Research on the Impact of Digital Serviceization Level on the Export of Digital Service Trade

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Abstract: With the advancement of digital development and the continuous acceleration of trade transformation, many countries around the world are formulating different policies to develop the digital economy and digital trade. The concept of digital trade was first officially proposed by the United States International Trade Commission in 2013, followed by the United Nations Conference on Trade and Development in 2015, which officially introduced the concept of digital services trade. In the rapidly developing digital economy, the service industry utilizes information technologies such as cloud computing systems and blockchain to scientifically analyze consumer needs, promote the liberalization and facilitation of the service trade industry, and it is evident that high-level digital service capabilities will become the main driving force for the development of the digital age. Therefore, exploring the impact of digital service levels on the development of digital service trade is crucial.

1. Introduction

The development and progress of various digital technology methods such as big data and cloud computing have effectively promoted the development and transformation of the new social economy. Digitalization has penetrated into many fields of production and has become a new indicator of measuring the country's modernization development. While promoting economic and social development and changes, digital technology has also endowed international trade with new characteristics of the times. Digital trade is gradually becoming a new form of international trade, attracting worldwide attention.According to Wang Bingnan, Vice Minister of Commerce, at the opening of the 2019 China International Conference on Digital and Software Services Trading, the innovation and rapid development of digital information technology have changed the traditional mode of international trade cooperation. Digital services trade using mobile internet data transmission technology as the transaction medium is developing into a new trend in the future international trade system.

In the context of the development of the digital age, the development of digital service trade will become the transformation trend of future service trade. The Internet and digital technology services, as strong support for the development of digital service trade, will provide a strong market for future innovation and expansion of global business models and trade scope. The level of digital services will also become an important foundation and consideration for the development of digital service trade. This article delves into the level of digital services and digital service trade, as well as their related impacts, with the aim of exploring the impact of digital service level on digital service trade, and providing valuable constructive insights for responding to the development of the digital economy era and connecting with the development of global digital service trade.

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2. Literature Review

2.1. Research on Digital Service Trade

In the process of continuous research on digital trade, the new concept of digital service trade is increasingly being valued and playing an important role. In 2016, the United Nations Conference on Trade and Development (UNCTAD) mentioned in its report at the 47th session of the United Nations Statistical Commission that "digital delivery services" are a type of service empowered by potential communication technologies and information, and proposed that all service trade using information and communication networks as carriers for cross-border delivery is digital service trade. This includes insurance, information and communication technology services, insurance and pension services, intellectual property services, other business services, and financial services.

Currently, it is relatively difficult to calculate and calculate the scale of digital service trade. The White Paper on the Development of Digital Trade (2020) released by the China Academy of Information and Communications Technology indicates that there are six categories related to digital services in the Expanded Balance of Payments Service Classification (EBOPS), namely ICT services, intellectual property services, insurance services, financial services, personal cultural and entertainment services, and other commercial services. For other commercial services, they can be further refined to cover trade services such as accounting, law, advertising, management, consulting, research and development.

2.2. Research on Digital Service Level

The level of digital service will represent the application ability of digital technology. The selection and improvement of digital service level measurement indicators. At present, there is no measurement standard or internationally recognized statistical data for the level of digital service. Most literature mainly uses the construction level of information and communication infrastructure such as the Internet and mobile phones as alternative indicators for measuring the level of digital service. For example, Freund and Weinhold used the product of the highest level domain name Internet host in a country as a measure of Internet usage level as early as 2004[1]. Zhang Pengfei and Tang Yunyi (2020) used internet users, fixed and mobile broadband subscription rates, and home computer and mobile phone ownership rates as alternative indicators to evaluate the level of digital services, in order to study the impact of digital service levels on the growth of trade exports[2].

2.3. Research on the Impact of Digital Service Level and the Development of Digital Service Trade

With the progress of the information age, digital development is becoming increasingly important for the development of trade. As of now, there are few studies on the relationship between the level of digital services and the development of digital service trade at home and abroad, and most of them analyze the impact on service trade from the perspective of ICT (Information and Communication Technology). Yue Yunsong and Li Rou (2020) argue that global digital service trade, represented by the growth of computer and information service trade related to information and communication technology, will drive global trade towards service-oriented development[3]; Wen Huwei et al. (2021) found through quantitative empirical analysis that internet infrastructure has a positive impact on the import and export of digital services in China[4].

Through literature analysis, it can be seen that there is no unified definition of digital service trade, and there are inevitably some shortcomings in the calculation and statistics of digital service trade from theory to practice. UNCTAD's calculation methods and statistical data are the main standards relied on by scholars. At present, research on digital service trade focuses on the specific provisions of digital rules and the comparison of digital service trade policies among countries. Most of the literature on digital service levels still focuses on traditional trade, and there is little comprehensive research on the impact of digital service levels on digital service trade.

3. Measurement and Analysis of Digital Service Level

This article is based on literature and digital infrastructure content, and refers to Zhang Pengfei et al. (2020) who selected indicators related to the Internet as alternative variables to evaluate the level of digital services, in order to represent the future development potential of a country's digital service level. Based on the above analysis, this article selects five indicators: fixed broadband subscription rate, mobile cellular subscription rate, internet usage rate, fixed phone subscription rate, and mobile broadband subscription rate to measure a country's digital service level. This article selects a total of 41 sample countries from OECD member countries and the BRICS countries, and selects the period from 2011 to 2020 as the evaluation interval. Stata17.0 software is used to analyze the digital service level indicators. The relevant indicator variable data comes from the World Bank database and ITU database.

Based on the digital service level measurement system established above, this article adopts the principal component analysis method for calculation.

Firstly, standardize the raw data. The specific standardization formula is as follows:

$$Z=\frac{X-\min(X)}{\max(X)-\min(X)} \tag{1}$$

Among them, X is the original observation value of the indicator, and Z is the standardized indicator value.

Secondly, in order to determine whether the data in this article can be used for principal component analysis, KMO test and Bartlett sphericity test need to be conducted. In the test results of the sample data, the KMO value is 0.656, greater than 0.6, and the Bartlett test p-value is 0.000, indicating that the data system constructed in this article is suitable for principal component analysis.

Thirdly, adopts the Kaiser criterion to determine the number of principal components, that is, to extract principal components with feature values greater than 1.

Fourthly, calculate the comprehensive score of digital service levels for each country. The specific calculation method is as follows:

$$F=\frac{0.5391*f1+0.2457*f2}{0.7848} \tag{2}$$

Among them, F represents the calculated comprehensive score of digital service levels for each country, f1 represents the principal component 1 score, and f2 represents the principal component 2 score.

According to the comprehensive score of digital service levels calculated from the above equation, it can be seen that developed countries such as Japan, Finland and the United States have higher average digital service levels. Among them, Japan has the highest digital service level, with a score of 3.844; However, India, Mexico, South Africa and other developing countries have a low average level of digital services. India has the lowest score of 0.477. From this, it can be seen that the level of national economic development will also reflect the comprehensive digital service level of the country.

4. Empirical Analysis

This article takes the comprehensive indicator of digital service level as the core explanatory variable of the study, and the export volume of digital service trade as the dependent variable. Based on the Porter diamond model, a total of 10 research explanatory variables are established from six perspectives of four basic elements and two auxiliary elements. Production factors: comprehensive index of digital service level, population, proportion of R&D expenditure to GDP; Demand factor: per capita GDP; Related and supporting industries: the total output value of the service industry, the percentage of service industry employees in total employment, and the openness of the digital service trade industry (the openness of the digital service trade industry is expressed as the proportion of a country's digital service trade import and export scale to its GDP); Enterprise organization, strategy, and competition: the proportion of actual foreign investment to GDP; Government policies: index of legal power; Opportunity: Dependence on foreign trade. The comprehensive index of digital service level was calculated and organized by the author, and the export volume of digital service trade, total output value of service industry, and openness of digital service trade industry were obtained from the UNCTAD database. Other data were all from the World Bank WDI database.

In order to empirically verify the impact of digital service levels on global digital service trade exports, combined with equation (3), this article first constructs the following static panel econometric model for estimation:

$$lnexpy_{it} = \alpha_i + \alpha_1 dig_{it} + \alpha_2 lnred_{it} + \alpha_3 lngdpp_{it} + \alpha_4 lnsergdp_{it} + \alpha_5 lnseremp_{it} + \alpha_6 open_{it} + \alpha_7 lnfdi_{it} + \alpha_8 lnslri_{it} + \alpha_9 lnddft_{it} + u_i + g_t + e_{it} \quad (3)$$

Among them, the intercept termα_i represents the fixed effect of country i;α_1 to α_7 represents the degree of correlation between each explanatory variable and the dependent variable, where α_i represents the degree of correlation between the level of digital services in country i and the export volume of digital services trade in year t. u_i indicates the fixed effect of the country; g_t represents a fixed time effect; e_{it} represents a random perturbation term.

Static panel models mainly include mixed utility models, fixed effects models, and random effects models. In this paper, the panel data structure is short panel data with large N and small T, and the static panel model of formula (3) is used for estimation. In this paper, the three models are tested by Stata17.0 software, and the results are shown in Table 1. Ols, Fe and Re in the table represent ordinary least squares method, fixed effect model and random effect model of panel data respectively. According to the Hausman test results, p is greater than 0.05, and the random effects model is ultimately selected.

Table 1 Regression results of static panel model.

variable	(1) Ols lnexpy	(2) Fe lnexpy	(3) Re lnexpy
dig	0.112*	0.046	0.112*
	(0.060)	(0.077)	(0.060)
lnrde	0.521***	0.533***	0.521***
	(0.071)	(0.072)	(0.071)
lngdpp	-0.087	-0.058	-0.087
	(0.083)	(0.087)	(0.083)
lnsergdp	0.932***	0.926***	0.932***
	(0.027)	(0.028)	(0.027)
lnseremp	-0.310	-0.259	-0.310
	(0.307)	(0.312)	(0.307)
open	1.570***	1.547***	1.570***
	(0.110)	(0.112)	(0.110)
lnfdi	0.133	0.159	0.133
	(0.105)	(0.109)	(0.105)
lnslri	0.074	0.069	0.074
	(0.057)	(0.058)	(0.057)
lnddft	0.641***	0.644***	0.641***
	(0.086)	(0.087)	(0.086)
_cons	-3.946***	-4.295***	-3.946***
	(1.176)	(1.210)	(1.176)
N	410.000	410.000	410.000
r2	0.880	0.880	
r2_a	0.878	0.875	
Hausman Test		Prob > chi2 = 0.9921	

After selecting the random effects model, the regression results in Table 1 show that dig is significantly correlated at a 1% significance level, which is consistent with the expected results. A higher level of digital services will provide a better trading platform for digital service trade, bring international distance closer, make digital service trade more convenient, and promote the increase of digital service trade exports.

5. Conclusion

This paper first reduced the dimension of digital service level to a certain extent. Using the panel data of 41 sample countries from 2011 to 2020, relying on the principal component analysis model, it established an indicator system to measure the evaluation of digital service level, analyzed the status quo of global digital service level and digital service trade export, and selected the influencing factors of global digital service trade export scale based on the Porter Diamond Model, We empirically analyzed the research issues of this article through a static panel model and ultimately reached the following conclusions:

Overall, the stronger the level of digital services in a country, the more it contributes to the increase in digital service trade exports. According to the current situation analysis in Chapter 3, the global level of digital services is steadily improving year by year. According to empirical research results, the level of digital services serves as the production foundation for the development of digital service trade exports, and higher levels of digital services can promote the increase of digital service trade exports. Therefore, improving the level of digital services is conducive to promoting the development of digital service trade exports.

References

[1] Freund C L , Weinhold D. The Effect of the Internet on International Trade[J]. Journal of International Economics, 2004, 62(1):171-189.

[2] Zhang Pengfei, Tang Yunyi. The Impact of Digital Service Level on Bilateral Trade of Countries along the "the Belt and Road": an Empirical Study Based on Asian Countries[J].Journal of Shanghai University of International Business and Economics, 2020,27(03):38-46.

[3] Yue Yunsong, Li Rou. Comparison of International Competitiveness in Digital Service Trade and Its Enlightenment for China[J].China Business and Market,2020,34(04):12-20.

[4] Wen Huwei, Shu Sizhe, Zheng Shufang.Analysis of the Global Digital Services Trade Pattern and China's Trade Status[J].Industrial Economic Review,2021(01):50-64.