15 | Kenya | 1.85 |
| Cape Verde | 0.59 | Philippines | 1.15 | Malaysia | 2.06 |
| Trinidad and Tobago | 0.62 | Ukraine | 1.17 | Lebanon | 2.13 |
| Laos | 0.64 | Latvia | 1.18 | Cambodia | 2.28 |
| Sri Lanka | 0.66 | Egypt | 1.19 | Guinea | 2.38 |
| Indonesia | 0.69 | | | Mauritania | 2.73 |
| Zambia | 0.69 | | | Singapore | 2.93 |
| Romania | 0.71 | | | Malta | 2.95 |
| Italy | 0.74 | | | United Arab Emirates | 2.99 |
| Namibia | 0.75 | | | Tajikistan | 3.19 |
| Lithuania | 0.77 | | | Benin | 5.47 |
| Bangladesh | 0.78 | | | Panama | 7.97 |
| Croatia | 0.79 | | | Liberia | 18.48 |
| Greece | 0.79 | | | | |

**Table 12** Estimated results of export trade potential

### 5.2.2. Trade potential of import

Results of average import trade potential from 2009-2018 between China and 80 BRC are shown in Table 13. The countries are grouping by potential.

| A/P < 0.8 | | 0.8< A/P < 1.2 | | A/P>1.2 | |
|---|---|---|---|---|---|
| Country | A/P | Country | A/P | Country | A/P |
| Austria | 0.15 | Oman | 0.81 | Bangladesh | 1.2 |
| Rwanda | 0.29 | Turkey | 0.82 | Bahrain | 1.22 |
| Moldova | 0.33 | Saudi Arabia | 0.86 | Hungary | 1.36 |
| Portugal | 0.36 | Estonia | 0.9 | Senegal | 1.36 |
| Qatar | 0.36 | Peru | 0.91 | Tanzania | 1.36 |
| Bolivia | 0.37 | Cameroon | 0.92 | Philippines | 1.53 |
| Barbados | 0.38 | Luxembourg | 0.92 | South Korea | 1.53 |
| Armenia | 0.44 | Sri Lanka | 0.92 | Ghana | 1.57 |
| Azerbaijan | 0.47 | South Africa | 0.95 | Mozambique | 1.71 |
| Burundi | 0.47 | Uruguay | 0.95 | Kenya | 1.75 |

| | | | | | |
|---|---|---|---|---|---|
| Italy | 0.49 | Ethiopia | 0.96 | Lebanon | 1.92 |
| Trinidad and Tobago | 0.5 | Chile | 0.97 | Kazakhstan | 1.96 |
| Bulgaria | 0.51 | Algeria | 1.04 | Laos | 2.06 |
| Uganda | 0.51 | Egypt | 1.04 | United Arab Emirates | 2.27 |
| Lesotho | 0.53 | Jamaica | 1.04 | Malaysia | 2.45 |
| Chad | 0.54 | Angola | 1.07 | Guinea | 2.47 |
| Mali | 0.54 | Ukraine | 1.07 | Malta | 2.76 |
| New Zealand | 0.59 | Cyprus | 1.08 | Mauritania | 3.01 |
| Cape Verde | 0.6 | Latvia | 1.1 | Singapore | 3.27 |
| Romania | 0.6 | Czech Republic | 1.13 | Cambodia | 4.02 |
| Greece | 0.62 | Nepal | 1.13 | Vietnam | 4.39 |
| Zambia | 0.64 | Slovenia | 1.13 | Mongolia | 4.95 |
| Poland | 0.65 | Pakistan | 1.18 | Benin | 5.77 |
| Croatia | 0.68 | | | Panama | 6.86 |
| Russia | 0.68 | | | Tajikistan | 7.54 |
| Lithuania | 0.72 | | | Liberia | 20.34 |
| Namibia | 0.72 | | | | |
| Kuwait | 0.74 | | | | |
| Morocco | 0.76 | | | | |
| Indonesia | 0.78 | | | | |
| Nigeria | 0.8 | | | | |

**Table 13** Estimated results of import trade potential

# CHAPTER 6: Discussion

## 6.1. Influencing factor

Table 14 shows the comparison between the initial hypothesis and the results of the empirical analysis. This chapter will discuss the results in combination with contrast.

| Variables | Hypothesis influence | Result of China's export | Result of China's import |
|---|---|---|---|
| $GDP_{it}$ | + | + | + |
| $GDP_{jt}$ | + | + | + |
| $POP_{it}$ | + | - | - |
| $POP_{jt}$ | + | + | - |
| $EX_{jt}$ | + | / | + |
| $DIS_{ijt}$ | - | / | + |
| $WGI_{jt}$ | +/- | + | / |
| $IFI_{jt}$ | +/- | - | / |
| $TFI_{jt}$ | +/- | - | + |
| $Net_{jt}$ | + | / | + |
| $Ph_{jt}$ | + | + | + |
| $Rail_{jt}$ | +/- | / | + |
| $Port_{jt}$ | +/- | + | / |
| $Air_{jt}$ | +/- | - | / |
| $BORD_{jt}$ | + | + | + |
| $RTA_{jt}$ | + | + | / |

**Table 14** Hypothesis and result

The results of this empirical model further validate some viewpoints of previous literature. The two variables, GDP of China and BRC, show positive influence in line with expectations when constructing the model. This proves the significance of GDP in the gravity model proposed by previous literature. Generally, the GPD of the exporting countries can be used to measure the production level and supply capacity of its own country, which is conducive to import and export. Besides, combined with the background, the expansion of China's economy may also mean an increase in its international influence, especially for One Belt And One Road countries. The increased opportunities for Cooperation between China and BRC are conducive to the import and export of Chinese products.

Another variable of the basic gravity model is the geographical distance between the two countries. The results contradict the hypothesis based on the literature. This may be because, in the context of BRI, the transport infrastructure between countries is developing at high speed. With the improvement of transportation infrastructure, geographical distance is no longer the primary factor hindering trade between the two countries, which makes the negative impact of geographical distance on trade insignificant. Even in the results of the import model, it shows that with the increase of geographical distance, the import value of China will increase continuously. The likely reason is that China has territorial disputes with neighbouring countries, such as Vietnam, which can affect China's imports to these countries. Another reason is that most of BRC close to China are factor endowment of productivity, with low complementarities with China. Thus, even geographical proximity does not mean that China tends to import from these countries as its domestic productivity spills over.

Looking at the hypothesis of population, only the impact of BRC's population on China's export volume conforms to the model's assumptions. Even so, the results were not surprising. Because the previous literature has also mentioned that the direction of the population's influence on trade volume is uncertain. This result may indicate that more of the consumer demand caused by China's growing population is in the domestic market. At the same time, the increase in domestic productivity caused by population growth in BRC has not been able to meet the increase in domestic demand.

Many studies also show the positive effect of the exchange rate. This research reflects this effect on China's imports. This indicates that with the appreciation of RMB against foreign currencies, it means that the purchasing power of RMB increases, thus generating income effect. China's imports will continue to increase. The impact of exchange rate on exports is

not significant, which may be because the fluctuation range of RMB exchange rate is relatively small during the period of study in this paper, which cannot reflect the competitive advantage of product price brought by the exchange rate.

From the empirical results, the impact of WGI on China's export trade volume is more significant. The improvement of BRC government governance can improve the efficiency of China's exports to BRC, reduce transaction costs, and promote the expansion of China's export value. But there is no evidence that the increased effectiveness of BRC's government will boost exports to China. Because of differences in the quality of political systems and political stability in various countries, the uncertainty of trade increases. The business considerations of importers and exporters of risk and benefit will be affected as well. Compared with foreign companies exporting to China, Chinese companies pay more attention to the policy environment when conducting export trade.

As investment freedom index rise, China's export value will continue to reduce. This may be because China's investment freedom is relatively low. As trading countries' investment freedom increases, the difference between the two countries becomes larger. Increase the exchange cost and transaction cost of transnational trade, and correspondingly reduce trade efficiency and trade flow. When BRC's trade freedom index increase, the country's exports to China increase while China's exports to it fall. Because of the two different influences, it is preliminarily ruled out that the increase of trade freedom of BRC will make the institutional difference between the two countries larger. Therefore, this research speculates that the increased freedom of trade in a country causes the competition of products from different countries in that country. It could decrease China's export trade value.

The level of infrastructure is an important variable in the expansion of this study. In the past, plenty of literature believed that BRI would promote trade volume by reducing trade costs through infrastructure construction. But there still has some research hold a different opinion. According to Cai& Yu(2017), Transportation infrastructure of countries along the route can have an impact on China's exports of goods through the trade creation effect, trade diversion effect and trade substitution effect. The final effect depends on the joint effect of the three effects. The results of this research found that the quality of railway infrastructure has the most significant impact on the trade of the relevant countries. This result supports the main opinion of the previous literature. This because rail infrastructure is currently the focus of The Belt and Road Initiative. Moreover, the significance of China's export model at the railway

infrastructure level is greater than that of imports. This support that China’s export can benefit more from railway construction. The improvement of the quality of port infrastructure is conducive to China's exports when the improvement of air transportation infrastructure decreases Chinese exports. Which means for port transportation, trade creation effect is greater than trade diversion effect and trade substitution effect. China's exports to BRC are mainly by sea, so the improvement of port infrastructure quality can significantly improve the efficiency of delivery. In regard to air transportation, it is the most expensive of the three modes of transportation. Costs are too high for many of China's labour-intensive products. As the country's air transportation infrastructure improves, more shipping is diverted to air transportation. In this situation, trade diversion effect and trade substitution effect could be greater than trade creation effect. It could reduce China's exports to it.

China's exports and imports to the BRC are affected by the number of mobile phone registrations in the country. The number of Internet users has only a significant impact on the size of China's imports. One reason could be China's e-commerce market is too limited in local and not global enough. Therefore, when the number of Internet users of the BRC increased, it did not increase the access to and purchase channels for Chinese products. Besides, the symbols of the import model of infrastructure do not conform to the expected hypothesis. It may also because for some countries, the improvement of infrastructure will improve the competitiveness of local industries and other countries with developed infrastructure, the product substitution effect will restrain the demand for Chinese imports.

Consistent with the hypothesis, a border with China makes it easier for BRC to export to China. It is also more conducive to imports from China. This suggests that neighbouring countries can expect more trade. Combined with the previous analysis of geographical distance, this may indicate that although the distance factor no longer has a significant general negative impact. But it still has a role to play between neighbouring countries and other countries. It is also possible that the two countries sharing a border will exchange information more easily and accurately. There will also be less cultural distance. This could help reduce costs and boost trade.

The common membership of RTA explains some amount of China's export trades, but not significant for China's import. Because import trade volume with BRC which have signed RTA with China, account for a relatively low proportion of China's total trade imports. Central and Eastern Europe, in particular, is currently a gap in China's RTA strategy.

## 6.2. Trade potential

As a whole, the average A/P value of the export potential and import potential of China and BRC is 1.12 and 1.09 respectively. Which indicates that, on the whole, the actual import and export volume is higher than the potential trade value. It supports the conclusion that previous literature suggests: a series of policies, including the establishment of the Silk Road fund, investment in infrastructure, the establishment of Free Trade Zone inside China and the signing of FTA with BRC, are of specific help to realize trade potential. There are 14 countries have an import A/P value close to 1 and 11 countries had an export A/P value close to 1. This result accords with previous research literature and the prediction of this research. This also indicates that variables in the model are more accurately described for imports. China had an A/P smaller than 0.8 with 31 countries out of 80 countries in the scope of the study. Of these 31 countries, 20 have a low A/P value in both export and import trade. This result suggests China has untapped potential for trade with BRC. Trade value along Belt and Road still has the opportunity to grow in the next period if the trade barriers decrease. It is also noted that 25 out of 80 countries have fully developed their import and export potential, indicating that the policies related to BRI are very effective for specific countries and regions. Singapore and Vietnam are both potential and mature in terms of import and export, indicating that China has established a relatively mature trade model and relationship with these countries in the development of bilateral trade.

In order to further study the development prospects of China and BRC, a regional classification analysis is needed so as to be able to obtain detailed characteristics of the trade potential in different regions.

This part discussion grouping the countries by region and A/P value. The results from Table 15 and 16 show that the trade potential of different areas shows different regional attributes.

| | High potential | | Potential to be explored | | Fully developed | |
|---|---|---|---|---|---|---|
| East Asia & Pacific | Indonesia | 0.69 | New Zealand | 0.89 | Cambodia | 2.28 |
| | Laos | 0.64 | Philippines | 1.15 | Malaysia | 2.06 |
| | | | | | Mongolia | 1.66 |
| | | | | | Singapore | 2.93 |
| | | | | | Vietnam | 1.63 |
| Europe & | Austria | 0.21 | Poland | 0.88 | Cyprus | 1.21 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Central Asia | Moldova | 0.32 | Estonia | 0.94 | Slovenia | 1.33 |
| | Armenia | 0.41 | Kazakhstan | 1.06 | Czech Republic | 1.49 |
| | Azerbaijan | 0.47 | Turkey | 1.1 | Hungary | 1.7 |
| | Russia | 0.48 | Luxembourg | 1.15 | Tajikistan | 3.19 |
| | Portugal | 0.49 | Ukraine | 1.17 | | |
| | Bulgaria | 0.57 | Latvia | 1.18 | | |
| | Romania | 0.71 | | | | |
| | Italy | 0.74 | | | | |
| | Lithuania | 0.77 | | | | |
| | Croatia | 0.79 | | | | |
| | Greece | 0.79 | | | | |
| Latin America & Caribbean | Barbados | 0.43 | Jamaica | 1.15 | Chile | 1.23 |
| | Bolivia | 0.47 | Peru | 1.02 | Panama | 7.97 |
| | Trinidad and Tobago | 0.62 | | | Uruguay | 1.31 |
| Middle East & North Africa | Qatar | 0.46 | Egypt | 1.19 | Algeria | 1.21 |
| | | | Kuwait | 0.87 | Bahrain | 1.28 |
| | | | Morocco | 0.89 | Lebanon | 2.13 |
| | | | Oman | 0.88 | Malta | 2.95 |
| | | | Saudi Arabia | 1.08 | United Arab Emirates | 2.99 |
| South Asia | Bangladesh | 0.78 | Pakistan | 0.84 | | |
| | Nepal | 0.49 | | | | |
| | Sri Lanka | 0.66 | | | | |
| Sub-Saharan Africa | Rwanda | 0.28 | Cameroon | 0.95 | Angola | 1.3 |
| | Burundi | 0.4 | Ethiopia | 1.01 | South Africa | 1.33 |
| | Lesotho | 0.49 | Nigeria | 1.05 | Tanzania | 1.43 |
| | Chad | 0.5 | | | Senegal | 1.45 |
| | Mali | 0.53 | | | Mozambique | 1.73 |
| | Uganda | 0.53 | | | Ghana | 1.76 |
| | Cape Verde | 0.59 | | | Kenya | 1.85 |
| | Zambia | 0.69 | | | Guinea | 2.38 |
| | Namibia | 0.75 | | | Mauritania | 2.73 |
| | | | | | Benin | 5.47 |
| | | | | | Liberia | 18.48 |

**Table 15** Export Trade Potential: With A/P value Groupings

| | High potential | | Potential to be explored | | Fully developed | |
|---|---|---|---|---|---|---|
| East Asia & Pacific | Indonesia | 0.78 | | | Cambodia | 4.02 |
| | New Zealand | 0.59 | | | South Korea | 1.53 |
| | | | | | Laos | 2.06 |
| | | | | | Malaysia | 2.45 |
| | | | | | Mongolia | 4.95 |
| | | | | | Philippines | 1.53 |
| | | | | | Singapore | 3.27 |
| | | | | | Vietnam | 4.39 |
| Europe & Central Asia | Austria | 0.15 | Turkey | 0.82 | Cyprus | 1.08 |
| | Moldova | 0.33 | Estonia | 0.9 | Latvia | 1.1 |
| | Portugal | 0.36 | Luxembourg | 0.92 | Slovenia | 1.13 |
| | Armenia | 0.44 | Ukraine | 1.07 | Czech Republic | 1.13 |
| | Azerbaijan | 0.47 | | | Hungary | 1.36 |
| | Italy | 0.49 | | | Kazakhstan | 1.96 |
| | Bulgaria | 0.51 | | | Tajikistan | 7.54 |
| | Romania | 0.6 | | | | |
| | Greece | 0.62 | | | | |
| | Poland | 0.65 | | | | |
| | Russia | 0.68 | | | | |
| | Croatia | 0.68 | | | | |
| | Lithuania | 0.72 | | | | |
| Middle East & North Africa | Barbados | 0.38 | Chile | 0.97 | Panama | 6.86 |
| | Bolivia | 0.37 | Jamaica | 1.04 | | |
| | Trinidad and Tobago | 0.5 | Peru | 0.91 | | |
| | | | Uruguay | 0.95 | | |
| Latin America & Caribbean | Kuwait | 0.74 | Algeria | 1.04 | Bahrain | 1.22 |
| | Morocco | 0.76 | Egypt | 1.04 | Lebanon | 1.92 |
| | Qatar | 0.36 | Oman | 0.81 | Malta | 2.76 |
| | | | Saudi Arabia | 0.86 | United Arab Emirates | 2.27 |
| South Asia | | | Bangladesh | 1.2 | | |
| | | | Nepal | 1.13 | | |
| | | | Pakistan | 1.18 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Sri Lanka | 0.92 | | |
| Sub-Saharan Africa | Rwanda | 0.29 | Cameroon | 0.92 | Tanzania | 1.36 |
| | Burundi | 0.47 | South Africa | 0.95 | Senegal | 1.36 |
| | Uganda | 0.51 | Ethiopia | 0.96 | Ghana | 1.57 |
| | Lesotho | 0.53 | Angola | 1.07 | Mozambique | 1.71 |
| | Chad | 0.54 | | | Kenya | 1.75 |
| | Mali | 0.54 | | | Guinea | 2.47 |
| | Cape Verde | 0.6 | | | Mauritania | 3.01 |
| | Zambia | 0.64 | | | Benin | 5.77 |
| | Namibia | 0.72 | | | Liberia | 20.34 |
| | Nigeria | 0.8 | | | | |

**Table 16** Import Trade Potential: With A/P value Groupings

East Asia & Pacific, Middle East & North Africa has a relatively outstanding trade capability. This is because these markets were China's main trading markets in the past, have already formed a more mature trade pattern and trade relations. More than half of all high potential countries are in Europe & Central Asia, sub-Saharan Africa and South Asia. This shows the great potential in import and export trade between China and these regions. But on the other hand, it also could be seen as the development prospects of China's trade with these countries are hindered by some trade.

Even within the same region, the export potential of different countries varies significantly. Take The example of Indonesia. It is the only country in East Asia with high potential in both import and export. The industrial structure of Indonesia is similar to that of China. Enterprises from the two countries can actively analyze the complementarity and competitiveness of industries. Avoid homogeneous competition. The average import and export potential of the Middle East & North Africa are both higher than 1.2, while the import and export potential of Qatar is only 0.46 and 0.36 respectively. Based on the actual situation and data information, it can be found that Qatar is located in the inland region, while the railway transport level has not yet developed. To a certain extent, it hinders the actual import and export volume. Europe, as a developed trade region, only has a few countries which have a trade potential value greater than 1.2. The result is related mainly to the trade barrier policies of the EU. Especially in Italy, Austria and other regions, the import trade potential value is greater than the export trade potential value. Europe has long led the way in sophisticated sectors and mature

industries, partly unleashing China's potential imports from these countries. It is also noted that Liberia's trade potential is abnormal high. On the one hand, it may be because the economic scale is underdeveloped and the data is relatively small, so the forecast result is affected. On the other hand, it analyzes the specific situation of the country. The very low number of Internet users in the country can be found in the data, which may indicate that Internet coverage is not yet a major influencing factor in the extremely underdeveloped trade regions.

# CHAPTER 7: Conclusion

## 7.1. Summary

The main purpose of this thesis is to study the development prospect of trade between China and the world under the background of the Belt and Road Initiative. In this paper, the relevant definitions of international trade, the significance of BRI, and the trade relations between China and BRC are firstly understood through relevant literature. Select research methods based on the literature review related to trade potential. Next, the original trade gravity model is extended to construct a trade gravity model with BRI characteristics. Finally, the import and export trade potential of China and the sample countries is estimated from two aspects of total volume and regional classification.

Based on these findings, this author Answers the core question of this thesis and gives the final conclusion:

Many countries that have signed the One Belt And One Road agreement have great potential for the development of import and export trade with China. Based on estimates of trade potential, the authors identify countries with high potential for trade growth, concentrated in Europe & Central Asia and sub-Saharan Africa. Among them, European countries are new partners of the Belt and Road Initiative in China, and they also have a guaranteed market size. East Asia & Pacific, Middle East & North Africa has a relatively outstanding trade capability.

According to the regression results of the trade gravity model, the GDP of the two countries still has a positive effect on trade. And geographically distance no longer has a significant negative impact on import and export trade. The significance of infrastructure construction to trade development is further affirmed. Infrastructure has a mixed impact on trade. It depends mainly on national characteristics. In general, the level of railroad infrastructure has the most significant impact. With the reduction of hard costs such as space distance, soft costs brought by institutional environment have a more significant impact on the trade of countries around B&R. The signing of regional trade agreements can promote the export, but the import effect still needs time to release gradually.

## 7.2. Managerial implication

Although in recent years under the Belt and Road Initiative, bilateral trade between China and countries part in the initiative has achieved development on different levels. But there also are problems that can be concluded from the results of empirical studies, such as the excessive concentration of trade and uneven development speed. The implementation of BRI strategy needs constant optimization to develop further the quality and effect of bilateral trade between China and BRC.

### 7.2.1. Strengthening economic and trade cooperation

Based on the analysis of trade gravity model, it can be found that the signing of RTA has multiple influences on the development of bilateral trade. Based on consolidating the existing achievements, further expand the trade market. On the one hand, China should actively widen the scope of signing free trade agreements and promote the establishment of trade cooperation frameworks with countries that are still in the new state of trade agreements. On the other hand, Countries that are already cooperating with China in the economic and trade field should give full play to their trade potential and advantages.

### 7.2.2. Promoting transportation infrastructure connectivity

Countries along the Belt and Road have different demands for infrastructure development due to their different development stages: developed countries mainly focus on upgrading and improvement, while less developed countries have more demands for new construction. Therefore, differentiated strategies should be adopted to promote infrastructure connectivity along the Belt and Road. On the one hand, faced with less developed countries, the establishment of regional international financing mechanisms, capital shortage. Countries with abundant labour resources are distributed in Central Asia, South Asia, Southeast Asia and other regions; their lack of government financial funds cannot cover the huge capital needs. On the other hand, to promote the standardized operation of transnational transport, improve transport efficiency. Develop information systems along the routes helps facilitate the flow of electronic customs declaration and cargo tracking information.

### 7.2.3. Actively expand the market

In the study of trade potential, the authors found that there was an overconcentration of trade. Therefore, for the good development of trade between China and BRC, the strategy of "trade diversification" should be actively developed and implemented. According to the empirical analysis, it can be concluded that in the development process of diversified trade, economy size, institutional environment, infrastructure and trade potential should be considered comprehensively. Countries with fully developed potentials, such as Singapore and South Korea, need to find new ways to boost trade. In order to realize the trade potential in the future, both high potential countries and China need to develop their comparative advantages, optimize their trade structure, deepen cooperation in specific industries, and increase the import and export of corresponding products. Besides, China should actively consult and cooperate to eliminate the unfavourable factors in actual trade. Among the BRC, several European countries such as Italy are new partners with China, and they have a guaranteed market size. How to strengthen cooperation with these countries and explore the potential of trade should be the focus of the development of BRI.

### 7.2.4. Improve transparency

Because the core of the Belt and Road Initiative revolves around large-scale infrastructure projects. There is a huge risk of investment and return. Moreover, because some participating countries have relatively low economic levels, they will exacerbate investment risks in this regard. Basically, the potential of the Belt and Road Initiative for trade is accompanied by sustainability problems. Therefore, the implementation of policies and investments is crucial. China should provide more public information about the policy, including programmed planning, budging and progress. This series of actions to increase transparency can build public trust and supervision, and encourage community to participate in investment decision-making.

## 7.3. Theoretical implication

As a community with interests, responsibilities and a Shared future, the Belt and Road Initiative not only brings about market-based competition and cooperation but also requires dialogue and alignment of rules and institutions. Therefore, in addition to traditional variables such as GDP, distance and population, this paper adds institutional differences, and trade

freedom into the key factor which could affect the realization of trade potential. Based on the background of Belt And One Road, this paper introduces three indicators to refer to the level of transportation infrastructure in the gravity model. It is found that different modes of transport have different effects on trade. In the study of geographical distance variable, it contradicts the view of the past and proposes that geographical distance is no longer a significant influence factor. The author also classifies 80 countries by trade potential. It provides reference classification for the future analysis of specific trade potential countries.

## 7.4. Limitation and suggestion

The first one is the constraint of data availability. At the time of data collection, the author reduced 138 countries to 80 because of lack of information. But the geographically regional analysis method is still used in the classification analysis. This can lead to bias in the overall analysis of the region. Regional results are less representative. Secondly, the set of indicators needs to be improved. Although this paper has taken into account the three indicators of Quality of Air Transportation Infrastructure, Quality of Port Infrastructure and Quality of Railroad Infrastructure to indicate the level of infrastructure, it has not carried out weight analysis on these three facilities. Third, the relationship between trade influencing factors and trade potential is not so clear. Although the trade potential and its influencing factors of countries along the Belt and Road are studied, there is no study of how these factors affect trade potential through influencing competitiveness.

In future studies, the entropy weight method can be used to construct comprehensive indicators of transportation infrastructure and communication infrastructure. Because the resource endowments and economic development levels of countries along the routes vary greatly, the effects of the same trade influencing factors on different economies may vary greatly. In the study of the country classification, countries can be classified from the aspect of resource endowment. Combined with the comparative advantages and complementarities of trade between countries along the Belt and Road and China, analyze the trade potential of China and countries along the Belt and Road from the perspective of import and export structure of each country. In another way, future research also could be carried out by grouping the countries in six major corridors. Since the infrastructure construction mostly developed according to the corridors.

## References


Anderson, J. (2011). The Gravity Model. *Annual Review Of Economics*, *3*(1), 133-160. doi: 10.1146/annurev-economics-111809-125114

Anderson, J., & van Wincoop, E. (2003). Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review*, *93*(1), 170-192. doi: 10.1257/000282803321455214

Anderson, J., & Van Wincoop, E. (2001). Borders, Trade, and Welfare. *Brookings Trade Forum, 2001*(1), 207-243. doi: 10.1353/btf.2001.0002

Armstrong, S. (2007). Measuring Trade and Trade Potential: A Survey. *SSRN Electronic Journal*. doi: 10.2139/ssrn.1760426

Batra, A. (2006). India's Global Trade Potential: The Gravity Model Approach. *Global Economic Review*, *35*(3), 327-361. doi: 10.1080/12265080600888090

Baniya, S., Rocha, N., & Ruta, M. (2020). Trade effects of the New Silk Road: A gravity analysis. *Journal Of Development Economics*, *146*, 102467. doi: 10.1016/j.jdeveco.2020.102467

Belt and Road Initiative. (2020). Retrieved 29 July 2020, from https://www.beltroad-initiative.com/belt-and-road/

Bergstrand, J. (1989). The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade. *The Review Of Economics And Statistics*, *71*(1), 143. doi: 10.2307/1928061

Bi,Y.,& Shi,B.(2012). Zhong duo you zhong ya wu duo mao yi dian li ce suan ji fen xi — mao yi hu bu xing zhi shu yu yin li mo xing. [The Analysis and Testing of Trade Potentialities between China and Central Asia Countries: Empirical Study by RCA and Trade Gravity Model]. *Asia-pacific Economic Review*, 03, 47-51.

Bialynicka-Birula, J. (2015). Modelling International Trade in Art – Modified Gravity Approach. *Procedia Economics And Finance*, *30*, 91-99. doi: 10.1016/s2212-5671(15)01258-7

Binh, D., Duong, N., & Cuong, H. (2020). Apply gravity model to analyze trade activities of vietnam. Retrieved 29 July 2020, from https://freit.org/WorkingPapers/Papers/TradePatterns/FREIT639.pdf

Cooper, R., & Frankel, J. (1997). Regional Trading Blocs in the World Trading System. *Foreign Affairs*, *77*(2), 144. doi: 10.2307/20048805

Cui, Y., & Yu, J. (2017). Yi dai yi lu guo jia jiao tong ji chu she shi zhi liang yu zhong guo huo wu chu kou. [Belt and Road countries' transport infrastructure quality and Chinese goods export]. *Contemporary Finance & Economics*, 11, 100-109.

de Soyres, F., Mulabdic, A., & Ruta, M. (2020). Common transport infrastructure: A quantitative model and estimates from the Belt and Road Initiative. *Journal Of Development Economics*, *143*, 102415. doi: 10.1016/j.jdeveco.2019.102415

de Soyres, F., Mulabdic, A., Murray, S., Rocha, N., & Ruta, M. (2019). How much will the Belt and Road Initiative reduce trade costs?. *International Economics*, *159*, 151-164. doi: 10.1016/j.inteco.2019.07.003

Dinh Thi Thanh, B., Viet Duong, N., & Manh Cuong, H. (2013). Binh, D.T.T., Duong, N.V. and Cuong, H.M. Applying Gravity Model to Analyze Trade Activities of Vietnam. Retrieved 30 July 2020, from https://freit.org/WorkingPapers/Papers/TradePatterns/FREIT639.pdf

Du, M. (2016). China's "One Belt, One Road" Initiative: Context, Focus, Institutions, and Implications. The Chinese Journal Of Global Governance, 2(1), 30-43. doi: 10.1163/23525207-12340014

Fan, Z., Zhang, R., Liu, X., & Pan, L. (2016). China's outward FDI efficiency along the Belt and Road. *China Agricultural Economic Review*, *8*(3), 455-479. doi: 10.1108/caer-11-2015-0158

Felicitas, N., & Inmaculada, M. (2005). MERCOSUR-EUROPEAN UNION TRADE: How Important Is EU Trade Liberalization for MERCOSUR's Exports?. *The International Trade Journal*, *19*(1), 31-66. doi: 10.1080/08853900590905739

Francois, J., & Manchin, M. (2013). Institutions, Infrastructure, and Trade. *World*

*Development*, *46*, 165-175. doi: 10.1016/j.worlddev.2013.02.009

Frankel, J., & Rose, A. (2002). An Estimate of the Effect of Common Currencies on Trade and Income. *The Quarterly Journal Of Economics*, *117*(2), 437-466. doi: 10.1162/003355302753650292

Frankel, J., & Rose, A. (2020). Estimating the Effect of Currency Unions on Trade and Output. Retrieved 5 August 2020, from http://www.nber.org/papers/w7857

Frankel, J., Stein, E., & Wei, S. (1995). Trading blocs and the Americas: The natural, the unnatural, and the super-natural. *Journal Of Development Economics*, *47*(1), 61-95. doi: 10.1016/0304-3878(95)00005-4

Frankel, J., & Wei, S. (1993). *Trade blocs and currency blocs*. [Cambridge, Mass.]: Research Programs, John F. Kennedy School of Government, Harvard University.

Freund, C., & Weinhold, D. (2002). The Internet and International Trade in Services. *American Economic Review*, *92*(2), 236-240. doi: 10.1257/000282802320189320

Gao,Z.,& Liu,W.(2015). “Yi dai” bei jing xia zhong gul yu zhong ya wu duo mao yi qian li ce suan ji qian jing qian wang. [The Analysis and Measurement of Trade Potential and Trade Prospect between China and Central Asia Countries under the background of the Silk Road Economic Belt]. *Journal of Shandong University(Philosophy and Social Sciences)*, 05, 24-34

Garcia-Herrero, A., & Xu, J. (2016). China's Belt and Road Initiative-Can Europe Expect Trade Gains?. *SSRN Electronic Journal*. doi: 10.2139/ssrn.2842517

Gong,X.,Qiao,S.,&Hu,Z.(2016) Si chou zhi lu jing ji dai: mao yi jing zheng xing, hu bu xing he mao yi qian li.[The Silk Road Economic Belt: Trade Competitiveness, Complementarity and Trade Potential]. *Inquiry Into Economic Issues*, 10, 145-154.

Helpman, E. (1981). International trade in the presence of product differentiation, economies of scale and monopolistic competition. *Journal Of International Economics*, *11*(3), 305-340. doi: 10.1016/0022-1996(81)90001-5

Index of Economic Freedom: Promoting Economic Opportunity and Prosperity by Country. (2020). Retrieved 5 August 2020, from http://www.heritage.org/index/

Jiang,G.,& Huo,Q.(2015). Zhong guo— dong meng zi you mao yi qu mao yi chuang zao xiao ying ji mao yi qian li— ji yu yin li mo xing mian ban shu ju de shi zheng fen xi. [The Trade Creation Effect and Potential of CAFTA: An Empirical Analysis Based on the Gravity Model Panel Data]. *Contemporary Economic Management,* 02, 60-67. doi:10.13253/j.cnki.ddjjgl.2015.02.012

Jing, S., Zhihui, L., Jinhua, C., & Zhiyao, S. (2020). China's renewable energy trade potential in the "Belt-and-Road" countries: A gravity model analysis. Renewable Energy. doi: 10.1016/j.renene.2020.06.134

Kostova, T., & Zaheer, S. (1999). Organizational Legitimacy under Conditions of Complexity: The Case of the Multinational Enterprise. *The Academy Of Management Review*, *24*(1), 64. doi: 10.2307/259037

Krugman, P. (1991). The move toward free trade zones. Retrieved 15 August 2020, from https://econpapers.repec.org/RePEc:fip:fedker:y:1991:i:nov:p:5-25:n:v.76no.6

Krugman, P., Melitz, M., & Obstfeld, M. (2012). *International economics.* Boston, Mass.: Pearson Addison-Wesley.

Kartz, M., Shapiro, C. (1985). Network externalities, competition, and compatibility. *American Economic Review*, *75*, 424-440.

Lau, Y., Tam, K., Ng, A., Fu, X., Jing, Z., & Feng, J. (2017). Effects of the 'Belt and Road' initiative on the wine import logistics of China. *Maritime Policy & Management*, *45*(3), 403-417. doi: 10.1080/03088839.2017.1405291

Li, W., & Li, C. (2020). The Empirical Study on Potential of Bilateral Trade between China and Kenya in the Context "The Belt and Road". *Theoretical Economics Letters*, *10*(01), 119-130. doi: 10.4236/tel.2020.101008

Li, Y., Bolton, K., & Westphal, T. (2018). The effect of the New Silk Road railways on aggregate trade volumes between China and Europe. *Journal Of Chinese Economic And Business Studies*, *16*(3), 275-292. doi: 10.1080/14765284.2018.1453720

Liao,Z.,&Ning,L. (2015). 21 shi ji hai shang si chou zhi lu zhi zhong guo yu dong meng mao yi chang tong— ji yu yin li mo xing de shi zheng kao cha.[China- ASEAN Trade Flow

Status,Influence Factors and Potential of 21st Century Sea Silk Roads:Empirical Investigation Based on the Gravity Model]. *On Economic Problems,* 12, 1-7.

Limao, N. (2001). Infrastructure, Geographical Disadvantage, Transport Costs, and Trade. *The World Bank Economic Review*, *15*(3), 451-479. doi: 10.1093/wber/15.3.451

Linnemann, H. (1966). *An econometric study of international trade flows.* Amsterdam: North-Holland.

List of countries that have signed cooperation documents with China to jointly build the Belt and Road Initiative(2020). Retrieved 15 August 2020 from https://www.yidaiyilu.gov.cn/gbjg/gbgk/77073.htm

Lu, J., Pan, X., & Xie, Z. (2020). Unity versus Collaboration: Construction of China's Belt and Road Free Trade Agreement 2.0 Network. *Pacific Economic Review*, *25*(2), 250-271. doi: 10.1111/1468-0106.12323

Martinez-Zarzoso, I., & Nowak-Lehmann, F. (2003). Augmented Gravity Model: An Empirical Application to Mercosur-European Union Trade Flows. *Journal Of Applied Economics*, *6*(2), 291-316. doi: 10.1080/15140326.2003.12040596

Meek, R., Raphael, D., & Stein, P. (1978). *Lectures on Jurisprudence. The Glasgow Edition of the Works and Correspondence of Adam Smith*. Oxford University Press.

Novy, D. (2012). Gravity redux: Measuring international trade costs with panel data. *Economic Inquiry*, *51*(1), 101-121. doi: 10.1111/j.1465-7295.2011.00439.x

Obstfeld, M., & Rogoff, K. (2000). The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?. *NBER Macroeconomics Annual*, *15*, 339-390. doi: 10.1086/654423

Rahman, M.M. (2003). A panel data analysis of Bangladesh's trade: the gravity model approach. University of Sydney. Retrieved 15 August 2020, from: http://www.etsg.org/ETSG2003/papers/rahman.pdf

Ricardo, D., Sraffa, P., & Dobb, M. (1966). *The Works and correspondence of David Ricardo*. London: Cambridge University Press.

Ricardo, D. (2012). *Principles of Political Economy and Taxation*. Dover Publications.

Roperto Jr, D., & Edgardo, C. (2013). Philippine Export Efficiency and Potential: An Application of Stochastic Frontier Gravity Model. Retrieved 30 July 2020, from https://mpra.ub.uni-muenchen.de/51677/1/MPRA_paper_51677.pdf

Shahriar, S., Qian, L., Kea, S., & Abdullahi, N. (2019). The gravity model of trade. *Review Of Innovation And Competitiveness*, *5*(1), 21-42. doi: 10.32728/ric.2019.51/2

Sun,J.,&Liu,H.(2016). Yi dai yi lu zhan lue bei jing xia zhong guo mao yi qian li de shi zheng yan jiu.[An Empirical Study of China's Trade Potential under the "One Belt One Road" Strategy]. *Contemporary Finance & Economics,* 06, 99-106.

Sun, Zhang, Xu, Yang, & Wang. (2019). Does the "Belt and Road Initiative" Promote the Economic Growth of Participating Countries?. *Sustainability*, *11*(19), 5240. doi: 10.3390/su11195240

The Belt and Road Initiative: Progress, Contributions and Prospects. (2019). Retrieved 15 August 2020, from: http://www.scio.gov.cn/32618/document/1652514/Image/201904231652514_336202.docx

Tan,J.,&Zhou,M.(2015). 21 shi ji hai shang si chou zhi lu mao yi qian li ji qi ying xiang yin su— ji yu sui ji qian yan yin li mo xing de shi zheng yan jiu.[Export Potential of 21st-Century Maritime Silk Road and Its Determinants:An Empirical Research Based on Stochastic Frontier Gravity Model]. *Journal of International Trade,* 02, 88-97.

Tang,C.,Shao,J.,Li,R.,&Wang,S.(2018). Zhong guo dui "yi dai yi lu" yan xian guo jia huo wu chu kou mao yi qian li. [Export Potential of China's Goods Trade to Countries along the Belt and Road]. *Economic Geography*, 09, 30-37. doi:10.15957/j.cnki.jjdl.2018.09.004

Wang,L.,&Wu,B.(2016) Si chou zhi lu jing ji dai de mao yi qian li — ji yu "zi ran mao yi huo ban" jia suo he sui ji qian yan yin li mo xing de fen xi.[The Trade Potential of the Silk Road Economic Belt——Analysis Based on the Hypothesis of "Natural Trading Partners" and the Stochastic Frontier Gravity Model]. *Economist*, 04, 33-41. doi:10.16158/j.cnki.51-1312/f.2016.04.005

WGI-Home. (2020). Retrieved 5 August 2020, from

http://info.worldbank.org/governance/wgi/

What Is International Trade Theory?. (2020). Retrieved 30 July 2020, from https://saylordotorg.github.io/text_international-business/s06-01-what-is-international-trade-th.html

Xi Focus-Backgrounder: Belt and Road Initiative progress - Xinhua | English.news.cn. (2019). Retrieved 15 August 2020, from http://www.xinhuanet.com/english/2019-04/26/c_138013178.htm

Xu, D., & Shenkar, O. (2002). Institutional Distance and the Multinational Enterprise. *The Academy Of Management Review*, *27*(4), 608. doi: 10.2307/4134406

Xu, J; Zhou, S& Hu, A. (2018). Institutional Distance, Neighboring Effects and Bilateral Trade:An Empirical Analysis Based on Spatial Panel Model of"One Belt and One Road"Countries. *Journal of Finance and Economics* ,01, 75-85. doi: 10.16538/j.cnkij.fe.2017.01.007

Yang,L., Liu,X.,&Yu,W.(2015)"Yi dai yi lu" bei jing via wo guo yu zhong ya guo jia mao yi hu bu xing yan jiu.[Research On the Trade Complementarity Between China and Central Asian Countries Under the Background of "the Belt and Road Initiative"]. *Shanghai Journal of Economics*, 11, 94-103.

Ye,X.,&Li,S.(2018). Zhong guo dui wai mao yi xiao lv ji qi ying xiang yin su fen xi— ji you yi day yi lu yan xian guo jia yu qi ta guo jia de bi jiao.[Analysis of China's foreign trade efficiency and its influencing factors—Based on the comparison between countries along the "Belt and Road" and other countries]. *Shandong Social Sciences*, 08. 159-165. doi:10.14112/j.cnki.37-1053/c.2018.08.025

Zhai, F. (2018). China's belt and road initiative: A preliminary quantitative assessment. *Journal Of Asian Economics*, *55*, 84-92. doi: 10.1016/j.asieco.2017.12.006

Zhang,H.(2017). Zhong guo yu "yi dai yi lu" yan xian di qu de mao yi qian li yan jiu.[A Study of Trade Potential between China and the Areas along the Belt and Road Initiative]. *Journal of International Trade*, 07, 85-95. doi: 10.13510/j.cnki.jit.2017.07.008

Zhang, Y., & Wang, S. (2015). Trade Potential of China's Export to ASEAN: The Gravity Model Using New Economic Mass Proxies. *Journal Of Systems Science And Information*, *3*(5), 411-420. doi: 10.1515/jssi-2015-0411

# List of Abbreviations

BRI: the Belt and Road Initiative

B&R: The Silk Road Economic Belt and The 21st-Century Maritime Silk Road

BRC: The countries have joined the BRI by signing a Memorandum of Understanding with China.

ASEAN: Association of Southeast Asian Nations

CMREC: China- Mongolia-Russia Economic Corridor

CCWAEC: China-Central Asia-West Asia Economic Corridor

WTO: World Trade Organization

OECD: The Organization for Economic Co-operation and Development

TBT: Technical Barriers to Trades

SPS: Sanitary and Phytosanitary Measures

RTA: Regional Trade Agreement

FTA: Free Trade Agreement

REM: Random effects model

FEM: Fixed effects model

GDP: Gross domestic product

WGI: Worldwide Governance Indicators

IEF: Index of Economic Freedom

TFI: Trade Freedom Index

IFI: Investment Freedom Index

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