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A Comparative Study on the Export Potential of the Digital Service Trade between China and Korea: Based on RCEP Country Data*

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Abstract

Purpose – The digital service trade has become an important driver of the global service trade. The main purpose of this study is to explore the influencing factors of digital service exports from China and Korea to RCEP sample countries respectively, and to comprehensively study the export potential of China and Korea to RCEP countries, so as to provide theoretical guidance and a decision-making reference to promote digital service trade exports and digital economy development in China and Korea.

Design/methodology – First, the stochastic frontier gravity model was improved by introducing non-efficiency factors affecting digital services trade, extending the gravity model of traditional services trade exports to digital services trade exports. Secondly, the panel data of China and Korea for the eight sample countries of RCEP from 2011 to 2021 were adopted for the empirical analysis of digital service export potential by a stochastic frontier model.

Findings – China's economic growth plays a role in increasing China's digital service trade exports, while Korea's economic growth does not play a significant role in increasing Korea's digital service trade exports. However, the economic growth of trading partner countries can play a significant role in boosting the digital service trade in both China and Korea, and comparison shows that Korea has higher resilience in the digital services trade than China. In addition, the market size of target countries plays a positive role in promoting the digital service trade exports of both China and Korea, and the increase in the value-added share of services in target countries will lead to a decrease in the digital service trade exports of both China and Korea.

Originality/value – This study is innovative in terms of research perspective and method. Academic research on the export potential of international trade has been extensive, but most studies are based on the perspective of the goods trade, fewer studies are based on the perspective of the service trade, and there are almost no studies based on the perspective of digital service trade. There is a gap based on the comparative analysis of the export potential of the digital service trade between China and Korea. This study extends the gravitational model of traditional service trade exports to digital service trade exports to comparatively analyze the export potential of China and Korea to RCEP countries. This study addresses this limitation by analyzing a comparative analysis of the digital service trade export potential of China and Korea.

Keywords: Digital Service Trade, Export Potential, RCEP
JEL Classifications: D12, F14, O53

1. Introduction

At present, along with the unfolding of the fourth industrial revolution, the rise of big data,

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cloud computing, and other digital technology promotes the transformation of economic and social development, and also leads to a new era of international trade characteristics. Digital trade has increasingly become a new mode of international trade, and has caused widespread concern around the world. The global spread of COVID-19 has also "accidentally" promoted the further extension of the application of digital technology; digital trade is accelerating the development of global trade in the direction of services. The digital service trade is increasingly becoming an important driver of the service trade.

China's total service trade fell 15.7% year-on-year in 2020, while trade in digital "knowledge-intensive" services grew 8.3% year-on-year against the trend, accounting for 44.5% of total service imports and exports, an increase of 9.9 percentage points, showing strong growth. Korea's total digital service trade grew from $59.186 billion in 2011 to $119.807 billion in 2021, with an average annual growth rate of 10.24%. It can be expected that the digital service trade will become the main driving force leading the innovative development of the service trade between China and Korea in the future. In recent years, the rise of counter-globalization and trade protectionism has impacted global economic and trade development. In an era of global power competition, trade friction between China and the United States has shown a long-term trend, and the WTO dispute settlement mechanism has gradually become paralyzed. Further, the COVID-19 epidemic in 2020 again disrupted trade and economic exchange between nations.

Korea is China's fifth largest trading partner, while China is Korea's largest trading partner. The entry into force of the RCEP will inject more vitality into China-Japan-ROK economic and trade cooperation. With the help of the RCEP framework, China and the ROK have experimented with free trade in tariff reduction, market access, and regional supply chains, providing an integrated institutional framework for China-ROK economic and trade cooperation.

However, academic research on the export potential of international trade has been extensive, but most studies are based on the perspective of the goods trade, fewer studies are based on the perspective of service trade, and there are almost no studies based on the perspective of digital service trade. The comparative analysis based on the export potential of the digital service trade between China and Korea has not been performed.

Therefore, this study, based on data of RCEP sample countries, uses a stochastic frontier gravity model to comprehensively evaluate the export potential of China and Korea to RCEP countries. It analyzes the current situation of digital service trade development in China and Korea separately, and analyzes the export potential of digital service trade from China and Korea to RCEP countries separately, so as to improve the statistical classification of relevant data between China and Korea, and provide data support for the development of digital service trade. This will provide theoretical guidance and decision-making reference to promote digital service trade exports and digital economic development in China and Korea, which will lay a solid foundation for trade cooperation and regional economic integration development between China and Korea and RCEP countries.

2. Literature Review

As a new stage and field of trade development, the digital service trade has received extensive attention from scholars in recent years. The literature on digital service trade can be viewed from three elements.

One is research on the restrictive index of the digital service trade. Ferencz (2019) proposed a digital service trade restrictiveness index based on the service trade restrictiveness index. Wang Tuo (2019) used the digital service trade restrictiveness index as a clue for policy analysis, and found a trend of increasing restrictive measures for digital service trade protection across countries. Meng Xia (2020), Zhou Nian-Li, and Yao Ting-Ting (2021) conducted an empirical study using the digital service trade restrictiveness index, and found that an increase in protective restrictive measures would largely hinder the import and export of digital services, with a more significant impact on exports compared to imports.

Second is an analysis of digital service trade rules included in regional trade agreements (RTA). Han Jian, Cai Ji-Wei, and Xu Ya-Yun (2019) found that countries with similar economies in terms of size and development were more likely to sign agreements that included digital trade provisions, while countries with large differences in Internet penetration and openness were less likely to sign agreements on digital trade provisions. Zhou Nian-Li and Li Yu-Hao (2021) found that RTAs containing IPR protection provisions could significantly promote the digital service exports of the parties. Peng Yu, Yang Bi-Zhou, and Shen Yu-Liang (2021) argued that the depth of digital trade provision rules in RTAs could have a significant positive impact on the parties' digital service trade exports (Zhou Sheng-Qi and Zhang Hao-Yu, 2021).

Third is a comparative analysis of the digital service trade between China and Korea. Feng Zhen and Zhang Ming-Ming (2022) compared the international competitiveness of the digital services trade between Korea and China. Gong Wen-Chao, Li Kan-Yong, and Wang Wen-Xia (2022) performed a stochastic frontier analysis of trade efficiency for Sino-Korea trade. Wang Xin-Yue (2022) undertook research on the efficiency and influencing factors of Korea's foreign direct investment in RCEP partners.

The above literature studies show that research on digital service trade focuses on the impact of trade rule governance on digital service exports, with comparative analysis of the digital service trade between China and Korea. However, the academic community has not yet made an analytical study on the export potential of the digital service trade based on RCEP country data. In this study, the stochastic gravity model was modified to extend the gravity model of traditional service trade exports to digital service trade exports by introducing non-efficiency factors that affect the digital service trade in order to analyze the digital service trade data between China, Korea, and RCEP countries from 2011-2021, explore the influencing factors of digital service exports from China and Korea to RCEP countries, respectively, and to make a comprehensive study of the export potential of China and Korea to RCEP countries.

3. The Status of the Development of the Digital Service Trade of China and Korea

3.1. Scale of the Digital Service Trade

With the accelerated integration of digital technology into the services trade, China's digital services trade is developing at a rapid pace and expanding in scale. Specifically, China's total digital services trade grew from $164.838 billion in 2011 to $359.690 billion in 2021, with an average annual growth rate of 11.82%. Among these, digital services exports grew from $75.007 billion in 2011 to $194.845 billion in 2021, with an average annual growth rate of

15.98%. Digital service imports grew from $89.831 billion in 2011 to $164.845 billion in 2021, with an average annual growth rate of 8.35%. In addition, as the overall scale of digital services trade continued to expand, the proportion of China's digital services trade in total services trade gradually increased from 36.72% in 2011 to 43.15% in 2021. Similarly, Korea's total digital services trade grew from $59.186 billion in 2011 to $119.807 billion in 2021, with an average annual growth rate of 10.24%. Among these, digital service exports grew from $21.880 billion in 2011 to $54.218 billion in 2021, with an average annual growth rate of 14.78%, and digital service imports grew from $37.306 billion in 2011 to $65.589 billion in 2021, with an average annual growth rate of 7.58%. In addition, with the continuous expansion of the overall scale of digital service trade, the proportion of Korea's digital service trade in the total service trade has gradually increased from 30.64% in 2011 to 47.95% in 2021. This indicates that the digital delivery level of the service trade is constantly improving, and the degree of digitalization is also increasing.

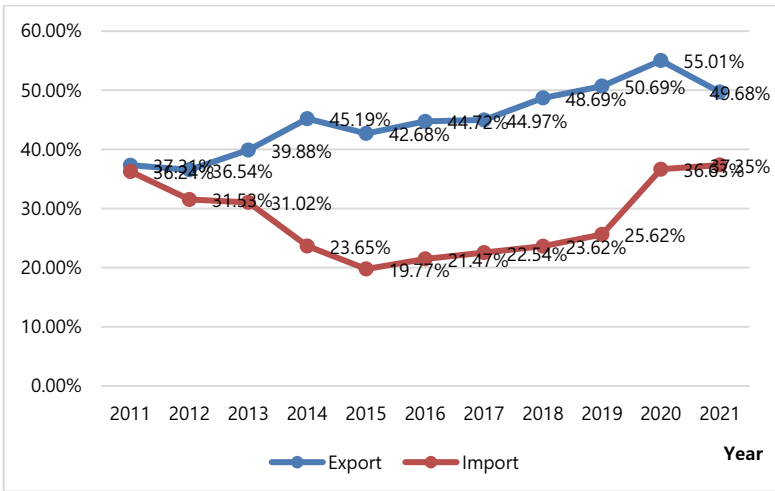
There are several reasons for the rapid development and expanding scale of digital service trade. First, the continuous integration of digital technology and the service trade has promoted a “tradable revolution” in services, making previously non-tradable services available across borders, and making the cross-border provision of previously tradable services more convenient. Secondly, with the strengthening of the trend of servitization in the global economy, the role of services in the value-added process of the supply chain has come to the fore, making the transnational supply and demand matching of services increasingly active. Third, the prevalence of regional trade agreements has accelerated the liberalization of trade in services (Zhu Fu-lin, 2021).

3.2. The Proportion of Import and Export of Digital Service Trade

The proportion of China's digital service imports and exports shows a significant " < " trend, and the proportion of digital service trade exports is always higher than that of digital service trade imports. Since 2011, the proportion of China's export of digital service has generally shown an upward trend, while the proportion of the imports of digital services has shown a downward — upward trend. In 2011, China's digital service trade export accounted for 37.31% of total service trade exports, while digital service trade imports accounted for 36.24% of total service trade imports in the same period, with the former being only 1.07 percentage points higher than the latter. The digitalization of China's service trade exports has performed quite well. Since 2011, the proportion of China's digital service trade exports in total service trade exports has been steadily increasing in general, reaching 49.68% in 2021, an increase of 12.37 percentage points from 2011. The digitization of China's service trade import reached its lowest point in 2015, with 2015 as the dividing line, with a downward trend before 2015. and an upward trend after 2015, rising to the same level as in 2011 by 2020. Currently, the proportion of China's digital service trade exports is only 12.33 percentage points higher than imports, which is much lower than the 25.07 percentage points in 2019. Fig. 1., details the proportion of China's digital service trade in imports and exports (2011-2021).

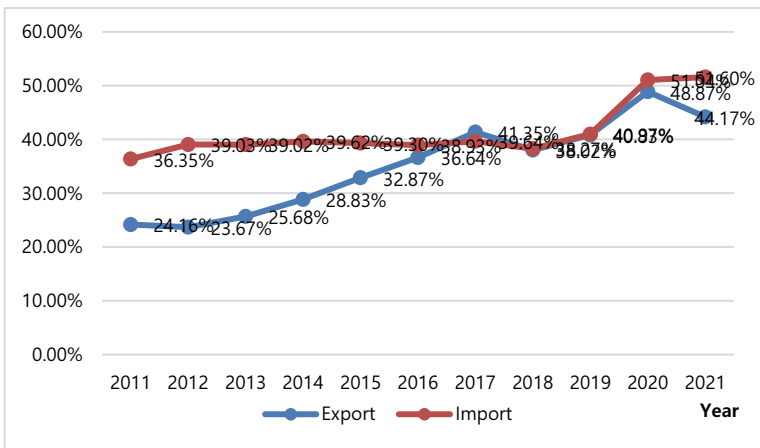
The proportion of Korea's digital service imports and exports shows a significant horizontal "Y" trend, with the first phase from 2011 to 2017, in which the import share of the digital service trade is higher than exports. In 2011, Korea's digital service trade exports accounted for 24.16% of total service trade exports, while digital service trade imports accounted for

Fig. 1. Proportion of China's Digital Service Trade in Imports and Exports (2011-2021)



Source: UNCTAD.https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx, on October 15, 2022.

Fig. 2. Proportion of Korea's Digital Service Trade in Imports and Exports (2011-2021)



Source: UNCTAD.https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx, on October 15, 2022.

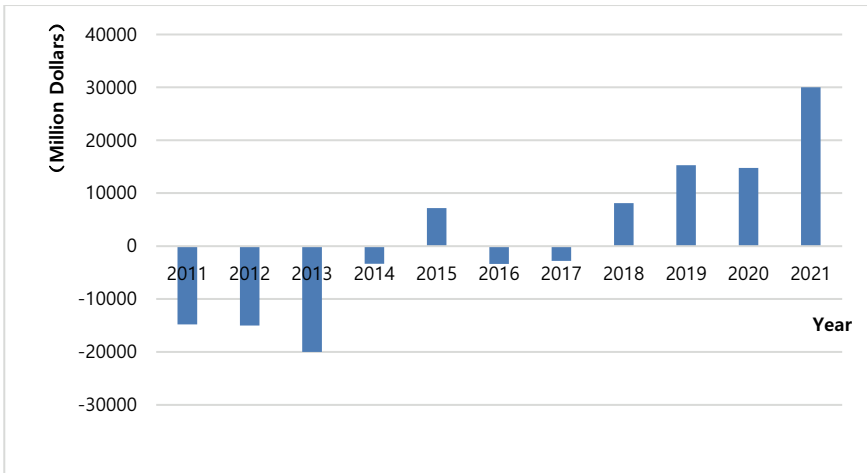
36.35% of total service trade imports in the same period, with imports 12.19 percentage points higher than exports, indicating that the degree of digitization of service trade exports was much lower than that of service trade imports at that time. However, since the crossover point in 2017, the overall share of both imports and exports in Korea's digital service trade were on the rise, and it increased at the same rate. Currently, the proportion of Korea's digital service

trade imports is slightly higher than the proportion of digital service trade exports, and imports were 7.43 percentage points higher than exports in 2021. Since 2011, the proportion of Korea's digital service trade imports and exports in total service trade imports and exports has generally shown a steady upward trend. In 2021, the proportion of digital service trade imports reached 51.60%, 15.25 percentage points higher than in 2011, and the proportion of exports reached 44.17%, 20.01 percentage points higher than in 2011. Fig. 2. Shows the proportion of Korea's digital service trade in imports and exports (2011-2021).

3.3. Digital Service Trade Balance Status

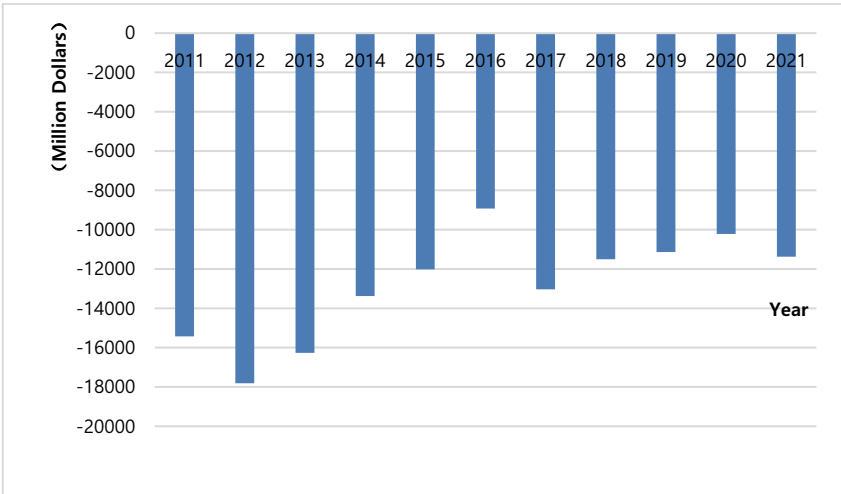
In general, China's digital service trade balance showed a negative and then positive situation. From 2011 to 2017, China's digital service trade was dominated by a deficit state, and from 2011 to 2013, the digital service trade deficit was larger. Among these, the deficit reached the largest amount in 2013 ($20.01 billion). After 2013, China's digital service trade deficit began to narrow, with a significant decline in 2014 ($3,345 million) compared to 2013 ($20,001 million), a surplus for the first time in 2015 ($7,185 million), a return to deficit from 2016 to 2017, a surplus again in 2018 ($8.102 billion) continuing on to 2021 (to $30.00 billion), an increase of 270.03% year-on-year. This can be seen in Fig. 3. detailing China's digital service trade balance status (2011-2021).

Fig. 3. China's Digital Service Trade Balance Status (2011-2021)



Overall, Korea's digital service trade balance showed a continuous decrease in the deficit, with the deficit reaching a maximum in 2012 ($17.814 billion). After 2012, Korea's digital service trade deficit began to enter a period of decline, with a significant decrease in the deficit in 2016 ($8.926 billion) compared to 2012 ($17.814 billion). There was a rebound in 2017 with an increase in the deficit, after which the deficit declined slowly again. The deficit declined insignificantly in 2017 ($13.036 billion) as compared to 2020 ($10.217 billion) and rebounded again in 2021 ($11.371 billion). This can be seen in Fig. 4. showing Korea's digital service trade balance status (2011-2021).

Fig. 4. Korea's Digital Service Trade Balance Status (2011-2021)



4. Model Construction, Variable Selection, and Data Sources

4.1. Theoretical Model

4.1.1. Stochastic Frontier Gravity Model

The gravity model is an important tool to measure trade potential, but the traditional gravity model only considers traditional geographical and other factors, combines all unmeasurable trade impediments into the perturbation term, assumes that the expectation of the perturbation term is 0, and that the measured trade potential is actually the average value of the influencing factors, not the optimal value expressed by the potential. At the same time, it will cause the omission of important variables and other problems, such that the estimation of trade potential is biased, and it is not in line with the development trend of the digital service trade.

The stochastic frontier gravity model overcomes the defect of the traditional gravity model by introducing an inefficiency term and reducing the estimation error of trade potential. Therefore, the stochastic frontier gravity model was adopted in this study. The general form of the stochastic frontier gravity model is:

$$Ex_{ijt} = f(x_{ijt}, \beta)\, exp(v_{ijt})\, exp(-u_{ijt}), u_{ijt} \geq 0 \quad (1)$$

$$lnEx_{ijt} = ln(x_{ijt,}\beta) + v_{ijt} - u_{ijt} \quad (2)$$

Eq. (2) is obtained by taking the logarithm of Eq. (1), where i is the exporting country, j is the importing country, and Ex_{ijt} is the actual export level of country i to country j at period t. x_{ijt} are naturally observable factors (including the size of the economy, the size of the population, and the geographical distance, and others) that affect the level of exports in the

two countries. β is the parameter to be estimated, and $v_{ijt} - u_{ijt}$ is a composite error term, where v_{ijt} is a random error term indicating the various types of influences that are unpredictably generated in the export. u_{ijt} is the inefficiency term, which represents the artificially caused trade resistance factor; due to the interference of various types of human factors, usually the actual export level cannot reach the maximum export level, and to measure the efficiency loss caused by human factors, Equation (4) is proposed:

$$Ex_{ijt}{}' = f(x_{ijt}, \beta)\, exp(v_{ijt}) \tag{3}$$

$$TE_{ijt} = Ex_{ijt}/Ex_{ijt}{}' = exp(-u_{ijt}) \tag{4}$$

wherein $Ex_{ijt}^{'}$ is the maximum export value that can be achieved in the absence of trade resistance ($u_{ijt} = 0$,) the trade potential. In Equation (4), TE_{ijt} is trade efficiency, which is the ratio of actual export value to trade potential. TE_{ijt} takes a value of [0,1] when trade inefficiency $u_{ijt} = 0$, the actual export value, is equal to the trade potential value, and exports reach the frontier level. When $u_{ijt} > 0, TE_{ijt} < 1$, there is trade resistance at this time, and the actual export value is smaller than the trade potential value.

4.1.2. Trade Inefficiency Model

To further investigate trade efficiency factors, it is also necessary to construct a trade inefficiency model. In order to deal with the problem of independent distribution, this paper adopts the approach of Battese and Coelli (1995) to deal with the trade inefficiency model by combining the stochastic frontier model and the inefficiency model to establish the export inefficiency model as below.

$$u_{ijt} = \sigma z_{ijt} + \varpi_{ijt} \tag{5}$$

wherein z_{ijt} is the various human factors affecting trade, σ is the parameter to be estimated, and σ>0; this factor positively affects trade inefficiency and prevents the trade level from reaching the optimal trade level. σ<0 has a negative effect on trade inefficiency and drives the level of trade to the optimal level of trade.

4.2. Empirical Models under Digital Service Export

In the trade frontier model, according to Lan Qing-Xin and Dou Kai (2019), digital trade needs to be built on the Internet, and the indicators of the product of a country's population and ICT penetration are used as proxy variables to measure the size of a country's domestic market. In the model of service trade inefficiency term according to Chen Xiu-Ying and Liu Sheng (2019), it was pointed out that factors such as cross-border electronic transaction regulation, cross-border payment system compatibility, and intellectual property right protection can have a significant impact on the liberalization of the digital service trade, which in turn affects the efficiency of the service trade. Considering that RCEP itself carries a regional economic partnership agreement, the indicator of whether there is a regional services agreement between the two countries is deleted, and a numerical services trade restriction index is introduced.

Considering that this study discusses the analysis of digital service trade potential between China, Korea, and other RCEP countries, the empirical model under traditional trade was

modified and refined, and the data is logarithmically processed as follows:

$$ln\,E\,x_{ijt} = \beta_0 + \beta_1\,ln\,G\,DP_t + \beta_2\,ln\,G\,DP_{it} + \beta_3\,ln\,M\,S_{it} + v_{ijt} - u_{ijt} \quad (6)$$

$$u_{ijt} = \sigma_0 + \sigma_1 Value_{it} + \sigma_2 DTB_{it} + \varpi_{ijt} \quad (7)$$

where Ex_{ijt} is the value of China's or Korea's digital service trade exports to trading partner countries, GDP_t is the GDP of China or Korea, and GDP_{it} is the GDP of the trading partner country. MS_{it} is a proxy variable for the size of the domestic market in the trading partner country. Among inefficiency impact factors, $Value_{it}$ is the share of value added of services in trading partner countries, and DTB_{it} is the digital service trade restriction in trading partner countries.

4.3. Explanation of Model Variable Selection

Based on the above theoretical basis, the explanatory quantity selected in this study for constructing the stochastic frontier gravity model is the total exports of the digital services trade. Influencing factors are mainly the GDP of China and Korea, and the Internet penetration rate of the target countries. In constructing the model of the inefficiency term of the digital service trade, the variables selected were mainly the value added share of service industry and restrictions on the digital service trade (Table 1).

Table 1. Explanatory Notes for Model Specific Variables and Data Sources

Variable	Variable Description	Data Source
Gross Domestic Product (GDP)	GDP as a proxy variable for the size of a country's economy, which affects the level of import and export in that country	World Bank Database
Gross Domestic Product (GDP) of Trading Partner Countries	GDP as a proxy variable for the size of a country's economy	World Bank Database
Market Size (MS)	Using the product of the country's population and ICT penetration rate as a proxy variable, the higher the value, the greater the potential for domestic market development	World Bank database and ITU official website related data calculation
Value Added of Service Industry (Value)	Reflect the status of the service sector in a country's national economy, and a higher level of development promotes the development of services trade in that country	World Bank Database
Digital Service Trade Restrictions (DTB)	Digital services trade that reflects the high level of various types of barriers faced in carrying out digital services trade; restrictions that are detrimental to the development of digital services trade	OECD Digital Regulatory Database

5. Empirical Analysis

5.1. Analysis of Results of Stochastic Frontier Gravity Model

Due to the rapid emergence of digital service trade, some data statistics are incomplete. In this study the stochastic frontier model was estimated and compared for the export value of China and Korea to eight RCEP partner countries, namely Australia, New Zealand, Indonesia, Thailand, India, Japan, Korea, and Malaysia, from 2011 to 2021. The estimated model is shown in Table 2, according to which a comparative analysis was performed.

In terms of economic size, the coefficient of exporting country GDP is negative in the Korean model, but fails the significance test. In the Chinese model, the coefficient of exporter GDP is significantly positive, and for every 1% increase in China's GDP, China's digital service trade exports to sample countries increase by 0.06%. Thus, China's economic growth plays a role in increasing China's digital service trade exports, but Korea's economic growth does not play a significant role in increasing Korea's digital service trade exports.

In the models of both China and Korea, the GDPs of trading partner countries were positive and could pass the significance test, indicating that the economic growth of trading partner countries can play a significant role in improving the digital service trade in both China and Korea. The comparison shows that Korea has higher elasticity in the digital service trade than China.

In terms of market size, the coefficients of the market size variables in China and Korea are positive, and both can pass the significance test. The higher the number of Internet users in target market countries, the larger the market size of target market countries, and the greater the demand for digital services. The market size of target countries plays a positive role in promoting the digital service trade exports of China and Korea.

Table 2. Model Estimation Results

Model		**Stochastic Frontier Gravity Model for Korea**		**Stochastic Frontier Gravity Model for China**	
Stochastic Frontier Function	Explanatory Variables	Coefficient	p-value	Coefficient	p-value
	$ln\ G\ DP_t$	-0.7214445	0.114	0.0558226	0.000
	$ln\ G\ DP_{it}$	0.7814571	0.000	0.37508	0.000
	$ln\ M\ S_{it}$	0.1577142	0.001	0.0950431	0.000
	Constant Term	9.695507	0.018	7.079621	0.000
Trade Inefficiency Function	$Value_{it}$	0.2775073	0.007	6.765935	0.000
	DTB_{it}	-9.850719	0.201	1.324329	0.005
σ^2		0.7202		0.1041	
γ		0.9931		0.9668	
LogLikelihood		83.5883		40.2264	

The constant terms of the stochastic frontier models for both countries were positive, and were able to pass the significance test. This parameter reflects the role played by technological progress in driving the digital services trade exports of both countries. Due to space limitations, this study only presents data for 2016-2021.

A comprehensive comparison of the stochastic frontier models of China and Korea shows that the estimated values of the elasticity coefficients of each factor in the Korean model were higher than those in the Chinese model, indicating that Korean digital service trade exports are more sensitive to the responses of each factor than those of China.

In terms of the trade inefficiency function, the coefficients on the share of value-added services in trading partner countries in the models for China and Korea were significantly positive. In terms of domestic barriers to digital service trade in importing countries, the coefficient of the inefficiency term of the trade partner country's digital service trade restriction variable DTB_{it} has a negative impact on the Korean model, but does not pass the significance test, and the coefficient of the inefficiency term on the Chinese model is positive and passes the significance test. Since a positive sign on the coefficient of the influencing factor of the inefficiency term implies that the variable drives inefficiency, a negative sign of the coefficient implies that the variable hinders inefficiency.

It follows that for China, both the share of value-added services in trading partner countries and domestic barriers to digital services trade in importing countries contribute to the inefficiency of China's digital services trade. This indicates that an increase in the value added of the service industry in the target country will lead to a decrease in China's digital service trade exports, which may be due to a stronger domestic service industry and higher competitiveness level in the target country, and the more they will capture the domestic market first. Stronger the digital service trade barriers lead to a reduced demand for digital service trade imports, and reduce China's reliance on its digital service trade exports.

For Korea, the share of value-added services in the target country plays the same role as China, but the barriers to digital services trade in the target country do not significantly impede the efficiency of Korea's digital services trade exports.

5.2. China-Korea Digital Service Trade Export Potential Analysis

A stochastic frontier gravity model for China and Korea was used to further calculate the numerical service trade export efficiency of the two countries, and the potential value of the services trade between China and Korea with RCEP trading partners.

Korea's service trade potential value is 0.80, and China's service trade potential value is 0.684 according to the calculation. Both countries still have a large untapped potential for digital service trade exports (Table 3 and Table 4). The conclusions of the analysis follow.

Table 3. Estimated Export Potential of the Digital Service Trade between China and RCEP Sample Countries

Trading Partner	2016	2017	2018	2019	2020	2021	Tec Mean	Tec Ranking
Korea	0.805575	0.898551	0.918615	0.83549	0.789912	0.947921	0.903712	1
Thailand	0.827564	0.86321	0.874789	0.815099	0.778853	0.893608	0.879686	2
India	0.7399	0.782934	0.828201	0.782205	0.654233	0.94363	0.858982	3
Japan	0.782305	0.847171	0.884137	0.834149	0.763273	0.903228	0.855879	4
Malaysia	0.718138	0.80292	0.864901	0.82296	0.8272	1	0.847997	5
Indonesia	0.423299	0.465202	0.477877	0.424955	0.417107	0.549312	0.509082	6
Australia	0.343324	0.395361	0.424009	0.449709	0.422135	0.54814	0.42058	7
New Zealand	0.172643	0.186863	0.191105	0.189127	0.185913	0.201151	0.19372	8
Sample Country Tec Mean	0.601594	0.655276	0.682954	0.644212	0.604828	0.748374	0.683705	/

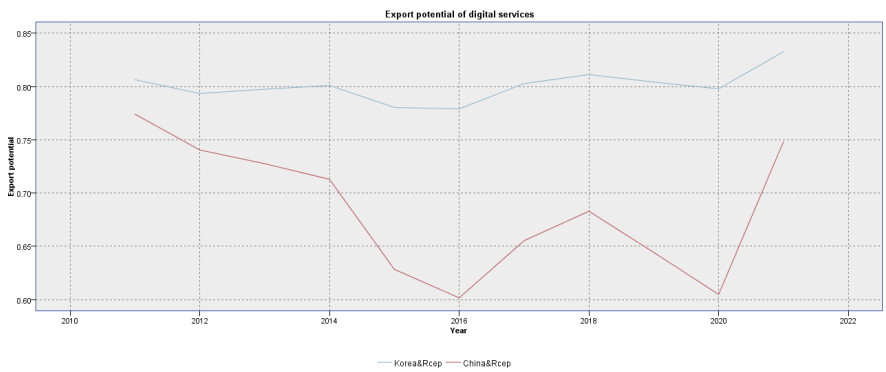
Table 4. Estimated Export Potential of the Digital Service Trde between Korea and RCEP Sample Countries

Trading Partner Countries	2016	2017	2018	2019	2020	2021	Tec Mean	Tec Ranking
Indonesia	0.991437	0.991468	0.991718	0.990672	0.991403	0.993192	0.992498	1
China	0.988459	0.98801	0.98701	0.985072	0.984654	0.987081	0.98989	2
India	0.983097	0.98316	0.984843	0.980656	0.984547	0.986323	0.983863	3
Thailand	0.956935	0.953653	0.950998	0.94176	0.942767	0.953632	0.960169	4
Malaysia	0.938576	0.944811	0.938841	0.928667	0.924845	0.950072	0.946045	5
New Zealand	0.559197	0.607601	0.612611	0.59898	0.601707	0.63049	0.603354	6
Japan	0.458337	0.528292	0.562436	0.524113	0.490134	0.585784	0.496335	7
Australia	0.356264	0.425465	0.461085	0.484074	0.463096	0.575246	0.432699	8
Sample Country Tec Mean	0.779038	0.802807	0.811193	0.804249	0.797894	0.832728	0.800607	/

The efficiency of digital service trade exports differs significantly between Korea, China, and RCEP sample countries. The efficiency of China's digital services trade surprisingly all realizes a clear regional distribution characteristic. Australia, Indonesia, and New Zealand show a low digital services trade export efficiency, while Korea, Japan East Asian countries maintain a very high trade export efficiency, basically above 0.8, and show a fluctuating upward trend.

Unlike China, the export efficiency of Korea's digital service trade with the sample countries shows a clear "convergence of economics". That is, a low digital service trade efficiency has been maintained with developed countries like Japan and Australia, where the service trade is relatively well developed, while a high digital services trade export efficiency has been maintained for a wide range of developing countries, including China.

Fig. 5. Trends in Export Potential of Digital Services Trade between China and Korea



In terms of time trend, as shown in Fig. 5, the change trend of digital service trade export potential between Chinese and Korean digital service trade export efficiency shows a relatively stable pattern, and China shows a fluctuating trend of first a decline, and then a rise. On one hand, it may be due to the impact of rising global trade protectionism, which has increased resistance to China's digital services trade exports. On the other hand, it may be due

to China's rapid economic growth and expanding international influence, which has laid a solid foundation for the digital services trade. Overall, it shows that China's digital service trade export potential still has much room for development, and also shows the importance of developing China's digital service trade exports to RCEP countries.

6. Conclusion and Policy-Related Suggestions

6.1. Conclusion

This study used a stochastic frontier gravity model to empirically study China, Korea, and eight representative countries in the RCEP. The results show that China's economic growth plays a role in increasing China's digital service trade exports, but Korea's economic growth does not play a significant role in increasing Korea's digital service trade exports. The economic growth of trade partner countries can play a significant role in increasing digital service trade in both China and Korea, and the comparison shows that Korea has a higher resilience in digital service trade than China. The market size of target countries plays a positive role in promoting the export of the digital service trade in both China and Korea. Moreover, the increase in the value-added share of services in the target countries leads to a decrease in the digital service trade exports of both China and Korea. This study comprehensively evaluated the export potential of China and Korea to RCEP countries, providing theoretical guidance and decision-making reference to promote the export of digital service trade and development of the digital economy between China and Korea.

6.2. Policy-Related Suggestions

6.2.1. For Both China and Korea

China and Korea should pay more attention to exports in the digital service trade. Part of the decline in China's digital services trade export potential is due to the mismatch between the rate of growth of China's non-trade efficiency items and the rate of growth of frontier items. This indicates that policy support for digital services trade has not yet matched China's economic growth rate, and China should actively work with other countries to reach consensus on digital trade policies and other factors to actively optimize and adjust the development direction of China's digital services trade. This will continue to maintain a positive trend of digital service trade exports to developed countries. Countries such as Korea and Japan have huge service trade markets and strong consumption capacity, which are the main direction and trend of digital service trade exports in the future, and should continue to promote China's digital service trade exports to Korea and Japan. At the same time, increasing the importance of digital service trade exports to developing countries such as Thailand and India is neccsary, thanks to the special characteristics of the digital service trade that do not depend on geographical distance and tariff exemptions that distinguish it from traditional trade. Therefore, China should not only increase digital service trade exports to countries such as Korea and Japan but also actively expand its digital service trade exports to developing countries such as Thailand, India, Malaysia. and Indonesia. Korea should continue the strong trend of exporting digital service to developing countries such as Indonesia and China, while promoting Korea's exports of digital service to Japan and Australia. Therefore, different export policies should be formulated according to the difference in development level among

RCEP countries.

It is necessary to expand the scope of economic cooperation and continuously improve trade relations between China and Korea and other countries. Exports can be greatly influenced by various policy factors in target countries,; it is vital to oppose trade protectionism and actively maintain stable and good trade relations with RCEP countries. In the field of digital services, policies on data flow and trade in digital products should be formulated with RCEP countries in line with their own circumstances, and a balance of interests of multiple parties should be reached as much as possible (Zhu, Zhe-Hua, Huang Meng, and Xiao Wei-Ge).

Both nations must actively participate in international negotiations and promote the docking of domestic and foreign digital services trade rules. Like traditional international trade, the healthy development and fair competition of digital service trade cannot be separated from the regulation and restraint of international trade rules. To this end, both China and Korea should take initiative to actively participate in future negotiations on international rules for digital services trade, and promote solutions for the international governance of digital services trade through negotiations.

China and Korea must improve the statistics and classification of relevant data to provide data support for the development of digital service trade. At present, there is a lack of relevant research data on the digital service trade, and relevant literature data sources mainly rely on the UNCTAD and OECD databases. There are also no standardized statistics on various influencing factors related to the digital service trade, and it is difficult to further develop research on the digital service trade (Zhu, Zhe-Hua, Huang Meng, and Xiao Wei-Ge). Therefore, it is important to improve statistics on the digital service trade and provide data support for the world digital service trade to study the development of the digital service trade.

6.2.2. In Terms of China-Korea Cooperation

Both nations should make full use of the RCEP agreement as a complementary agreement to the China-Korea FTA. After several years of practice, the trade dividends brought by the China-Korea FTA agreement have been released on a large scale. Both sides have their own advantages in trade due to the coexistence of competitive and complementary trade between China and Korea. China and Korea should firmly grasp the new opportunity stemming from the RCEP agreement to achieve mutual benefits and a win-win situation. Since both sides retain tariff barriers for some goods in the FTA agreement, they also retain a certain trade potential (Feng Xiao-Ling and Zhao Xin, 2022). Therefore, the RCEP agreement may optimize the existing value chain structure of China and Korea after it comes into effect, which in turn will promote the further release of the potential of the digital service trade between the two countries.

On the basis of the successful signing of RCEP, China and Korea should accelerate the second phase of China-Korea FTA negotiations to facilitate a swift conclusion of the China-Korea FTA. The entry into force of the RCEP agreement will release more dividends, which will further broaden the development of trade between China and Korea. The general cycle of economic integration and development in East Asia can also promote the development of bilateral trade between China and Korea (Feng Xiao-Ling and Zhao Xin, 2022). More importantly, based on the signing of the RCEP, the two countries should jointly explore the second phase of China-Korea FTA negotiations under newer and higher trade standards, and should actively promote the construction of the China-Korea FTA under the current

situation, wherein the multilateral trade system is hampered and regional economic integration is flourishing, while also regulating conflicts between the RCEP agreement, the China-Korea FTA, and the future CPTPP agreement.

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