Empirical Study on the Trade Status and Potential of China and India

-Based on the Expanded Trade Gravity Model

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Abstract

According to the 2008-2018, China and India's bilateral trade in goods import and export data, analyzes the current situation of the development of bilateral trade, and calculate the trade between the two countries each index, in order to determine the distribution of the trade between the two countries, also introduced the development of the trade gravity model, through the empirical analysis, estimate the potential of bilateral trade. The results show that although the total trade volume between China and India has been declining for some time, it has been developing well in recent years with the scale increasing and the growth rate increasing. The mean value of the trade combination between China and India is more than 1, and the bilateral trade relationship is close with a high degree of dependence. In recent years, the potential of bilateral trade between China and India has shown an increasing trend, with the average potential also around 0.9, indicating that the trade potential of the two countries has not yet been fully tapped and there is some room for expansion. Finally, this paper puts forward some countermeasures and Suggestions to promote the development of trade between China and India.

Keywords

Trade between China and India, trade combination, the expanded trade gravity model, trade potential.

1. Introduction

As the largest economy in South Asia, India's bilateral trade relations with China have been attracting much attention, affecting the development of the economic pattern in Asia and even the world. The year 2020 will mark the 70th anniversary of the establishment of diplomatic ties between China and India. The bilateral trade volume has increased from us \$51.844 billion in 2008 to us \$95.731 billion in 2018, an increase of 1.85 times and an average annual growth rate of 7.51%. Under the background of Sino-Indian bilateral trade volume increasing, this paper introduce development of gravity model, through the empirical analysis, find out the influence factors of trade flows between the two countries, according to the model to estimate the potential of bilateral trade, the results show that the average at around 0.9, that trade between the two countries type pioneering belong to trade, the future trade has certain development space, finally in order to further promote the trade between China and India on provide countermeasures and Suggestions.

Sino-Indian trade relations have always been one of the issues closely followed by scholars at home and abroad. Among them, Guo min (2018) pointed out that under the background of "One Belt And One Road", there are problems of trade imbalance and status mismatch

between India and India, and made Suggestions on encouraging India to join the "One Belt And One Road" initiative at an early date. Shi yi (2019) analyzed the scale and structure of trade between China and India, proposed opportunities and challenges in the development of trade between the two countries, and issued countermeasures and Suggestions on promoting bilateral trade. Wen fude (2015) summarized the existing problems in china-India economic relations and put forward the causes of the problems, holding that the construction of bcim economic corridor and china-India free trade area are of great significance to both sides. Song zhouying and han mengyao (2019) analyzed the development trend of Sino-Indian trade from the perspective of trade, and found that the trade between China's eastern coastal provinces and India is closer than that between most western provinces, and China's commodities exported to India are gradually becoming technology-intensive, providing a strong support for the evolution of Sino-Indian trade relations. Also have scholars of China and India trade competitiveness, trade complementarity index is analyzed, such as ChengRong and hui-fang cheng (2011) based on goods trade and service trade, analysis of the two countries' trade structure and trade competitiveness of calculation of the two countries, complementarity and similarity index, the results show that China's merchandise trade structure is better than that of India, should strengthen cooperation to gain more benefits. Huang lujin and wang jingjing (2010) calculated the competitiveness index and explicit comparative advantage index of service trade between China and India, and found that India's international competitiveness of service trade was better than that of China, and China's service trade industry with comparative advantage was less than that of India.

One of the most common ways to predict trade potential is to introduce the trade gravity model. Tinbergen(1962) and Poyhonen(1963) first introduced the gravity model into trade research. Nilsson (2000) and Egger (2002) refer to the ratio of actual bilateral trade volume to trade volume simulated by gravity model as "trade potential". In recent years, many scholars at home and abroad have introduced the model of trade attraction to measure the trade efficiency between countries. Jinzhuigiao (2015) conducted an empirical analysis on the trade potential between China and South Korea by introducing the gravity model, and the research showed that the bilateral trade scale between China and South Korea increased rapidly and the trade potential showed an upward trend. Li yabo (2013) calculated the bilateral trade potential of China and Chile through the gravity model. The paper found that the bilateral trade potential value of China and Chile is around 1, indicating that the bilateral trade potential of the two countries has not been fully developed and there is still room for progress. For gravity model development, domestic related research, some scholars also introduce the Wan Hongxian (2019) of Anhui and extend the gravity of the model by introducing a "neighborhood" all the way along the country's trade potential, empirical analysis, by calculating the potential value of trade between, according to the classifying countries along the trade type, and targeted to give countermeasures of improving trade relations. It can be seen that there are many analyses on the trade potential of bilateral or multilateral countries by introducing the trade gravity model. Therefore, this paper will establish an empirical study on the trade potential of China and India based on the expanded gravity model.

2. An Analysis of the Current Trade Situation between China and India

Analysis of Bilateral Trade Scale 2.1.

This article chooses the United Nations under the trade in goods classification standard of data, from 2008 to 2018 between the two countries trade in goods size were analyzed, and the results show that more than ten for years, bilateral trade has developed rapidly, the trade scale expands unceasingly. Bilateral trade volume increased from us \$51.844 billion in 2008 to us \$95.731 billion in 2018, an increase of 1.85 times and an average annual growth rate of 7.51%. As is shown in Fig.1, the trade volume between China and India showed a downward trend after the financial crisis in 2008, and began to recover after 2009. The bilateral trade volume fluctuated from 2011 to 2016, indicating that the bilateral trade was not stable during this period.



Fig.1 The bilateral trade scale between China and India from 2008-2018

From 2008 to 2018, the growth rate of the total bilateral trade between China and India varied, and even showed a negative growth in 2012. However, China's total exports and imports to India generally showed an upward trend, especially in the past two years. China's exports to India increased from us \$31.585 billion in 2008 to us \$76.881 billion in 2018, with a year-on-year growth of 143.41 percent, while imports declined from us \$20.259 billion to us \$18.85 billion, a year-on-year decline of 6.95 percent. This shows that there is a surplus between China and India, and the gap is getting wider. The total import volume experienced a decline from 2011 to 2016. The reason may be that India has adopted a series of trade protection measures against China, such as export control and quota system, etc. Therefore, it is of great significance to understand the bilateral trade relations between China and India to further solve the trade friction between China and India.

2.2. Distribution of Bilateral Trade Flows

As for the distribution of trade flows between China and India, this paper presents the distribution of trade flows through the trade integration index. The index of trade integration degree is used to study the intensity of trade relations between two countries or regions. The index was originally proposed by Brown (1947) and later modified and improved by Kojima et al. The calculation formula is as follows:

Where, TCDij represents the index of trade integration degree between country i and country j; Xij represents the export from country i to country j; Xi is the total exports of country i; Mj represents total imports of country j; Mw is the world's total import; Similarly, TCDji represents the trade integration index of country j to country i. If the TCD value is less than 1, the trade relationship between the two countries is relatively loose. If the value is greater than 1, the trade relationship is relatively close. Equal to 1 indicates that the trade relationship between the two countries is not and India from 2008 to 2018 is as follows.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TCDij	2.18	2.42	2.29	2.21	1.90	1.96	2.11	2.37	2.56	2.40	2.42
TCDji	1.50	1.58	1.70	1.17	1.02	1.02	0.81	0.71	0.69	0.81	0.92

Table 1. TCD between China and India from 2008 to 2018

Source: United Nations database on trade in goods, calculated by the author.

According to the data in the Tab.1 shows that from 2008 to 2018, China's trade with India TCDij average at around 2.26, each index shows that the trade relationship is relatively close, China as India's largest trade importer, has an important role in the field of trade in India, India to China trade index TCDji spent around 1.08, also means that a certain impact on China's trade in India, each other each other important export countries; The TCD value of China to India is higher than the TCD value of India to China not only from the mean value but also from previous years, indicating that in the bilateral trade between China and India, the Indian side's dependence on China is higher than that of China to India. However, since 2013, the TCD value of India against China has been less than 1, which may be due to the fact that the Indian side has continuously launched anti-dumping investigation against China and adopted export quota and other measures to restrict exports. However, after 2016, there has been an upward trend, indicating that the bilateral trade potential between China and India still has room to expand.

3. Bilater Trade Potential Empirical Analysis between China and India

Handled in the empirical analysis shows that more than a decade in China's and India's bilateral trade scale expands unceasingly, trade links are close, but in recent years, bilateral trade each other started to decline trend, but the two countries' TCD index is stronger, but also showed declining trend in recent years, 2008-2018 China's exports a higher share of India's total capital intensive and technology intensive and other complementary products began to weaken. Based on the above facts, this paper introduces an extended trade gravity model to further investigate the trade potential between China and India.

3.1. Theoretical Model and Variable Selection

Trade gravity model is widely used in analyzing the factors which affect bilateral trade flow, early gravity model mainly explore the import and export countries GDP scale and bilateral factors such as the impact on bilateral traffic geographical position, with the constant improvement of the theory, the model of continuous improvement, and added in the model system of regional economic cooperation and trade, national trade environment, the influence factors such as the common language, and will call to expand the trade gravity model; With this as the background, this paper introduces 8 explanatory variables and constructs the following extended gravity model:

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lnTijt=\alpha 1lnGDPit+\alpha 2lnGDPjt+\alpha 3lnIGDPijt+\alpha 4OPEN+\alpha 5lnDISTij+\alpha 6lnFC+\alpha 7APEC +\alpha 8LANG+\mu ij
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Where, $\alpha 1$ - $\alpha 8$ is the regression coefficient, and uij is the random error; Subscript i represents the exporting country, j represents the importing country, and t represents the year. The meanings, theoretical explanations, data sources and expected effects of specific explanatory variables and explained variables are shown in the following Tab.2.

variable meaning, theoretical explanation .data source								
variable name	variable meaning	theoretical explanation	data source	expected				
lntijt	bilateral trade volume, the logarithm of bilateral trade volume of country i and country j in period t		un comtrade database					
lngdpit	the log of the gdp of country i in period t	the bigger the exporting country's economy, the stronger its supply and demand capacity	the world bank database	positive				
lngdpjt	the log of the gdp of country j in period t	the bigger the importing country's economy, the stronger its supply and demand capacity	the world bank database	positive				
lnigdpijt	the absolute log of the difference in gdp per head	the smaller the value, the greater the likelihood of intra-industry trade between the two parties	the world bank database	negative				
open	the log of the share of imports and exports in a country's gdp	foreign trade dependence of trading partners	the world bank database	positive				
lndistwij	the log of the spherical distance between the capitals of the importing and exporting countries	the greater the distance between the two countries, the higher the cost of trade	cepii database	negative				
fc	did trade take place after the financial crisis (0,1)	the financial crisis as a trade drag will reduce bilateral trade flows	"0" before occurrence, "1" after occurrence.	negative				
APEC	whether the trading parties are members of APEC (0,1)	APEC facilitates trade flows by offering preferential trade policies	"0" without adding, "1" after adding.	positive				
lang	whether the trade parties have common languages	trade partners with a common language are more likely to trade bilaterally	cepiidatabase	positive				

Table 2 .Variable selection

China and India have 126 trading partners (Source: the author collected the data from China national bureau of statistics, India national bureau of statistics and China customs.), given the large number and in some countries, the proportion of total trade volume of trade between the two countries is not high, so this paper selects including India, a total of ten top countries or regions, respectively is the European Union, the United States, Japan, Korea, Germany, Australia, Singapore, Malaysia, Indonesia, the sample observations of 2008-2018, a total of 11 years, 110 valid samples, expand the gravity of a short panel data model.

3.2. Empirical Test and Result Analysis

In this paper, Eviews10 is used to conduct regression analysis on the panel data of 10 trading countries Shared by China and India from 2008 to 2018. The panel data mainly includes mixed regression model, fixed effect model and random effect model. As Tab.3 Mixed regression equation, this paper first observation in the Cross Section and select None option Period, an affirmative coefficient is 0.8573, consider heteroscedasticity phenomena might be individual members of the Cross Section, and modify the model to the weighted after mixed regression model, an affirmative coefficient is 0.9808, eliminate the phenomenon of Cross Section data of different variance and knowable weighted after mixed regression model is better than that of mixed regression model. Secondly, the selection of fixed - effect model and

random - effect model is distinguished. Select Hausman test in the View window, and the P value of the output test result is equal to 0.9560. According to the P value greater than 0.05, the null hypothesis of selecting the random effect model is accepted. Therefore, based on the above analysis, this paper finally adopts the random utility model to conduct regression analysis and test.

Table 2 Empirical regults of hildstoral trade gravity model

	Table 5. Empirical results of bilateral trade gravity model								
	Hybrid regression model	Weighted hybrid regression model	Random effect model						
С	-4.0792(0.2266)	-3.3596(0.0045)	-5.1898(0.0738)						
lnGDP _{it}	0.4403(0.0001)	0.3872(0.0000)	0.3177(0.0000)						
lnGDP _{jt}	0.5291(0.0000)	0.5821(0.0000)	0.7921(0.0000)						
lnIGDP _{ijt}	0.0782(0.0392)	0.0724(0.0042)	-0.0491(0.0078)						
OPEN	0.0075(0.0000)	0.0088(0.0000)	0.0036(0.0000)						
lnDISTW _{ij}	-0.0134(0.7875)	-0.0875(0.0011)	-0.1602(0.5369)						
FC	-0.0720(0.5745)	-0.0394(0.3910)	-0.0394(0.2973)						
APEC	0.7480(0.0000)	0.7667(0.0000)	0.7026(0.0000)						
LANG	-3.2115(0.0000)	-3.8580(0.0000)	-0.2231(0.0000)						
SAMPLES	110	110	110						

Note: in parenthesis is the P value of the corresponding explanatory variable

According to the regression results, the equation is as follows:

lnTijt=0.3177lnGDPi+0.7921lnGDPj-0.0491lnIGDPij+0.00360PEN-0.1602lnDISTij-0.0394FC+0.7026APEC-0.2231LANG-5.1898

Model results show that under 5% significance level, import and export countries GDP scale, the per capita GDP gap between the two countries, the import country opening to the outside world degree, whether joined APEC, whether to have the common language that both six explanatory variables through the test of significance, to illustrate the six variables can better explain the bilateral trade flow; Then observe whether the sign of the explanatory variable is consistent with the expectation. The results of this paper show that the sign direction of other explanatory variables is consistent with the expectation except whether the sign of the common language variable is inconsistent with the expectation. It can be preliminarily considered that whether the two sides have a common language does not affect the trade flow, because English is still the universal language in the world and it is universally applicable in the global scope, so whether the two sides have a common language does not affect the bilateral trade. According to the significance test and the economic significance test of variables:

lnTijt=0.3177lnGDPi+0.7921lnGDPj-0.0491lnIGDPij+0.00360PEN+0.7026APEC-5.1898

Among the five explanatory variables of the selected equation, the factors affecting bilateral trade flow from large to small are the GDP size of the importing country in period t, the accession to APEC, the GDP size of the exporting country in period t, the per capita GDP difference between the two countries in period t, and the degree of openness of the importing country. Under the condition that other variables remain unchanged, the bilateral trade volume between China and the importing country increases by 0.7921% for every 1% increase in GDP of the importing country during t. Whether China and the importing country

join APEC together is 101.90% higher than the trade volume with non-member countries (e $^{0.7026-1} = 1.0190$); In t period, for every 1% increase in the GDP of exporting countries, the bilateral trade between China and the importing countries increased by 0.3177 percent. In this paper, the regression results meet the demand of linde preferences similarity theory [according to linde theory of demand preference similarity, the absolute value of gross national product (GNP) the difference between the two countries is smaller, on behalf of the trade between the two countries demand structure is more similar, the easier to form intraindustry trade], t period between the two countries per capita GDP fell 1%, a 0.0491% increase in the volume of trade between China and the import countries; For every 1% increase in the degree of opening-up of the importing country, the trade volume between China and the trading country increases by 0.0036%. From the above analysis, it can be seen that the factors of distance between the two countries, whether there is a financial crisis, and whether there is a common language have no obvious influence on bilateral trade flow.

3.3. Estimation of Trade Potential between China and India

Another important application of the trade gravity model is to estimate the development potential of bilateral trade between countries by comparing the actual trade volume with the theoretical trade volume simulated by the gravity model. The specific calculation formula is as follows:

Where, TPij refers to the trade potential index between I and j; FTVij is the actual bilateral trade volume; TTVij represents the theoretical bilateral trade volume simulated by gravity model. Based on the extended gravity model, this paper compares the actual trade volume with the theoretical trade volume between China and India, and the results are shown in the following table.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Potential	0.927	0.917	0.922	0.924	0.919	0.917	0.917	0.917	0.914	0.916	0.919
Types	Trade pioneer										

Table 4.China-india bilateral trade potential index and types from 2008 to 2018

According to liu qingfeng and jiang shuzhu (2002) (Liu qing-feng, jiang shu-zhu. China's bilateral trade arrangement from the perspective of trade gravity model [J]. Zhejiang social sciences, 2002 (6) : 17-19.). As for the classification of trade potential, when the trade potential index is greater than 1.2, the bilateral trade type belongs to "potential remodeling". The trade potential of this type of trading partners is nearly saturated, and it is often necessary to find new impetus or factors to promote the further expansion of bilateral trade. When the trade potential index is between 0.8 and 1.2, the type of bilateral trade belongs to "potential, and the bilateral trade scale needs to be further expanded. When the trade potential index is less than 0.8, the type of bilateral trade belongs to the "huge potential type". This type of trade partners has huge trade potential, so we should try our best to eliminate the factors that hinder the development of bilateral trade and provide sufficient space for the development of bilateral trade.

According to the data in the table, the trade potential index between China and India fluctuated around 0.9191 from 2008 to 2018. The type of trade is pioneering, indicating that there is a certain trade potential between the two sides, which can further expand the space of

bilateral trade. From the perspective of the change trend of potential trade index, the downward trend after the two sides since the financial crisis in 2008, but in 2009, began to appear short rise, rise to presents downtrend began in 2011, 2016 minimum value reached more than 10 years, and then began to gradually rise, to 2018, average level of 0.919, which means that China vigorously promote "neighborhood" good policy, encouraging measures such as construction of free trade zone, expand trade between China and India on the space has important meaning to stimuli.

4. Conclusion and Recommendation

This paper mainly studies the trade potential between China and India. Firstly, it analyzes the trade relationship between two countries. In this paper, the degree of trade connection between China and India is also calculated to analyze the degree of trade connection between the two countries. Then introduced to expand the trade gravity model, using panel data to empirical analysis, find out the factors affecting the size of the trade flows between the two countries, finally from the bilateral trade potential estimation results, the potential trade between the two countries in 2008-2018 average in the vicinity of 0.919, which means that the two countries have a certain trade potential, space needs further development of bilateral trade, belong to pioneering business relationship. Based on the above empirical research, this paper proposes the following Suggestions for further releasing the trade potential between China and India.

4.1. Balance the Trade Deficit and Enhance Mutual Political Trust

At present, China has replaced the United States and the united Arab emirates as India's largest trading partner and source of imports. The trade surplus between China and India has grown extremely rapidly, from \$11.326 billion in 2008 to \$58.031 billion in 2018, an increase of 412.34 percent in 11 years. China as a source of India's first big deficit at the same time, this is the direct cause of the Sino-Indian trade friction intensified, or accept from India launched anti-dumping investigation in our country most populous country, a variety of factors unfavorable to the trade both sides, accumulate together, eventually lead to the Indian side to continue to trade with our country holds a negative attitude. Therefore, to balance the trade deficit between the two countries is the basis for building political mutual trust, as well as expressing to the Indian side China's idea of establishing friendly trade relations. Enhance political mutual trust, not only need high-level mutual visits between the two countries, through a series of agreement in order to promote and maintain, also need to the two peoples, from the perspective of culture and the humanities, the correct understanding of the historical problems, increase mutual between civilian personnel flow, enhance political mutual trust between China and India, China and India to promote political and economic relations big step forward.

4.2. Continue to Play a Compartive Advantage and Increase the Infrastructure Investment

At present, the trade between China and India is mainly focused on goods trade. Among them, China mainly exports high-tech manufacturing products such as electronics and electrical products, while India mainly exports primary products and resource-intensive products. In recent years, China's high-tech industry has been developing rapidly, and China's comparative advantage will continue to play its role. This will not only help maintain trade cooperation between China and India, but also promote China to the middle and high end of the global value chain. India as South Asia the first big economies, but there are still insufficient in domestic infrastructure construction, by contrast, China has a comparative advantage in terms of infrastructure and transportation, enlarges to the Indian infrastructure construction, not only can reduce the transportation cost of the freight between, improve the efficiency of trade, more can increase the Indian side on the degree of trust and rely on investment from China.

4.3. Efforts to Improve Bilateral Trade Integration and Encourage India to Join the "One Belt One Road"

Through the empirical analysis, from 2008 to 2018 between the two countries trade tight average spent more than 1, although there is a decrease in the midway phenomenon, but also showed a trend of rising in recent years, the cooperation between China and India appear a new growth opportunity, but India to China's trade index is still spent less than 1, requires joint efforts of the two countries improve bilateral trade each other. On the one hand, the two governments should pay more attention to the negative factors affecting bilateral trade, correctly treat the issues left over from history, face squarely the status of both sides as major trading powers, and choose to join forces to speak up for more developing countries in the world, rather than fight each other to create trade disputes and frictions. Second, the two sides can sign a series of equal and reciprocal agreements through consultation based on the principle of mutual benefit, so as to promote the prosperity and development of bilateral trade. On the other hand, as the only country that covers both land and maritime silk road, India should actively strive to dispel concerns of the Indian side and encourage it to join the One Belt And One Road family at an early date.

4.4. Paly the Rolr of APEC and Look for New Breakthroughs in the Trade Field

APEC is the abbreviation of the Asia-pacific economic cooperation organization, namely by the Asian and Pacific countries of a regional economic organization, its purpose is by reducing the intra-regional trade barriers, to reduce the trade risk, provide members with more freedom and convenient trade environment, so will be whether for APEC members, as one of the factors that affect the bilateral trade flows. As both China and India are members of APEC, they have an obvious advantage in conducting trade. The preferential terms in the organization have reduced the cost and improved the efficiency of bilateral trade. However, it is still limited to play the role of promotion only by relying on the platform. Therefore, it is necessary to find a new breakthrough point on the basis of the organizational platform, so as to give full play to the trade creation and trade transfer effects in the customs union theory, and provide a new starting point for expanding bilateral trade space and exploring bilateral trade potential.

4.5. Build the Bcim Economic Corridor Actively

The bcim economic corridor is a narrow economic belt connecting China and India, the world's two most populous countries, southwest China, northeast India, Myanmar and Bangladesh. The active construction of the economic corridor is of great significance not only to the economic development of the economic belt region and countries, but also to the strengthening of China-India economic relations. Economic corridor core region is rich in natural resources but the complex terrain, roads and railways and other infrastructure conditions is bad, so want to develop economic corridor, we must invest in infrastructure, mentioned before India's infrastructure is weak, so its background of construction of China and India and myanmar meng economic corridor, speed up the construction of China and India, especially India highway, railway, communications and other infrastructure, to promote connectivity between the bilateral trade has a positive meaning.

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