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The Effect of Logistics Performance Index of RCEP Countries on China's Export Trade

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ABSTRACT

The signing of RCEP has created new opportunities for the development of China's export trade, and international logistics capacity is an important factor affecting the conduct of international trade. This paper qualitatively describes and analyzes the LPI index and its sub-indicators of RCEP member countries, and empirically investigates the impact of logistics performance level on China's export trade through an extended gravity model. The study shows that there are large differences in logistics performance levels among RCEP member countries, especially in South Asia, where the quality of logistics infrastructure and customs efficiency are the most lagging behind, which are the key factors pulling down the logistics performance index; the signing of RCEP has effectively promoted China's foreign trade level, but there are great differences in export amounts to different countries, and the logistics performance levels of importing countries and China's export trade are significant positive correlation, the improvement of logistics performance is conducive to promoting China's export trade to RCEP member countries, and from the viewpoint of logistics links, the role of logistics infrastructure quality is the strongest, and the influence of cargo transportation timeliness is the weakest.

KEYWORDS

RCEP; Logistics Performance Index; Export trade; Expansion gravity model

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1. Introduction

On November 15, 2020, the Regional Comprehensive Economic Partnership Agreement (RCEP) was officially signed by the 10 ASEAN members countries and 15 Asia-Pacific countries, including Japan, China, South Korea, New Zealand, and Australia, marking the official departure of the world's largest free trade area in terms of population size, economic and trade scope and development prospects. The "14th Five-Year Plan" proposal clearly proposes to "build a global network of high-standard free trade zones", accelerating the implementation of the free trade zone strategy has become an important element of China's new round of opening up. In 2021, the total amount of China's foreign exports and exports to RCEP member countries increased significantly, indicating that the formal signing of RCEP has promoted the further development of China's foreign trade, and gradually become a very key cooperation mechanism for the new development pattern of double-cycle, providing great help for the formation of a new pattern of China's opening up to the outside world. International logistics as an important factor affecting the formation of international trade or not is an important guarantee for the successful completion of economic exchanges between countries. Logistics performance is a reflection of the logistics level of each country, which will have an important impact on trade exchanges. High logistics performance will enable goods to flow between trading countries at a high speed and low-cost level, providing important support for trade between countries. Therefore, it is significant to study China's export trade with the logistics performance of RCEP countries as the starting point. It is not only able to determine the shortcomings in the logistics construction of each RCEP member country and provide directions for future cooperation construction based on digital economy and new infrastructure background, but also to empirically test the relationship between the logistics performance of each country and China's total exports, and provide targeted countermeasures to promote China's exports to the agreement countries to expand export markets and ultimately promote the common development of RCEP free trade zone.

2. Literature Review

In 2007, the World Bank released the Logistics Performance Index (LPI) for the first time. The LPI involves six sub-indicators, which are scored on a 5-point scale, with higher values resulting in optimal performance. The six sub-indicators are (1) Customs efficiency (Customs); (2) the quality of logistics infrastructure (Infrastructure); (3) international transport convenience (International shipments); (4) logistics service competence (Logistics competence); (5) cargo traceability (Tracking & tracing); (6) cargo transport timeliness (Timeliness). The LPI index is not only an important indicator reflecting the development level of logistics industry in various countries, but also an important indicator reflecting the degree of trade facilitation.

Regarding the relationship between logistics performance and international trade, scholars at home and abroad have conducted more adequate studies. In domestic research, Qin (2022) empirically showed that the synergistic industrial agglomeration and the improvement of logistics performance in countries along the Belt and Road would significantly improve the level of China's foreign trade opening. Wang (2019) also studied the countries and regions along the Belt and Road and found that the higher the level of logistics performance of trade target countries, the more import and export transactions between China and them. Yang et al. (2022) showed that comprehensive logistics performance significantly and positively influenced China's agricultural trade, and ranked first among all influencing factors. Based on an extended gravity model, Shi et al. (2022) found that improved logistics performance significantly contributed to the growth of China's wood forest products exports to the "Belt and Road" partner countries. Hu et al. (2021) showed that the improvement in logistics performance plays a vital and positive role in China's fruit trade with ASEAN. Pang et al. (2020) found that the improvement in the level of logistics performance in Russia will effectively promote the export of China's Greater Tumen River region to it. Feng et al. (2019) specifically studied mechanical transportation equipment and found that the improvement of the level

of logistics performance of countries along the Belt and Road would effectively promote their exports. Hao et al. (2019) used the LPI index as an entry point to construct a trade facilitation measurement system, and the analysis found that the LPI index is representative of the level of trade facilitation. In terms of foreign studies, Jayathilaka et al. (2022) found that the LPI index significantly increased the level of net exports of countries and promoted the development of international trade by studying the relationship between GDP and LPI index and net exports in 142 countries around the world. Suroso (2022) constructed an extended gravity model; the study developed that the LPI index effectively and efficiently promoted the export of palm oil and palm products in Indonesia and Malaysia, indicating that the increase in the level of logistics performance can promote the export of agricultural products. Song and Lee (2022), focusing on the industrial sector in Korea, found that logistics performance plays an important role in international trade from the perspective of industry. In the case of global supply chains, logistics performance is a determinant in facilitating international trade flows and reducing logistics costs. Riadh (2020) studied the factors behind facilitating international trade and found that an increase in the LPI index first reduces transportation costs, which further facilitates trade, as evidenced by a 10% increase in the index, a 30% increase in trade volume in importing countries and a 40% increase in trade volume in exporting countries. Çelebi (2019) found that an increase in the level of logistics performance in partner countries is more conducive to promoting exports than in their own countries. Using structural equation modeling (SEM), Munim and Schramm (2018) found that the logistics performance of 91 countries with seaports had a significant positive relationship with the number of economic transactions in the country. The results of Gani (2017) show that the overall level of logistics performance of a country has a synergistic development with the country's exports.

Some scholars have also conducted studies on the LPI sub-index, Deng et al. (2022) based on an extended gravity model study found that an improvement in any component of the LPI leads to an increase in the country's trade volume and that improved logistics performance has an international trade for importing and exporting countries as well as upper-middle-income and lower-middle-income countries have a positive impact. Dong (2022) analyzed the mechanism of the effect of logistics on cross-border e-commerce export trade using six sub-indicators of the logistics performance index as different dimensions, and the results showed that the improvement of the logistics performance index and its six sub-indicators in RCEP countries can promote the growth of China's cross-border e-commerce export trade to them. Shikur (2022) used GLS regression study using developing countries as a sample and found that all six sub-indicators of LPI positively and significantly determine merchandise exports and imports of goods and services. Suroso (2022) showed that all logistics performance index indicators affect the export of palm oil and palm products in Indonesia and Malaysia, cargo traceability and timeliness of cargo transportation affect the key indicators of Indonesia's palm products exports, while the quality of logistics infrastructure is the key indicator of Malaysia's palm products exports. Górecka et al. (2021) found that all six sub-indicators of the LPI index have a significant effect on exports of liquid energy products. Puertas et al. (2014) used the gravity model to analyze the impact of each sub-indicator of the LPI index on the trade of emerging economies and found that an improvement in any of the LPI index indicators can lead to a significant increase in a country's trade flow. Tao et al. (2020) found that the four indicators that have a significant positive effect on both import and export trade are the ease of arranging competitively priced freight, the ability to track and trace goods, the frequency of goods arriving at the consignee within the scheduled or expected time, and the quality of trade and transport-related infrastructure; the only indicators that have a significant positive effect on The only ones that have a significant positive impact on export trade are the capacity and quality of logistics services, which do not significantly affect import trade, while the efficiency of the customs clearance process does not have a significant impact on either import or export trade. Lu et al. (2020) found that six indicators of infrastructure level, logistics quality and service capacity, cargo traceability, international transportation capacity, customs efficiency, and cargo transportation timeliness have decreasing degrees of influence on logistics performance in CEE and China. Liu et al.

(2018) showed that among the sub-indicators, the indicators of logistics service quality and capacity of the countries along the "Belt and Road" have the strongest role in promoting the export of Chinese electromechanical goods. Yang et al. (2017) analyzed the six sub-indicators of LPI of G20 countries in 2016 and concluded that improving customs efficiency is the most effective way to improve overall logistics performance. Fan et al. (2015) study of the Maritime Silk Road Economic Belt showed that the first of the sub-indicators in terms of the degree of promotion of China's import and export trade was customs efficiency, and the weakest was cargo traceability. The study of Jazairy et al. (2017) showed that improving the timeliness of cargo transportation can significantly promote cross-border trade. Jesus and Hertel (2010,2009) did a study on the importance of LPI sub-indicators and the results showed that among the sub-indicators, the improvement of infrastructure is more beneficial in promoting trade.

In summary, previous studies have shown that international logistics performance plays an important role in the development of international trade, but it varies from country to country and region to region, and different aspects of logistics play different roles. Most of the studies take "Belt and Road" as the research sample, and there is a lack of research on RCEP countries. To better understand the level of logistics performance of RCEP countries, provide suggestions for the future construction of logistics in each country, and promote the further development of China's export trade with the level of logistics performance as an entry point, this paper focuses on the link between China's exports to RCEP countries and the logistics performance of each country.

3. Analysis of The LPI index and the current situation of export trade

3.1. Comparative Analysis of LPI Logistics Performance Index of RCEP Member Countries

Based on the data released by the World Bank, this paper describes and compares the logistics performance status of RCEP countries in 2007, 2010, 2012, 2014, 2016, and 2018, and it should be noted that although Brunei in ASEAN is included in the REPC countries, due to the small economic volume of Brunei, the World Bank did not count the relevant data of Brunei before 2016, to ensure the accuracy of the comparative analysis results, Brunei is not included in the scope of the study. Table 1 shows the LPI index and international ranking of each country. It can be seen that there are significant differences in the logistics LPI indices of the RCEP countries. In terms of the overall LPI index, Singapore ranks 1st among countries in terms of logistics performance level and is also at the top of the global ranking, maintaining an LPI index of 4 and above for six years. Japan is also in the top 10 in the global ranking for all years except 2016 when it was in 12th place, and its index also fluctuates closely around 4 and above. However, other countries do not rank well globally, with significant gaps to Singapore and Japan, especially Laos and Myanmar, both of which are ranked outside the top 100. Individually, however, Myanmar and Laos have a clear trend of improvement in logistics performance levels, from 1.86 and 2.25 in 2007 to 2.3 and 2.7 in 2018, respectively, but are still in the bottom two positions among countries, with much room for improvement. By region, the average value of LPI of ASEAN countries is lower than the average of the remaining five countries in six years, with the difference between the average value of each year at 0.64 and above, and the difference of the total average value reaching 0.702. All ASEAN countries except Singapore are at the back end, especially Indonesia, Philippines, Cambodia, Laos, and Myanmar, where the average value of all six countries is below 3, with obvious disadvantages.

Table 1. Status of logistics performance in RCEP countries.

Country	2007	RA NK	2010	RA NK	2012	RA NK	2014	RA NK	2016	RA NK	2018	RA NK
CHN	3.32	30	3.49	27	3.52	26	3.53	28	3.66	27	3.61	26
JPN	4.02	6	3.97	7	3.93	8	3.91	10	3.97	12	4.03	5
SGP	4.19	1	4.09	2	4.13	1	4.00	5	4.14	5	4.00	7

NZL	3.75	19	3.65	21	3.42	31	3.64	23	3.39	37	3.88	15
AUS	3.79	17	3.84	18	3.73	18	3.81	16	3.79	19	3.75	18
KOR	3.52	25	3.64	23	3.70	21	3.67	21	3.72	24	3.61	25
THA	3.31	31	3.29	35	3.18	38	3.43	35	3.26	45	3.41	32
VNM	2.89	53	2.96	53	3.00	53	3.15	48	2.98	64	3.27	39
MYS	3.48	27	3.44	29	3.49	29	3.59	25	3.43	32	3.22	41
IDN	3.01	43	2.76	75	2.94	59	3.08	53	2.98	63	3.15	46
PHL	2.69	65	3.14	44	3.02	52	3.00	57	2.86	71	2.90	60
LAO	2.25	117	2.46	118	2.50	109	2.39	131	2.07	152	2.70	82
KHM	2.50	81	2.37	129	2.56	101	2.74	83	2.80	72	2.58	98
MMR	1.86	147	2.33	133	2.37	129	2.25	145	2.46	113	2.30	137

There are also differences among the RCEP countries in terms of the mean values of the six sub-indicators of the LPI index. As can be seen in Figure 1, Singapore and Japan have maintained their leading positions in each sub-index, while Laos and Myanmar are lagging. By region, the average values of the six indicators of ASEAN countries are also lower than the remaining five countries, which is consistent with the characteristics shown in the overall LPI. However, for ASEAN countries, their average value of logistics infrastructure quality is the lowest, while the remaining five countries have the lowest international transport facilitation indicators, and the future construction direction differs between the two parties. In the comparison of the mean values of the six indicators, the quality of logistics infrastructure has the largest drop with a difference of 2.169 (Singapore 4.197, Myanmar 2.028); the timeliness of cargo transportation has the smallest difference of 1.595 (Singapore 4.353, Myanmar 2.758), and the construction of logistics infrastructure is a key factor to improve the LPI index and should be paid attention to by countries lagging in performance level. In terms of the fluctuation status of each sub-indicator among countries, all six indicators show a consistent slope to the lower right, indicating that countries on the right side of the axis are at a disadvantage in terms of all six logistics capabilities. The logistics performance level of ASEAN countries other than Singapore needs to be enhanced in many ways.

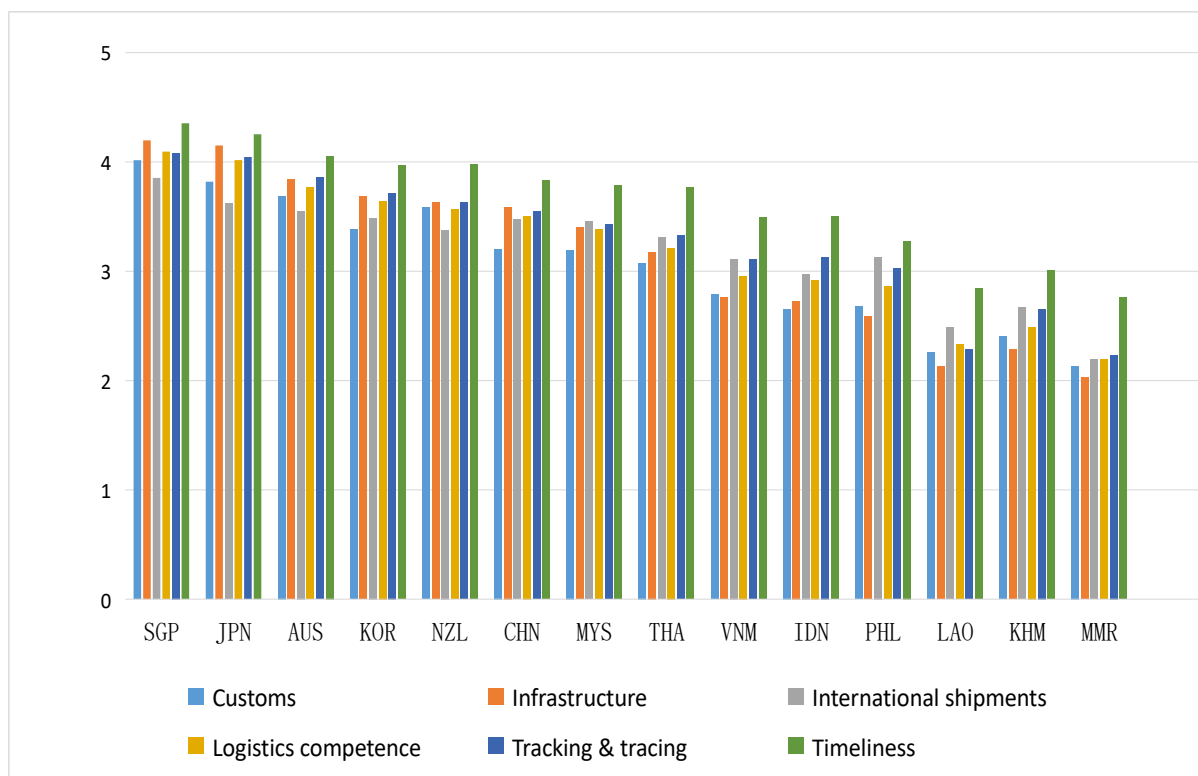


Figure 1. Average value of LPI sub-index for RCEP countries.

3.2. Comparative Analysis of LPI Logistics Performance Index of RCEP Member Countries

Export trade is an important factor to drive China's economic growth, and RCEP countries have been important trade partners of China. In this paper, the export value of China to each RCEP member country and the total export value to the world from 2007 to 2021 are selected for comparative analysis. As shown in Figure 2, export value to the world indicates the total export value of China in that year, export value to RCEP countries indicates the total export value of China to RCEP member countries in that year, and percentage indicates the ratio of the export value of China to other RCEP countries to the total export value, increase speed (world) and increase speed (RCEP) denote the growth rate of China's total exports and exports to RCEP member countries respectively. It can be seen that China's total exports to each member country from 2007 to 2021 have an obvious upward trend, reaching the highest amount of \$873.145 billion in 2021, an increase of \$599.774 billion compared with 2007. The ratio of my exports to other RCEP countries to total exports is above 20%, reaching a maximum of 26.97% in 2019 and 2020, and declining by 1% in 2021, but still an upward trend overall. 2021 China's total exports as well as exports to RCEP member countries and their growth rates show a significant growth trend, indicating that the signing of RECP at the end of 2020 effectively promotes the level of China's foreign trade. In addition, Table 3 gives the total export value of China to each RCEP member country and its share from 2007 to 2021, which shows that the total export value of China to RCEP countries from 2007 to 2021 is \$777.312 billion. Among them, exports to Japan are the highest at \$203.725 billion, accounting for 26.2% of all countries. Japan and South Korea's total imports amounted to \$3,431,080 million, accounting for 44.15% of the total exports to the RCEP countries, nearly half of China's total exports. Cambodia, New Zealand, Laos, Myanmar, and Brunei all have a relatively lower share, with a combined total of \$266.652 billion for the five countries, accounting for only 3.43%. Thus, it can be seen that in the RCEP countries, there is a great difference in China's total exports, and the export market has not been fully opened.

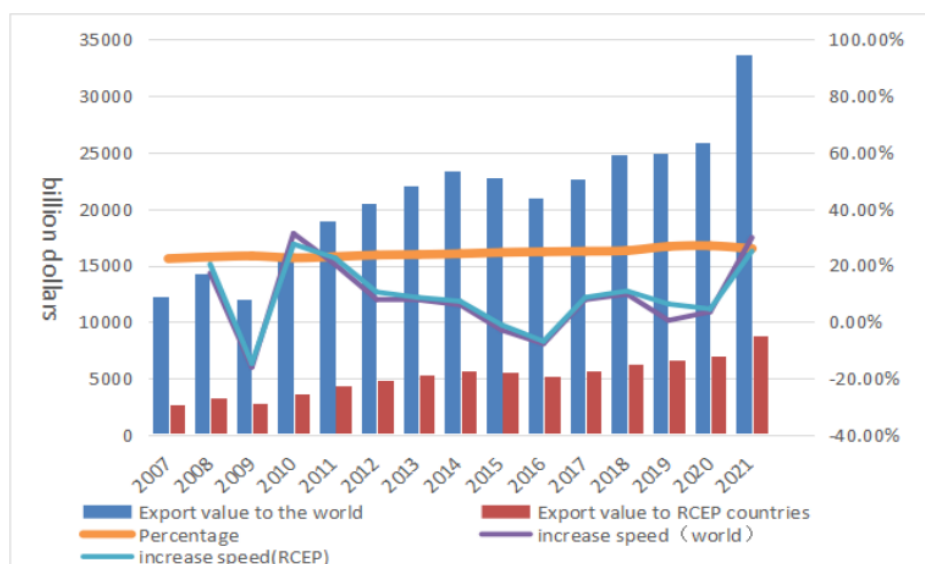


Figure 2. Annual export value and share of China's exports to RCEP by country, 2007-2018.

Table 2. China's total exports to each RCEP member country from 2007-2021 and its share.

	Total exports 2007-2021 (billion dollars)	Percentage
JPN	18716.03	26.87%
KOR	12448.07	17.87%
VNM	7363.29	10.57%
SGP	5986.53	8.60%

AUS	5709	8.20%
MYS	5165.01	7.42%
THA	4376.08	6.28%
IDN	4370.97	6.28%
PHL	3173.69	4.56%
MMR	988.10	1.42%
NZL	583.38	0.84%
KHM	504.60	0.72%
LAO	146.22	0.21%
BRN	114.63	0.16%

4. Empirical analysis

4.1. Empirical strategy

The gravity model is one of the important tools to study international trade issues, used to explore the impact of the economic size (GDP) of the two trading countries, and the distance between countries on the trade of one of them, was first used by economists Tinbergen and Pöyhönen to analyze the impact factors of international trade, and the basic equation of the gravity model is $\ln Trade_{it} = c_0 + c_1 \ln GDP_{it} + c_2 \ln GDP_{ct} + c_4 Distwces_{it} + u_{it}$. In this paper, on top of the basic gravity model, drawing on the ideas of Fan (2015), we add the logistics performance index LPI, the population size of importing countries, and the presence or absence of border control variables among trading countries to study the impact of logistics performance on China's export trade, and the extended model constructed is as follows:

$$\ln exp_{cit} = \alpha_0 + \alpha_1 \ln GDP_{ci} + \alpha_2 \ln GDP_{it} + \alpha_3 \ln dis_{ci} + \alpha_4 LPI_{it} + \alpha_5 bor_{ci} + \alpha_6 \ln peo_{it} + \varepsilon_{it} \quad (1)$$

Where exp_{cit} represents the export value of China to country i in year t , GDP_{ct} is the total GDP of China in year t , then GDP_{it} is the total GDP of importing country i in year t , dis_{it} represents the distance between importing country i and China, measured by the distance between the two capitals, LPI_{it} represents the level of logistics performance of importing country i in year t , bor_{it} represents the presence or absence of border between China and importing country i , then peo_{it} represents the population size of importing country i in year t , ε_{it} is the random disturbance term. The LPI index can be divided into six sub-indices, which can be used to study the role of different logistics links in export trade generation. Therefore, the LPI variables in the model (1) can be further substituted by six sub-indices. cus_{it} represents the customs efficiency of importing country i in year t ; inf_{it} represents the quality of logistics infrastructure, shi_{it} denotes international transport facilitation; com_{it} is logistics service capacity; tra_{it} represents cargo traceability; then tim_{it} is the cargo transport timeliness.

4.2. Data and variable selection

In this paper, to conduct a study on China's export trade, since the World Bank has only published LPI indexes for six years, 2007, 2010, 2012, 2014, 2016, and 2018, and Brunei has only published two years, this paper selects China's export value to 13 countries of RCEP except for Brunei during 2007-2018 as the dependent variable, and the data are obtained from UN COMTRADE;¹ the level of logistics performance (LPI) and its sub-indicators are selected as the core independent variables, and since only six years of data are available, this study substitutes the data of unpublished years with similar years, i.e., 2008 is substituted with 2007, 2009 is substituted with 2010, 2011 was replaced with 2012, 2013 with 2014, 2015 with 2016, and 2017 with 2018. Data are from the World Bank.² Also, the model adds distance, GDP of the importing country, GDP of the exporting country, and population

¹ <https://comtrade.un.org/>

² <https://www.worldbank.org/en/home>

size of the importing country as control variables, and all data are logarithmically processed. In addition, this study adds the dummy variable of the presence or absence of borders between trading countries, which is taken as 0 if the importing country i does not have a border with China, otherwise it is taken as 1. Data are obtained from the World Bank and CEPII databases was obtained.³

The results of the descriptive statistical analysis of the main variables are given in Table 3, which shows that there are large differences in China's exports to RECP countries and the economic size, LPI index, population size, and trade distance between countries. In terms of economic size, Japan's total GDP in 2013 was as high as USD 62,943,395 million, more than 620 times the total GDP of Laos of USD 10,149 million in the same year. In terms of population, Indonesia's population size of 268,940,000 in 2018 is 2.8 times larger than Singapore's total population (3,751,800,000) in the same period. In terms of bilateral trade, the closest distance between RECP countries and China is South Korea (955.65 km) and the farthest is New Zealand (11,040.99 km). In terms of LPI, there is a huge disparity between the best-performing Singapore and the worst-performing Myanmar, and the development potential of international trade needs to be further developed.

Table 3. Description of the statistical characteristics of the main variables.

	Mean	Standard deviation	Min	Max	Obs
Expctit(Billions of dollars)	353.89	374.17	1.79	1510.2	156
GDPit(Billions of dollars)	7922.28	13693.84	42.09	93943.95	156
GDPct(Billions of dollars)	86593.44	31673.2	35596.41	138690.5	156
Peoit(million people)	6301.10	6619.88	423.97	26894.03	156
Disit(Kilometers)	4232.5	2724.58	955.65	11041	156
LPIit	3.23	0.58	1.86	4.19	156
cusit	3.05	0.62	1.85	4.18	156
infit	3.12	0.75	1.69	4.28	156
shiit	3.17	0.5	1.73	4.03	156
comit	3.18	0.62	2	4.21	156
trait	3.27	0.62	1.57	4.24	156
timit	3.62	0.54	2.08	4.53	156

4.3. Analysis of empirical results

4.3.1. Baseline results

The generalized least squares (GLS) method is used for estimation because of the between-group heteroskedasticity (Modified Wald Statistic: Prob > chi2 = 0.0000) and cross-sectional correlation (Pesaran Test: Pr = 0.0000) problems of the model. In this study, two variables from the basic gravity model (economic size and mutual distance between two countries) are first selected for regression, and then new explanatory variables are gradually introduced for regression, and the results are shown in Table 4. From the regression results, with the addition of the LPI index, the impact of the two indicators of economic size and trade distance of importing countries on China's export trade becomes smaller, indicating that the improvement of logistics performance offsets the transportation cost brought by trade distance to a certain extent and promotes the trade facilitation process, while the smaller regression coefficient of the economic size of importing countries indicates that logistics performance plays a key role in promoting China's export trade to other RECP countries. The regression coefficients of the population size of importing countries and the dummy variable of whether they have a border with China are positive and pass the 5% significance level test, which also plays a positive role in promoting China's export cross-border trade.

³ http://cepii.fr/cepii/en/bdd_modele/bdd_modele.asp

Table 4. Regression results of LPI index on China's export trade.

expcit	Basic gravitational model		Extended Gravity Model	
		lnpeoit	borit	LPIit
lnGdpit	0.75*** (859.1)	0.74*** (259.96)	0.74*** (251.48)	0.14*** (10.34)
lnGdpct	0.55*** (195.06)	0.55*** (199.25)	0.55*** (199.44)	0.73*** (90.64)
disit	-0.51*** (-137.22)	-0.4817*** (9.27)	-0.48*** (-90.30)	-0.38*** (-34.94)
lnpeoit			0.04*** (9.28)	0.55*** (53.20)
borit			0.004 (0.745)	0.25*** (12.19)
LPIit				1.72*** (52.69)
cons	-2.77*** (-59.84)	-2.89*** (-61.15)	-2.89*** (-51.63)	-6.13*** (-43.09)
Obs	156	156	156	156

Notes: *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively; standard errors are displayed in parentheses. In addition, this paper uses GLS regression to correct the heteroskedasticity in the model, and the goodness of fit R2 becomes unreasonable, so R2 is not reported in the results.

4.3.2. LPI sub-index regression

Table 5 shows the regression results of LPI sub-indices on China's export trade, the sign of the coefficients of each variable does not produce any change and they all pass the significance test, which is consistent with the previous findings, indicating that the regression models and methods are appropriate. From the results, it can be seen that all sub-indices have a significant positive impact on China's export trade, and the effect is the largest among all variables that play a positive role. Among the sub-indices, the quality of logistics infrastructure in the importing country has the strongest effect on China's export trade, while the others are logistics service capacity, customs efficiency, international transport convenience, cargo traceability, and the weakest effect is the timeliness of cargo transportation. Therefore, the improvement of any aspect of logistics can promote the development of China's export trade, especially the improvement of the quality of logistics infrastructure. Relative to the overall index, the coefficients of each sub-index have decreased, indicating that the single role of each link of logistics is weaker than the overall level of improvement.

Table 5. Regression results of LPI sub-indicators on China's export trade.

Variables	cusit	infit	shiit	comit	trait	timit
lnGdpit	0.28*** (35.12)	0.11*** (25.01)	0.46*** (59.79)	0.24*** (24.93)	0.37*** (40.66)	0.45*** (40.53)
lnGdpct	0.66*** (43.92)	0.66*** (112.15)	0.66*** (45.87)	0.7*** (52.31)	0.64*** (81.77)	0.7*** (75.06)
disit	-0.45*** (-54.22)	-0.35*** (-119.82)	-0.41*** (-29.33)	-0.38*** (-30.19)	-0.44*** (-46.15)	-0.46*** (-61.35)
peoit	0.48*** (49.81)	0.60*** (140.68)	0.27*** (35.47)	0.47*** (56.65)	0.31*** (40.59)	0.26*** (30.98)
borit	0.08*** (1.65)	0.14*** (9.98)	0.28*** (6.03)	0.15*** (8.29)	0.21*** (13.36)	0.09*** (6.6)
cusit	1.22*** (55.40)					
infit		1.35***				

		131.93)				
shiit			1.09*** (41.62)			
comit				1.31*** (71.43)		
trait					1.04*** (46.15)	
timit						0.90*** (39.17)
cons	-4.07*** (-19.85)	-3.99*** (-26.56)	-5.97*** (-28.96)	-5.31*** (-27.51)	-4.64*** (-32.45)	-5.59*** (-40.94)
Obs	156	156	156	156	156	156

Notes: *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively; standard errors are displayed in parentheses. In addition, this paper uses GLS regression to correct the heteroskedasticity in the model, and the goodness of fit R2 becomes unreasonable, so R2 is not reported in the results.

5. Conclusions and Recommendations

China's export trade potential with RCEP countries is huge, and the improvement of the logistics performance level of each country will further promote international trade activities. By studying the role of the logistics performance level of RCEP countries on China's export trade, this paper provides targeted suggestions for the exploration and development of China's international market, and the conclusions and suggestions are as follows.

First, there are obvious differences in the logistics performance levels of RCEP member countries, and overall, Singapore has the highest logistics performance level and Myanmar has the lowest. On the whole, the logistics level of ASEAN countries lags behind that of the other five countries. The sub-indicators also reflect the same characteristics as the overall LPI indicators, indicating that countries with lagging logistics performance levels need to further improve their development levels in all aspects of logistics. The signing of the RCEP agreement has provided convenient conditions for cooperation among countries, and countries with lagging logistics performance levels can improve their logistics capabilities through exchanges and cooperation with Singapore and Japan, while countries with high logistics performance levels can also take the initiative to share their own experience, especially to pay attention to the development of ASEAN countries, the overall level of RCEP logistics performance is mainly pulled down by ASEAN countries other than Singapore. In addition, China's logistics performance level also still has a lot of room for improvement, especially in the customs efficiency, and Singapore's biggest gap should improve the procedures, from the simplification of the approval procedures to improve the efficiency of the work, speeding up the inspection procedures, improve the speed of goods out of the transport.

Second, the level of logistics performance of RCEP countries is directly proportional to the amount of China's export trade. the total LPI indicator and its six sub-indicators all show a significant positive impact on China's export trade and have the highest importance among all the factors that affect exports. The population size and the GDP of the importing and exporting countries, although they also drive exports, are difficult to control relative to the level of logistics performance. Therefore, in order to expand international markets and enhance economic relations with other RCEP member countries, China should actively assist countries with low levels of logistics performance development to improve their logistics capabilities and make full use of policies and tools such as new infrastructure and digital economy to help lagging countries to build and provide their own experience in all aspects of logistics. Logistics improvement is the main focus, supplemented by other aspects, in order to effectively promote the progress of China's export trade. In addition, this also provides ideas for China's own construction, China is in the last place in the level of logistics performance in countries other than ASEAN, so we should effectively use the RCEP agreement, while actively learning from the experience of Singapore, and Japan and other countries in logistics

construction, but also to seize the opportunity of the development of the domestic digital economy, through the use of big data, blockchain and other new digital technologies to further promote the improvement of logistics performance level.

Third, among the six sub-indicators of LPI, the improvement of logistics infrastructure quality is the most beneficial. There is a difference in the size of the positive effect of the six sub-indicators on China's export trade, with the improvement in the quality of logistics infrastructure being the most beneficial to the promotion of export trade and the timeliness of cargo transportation playing the smallest role. However, from the current situation, the quality of infrastructure in each RCEP member country is at a low level among the six indicators, while the timeliness of cargo transportation is at a high level. Most of the ASEAN countries are limited by factors such as the degree of economic development, and the construction of various infrastructure facilities is relatively backward. In the future, countries should focus on infrastructure construction, while taking into account the development of other links, and make full use of the RCEP agreement to improve the quality of infrastructure through their own research and development as well as exchange and collaboration to achieve an overall improvement in logistics and promote more trade transactions. On the one hand, China should make full use of AIIB and other organizations to provide assistance to ASEAN countries in the construction of highways, railroads, warehouses, logistics information technology, etc. On the other hand, we should actively accelerate the construction of new infrastructure and further promote the process of informationization and digitalization of logistics infrastructure, so as to improve the overall logistics performance of RCEP countries and achieve high-quality development of export trade at the same time.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

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