

An Empirical Study on the Impact of Digital Trade Barriers on the Export Benefits of Cross Border E-commerce

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Abstract: The world today is facing unprecedented changes, and the rapid development of digital technology and the digital economy is becoming a key force in restructuring global factor resources and reshaping the global economic structure. However, at the same time, issues such as digital trade barriers and digital divide have also emerged, affecting the healthy development of digital service trade among countries, including cross-border e-commerce, to varying degrees. Based on reviewing relevant literature and conducting research on the development status of digital trade barriers and cross-border e-commerce exports, this article empirically analyzes the impact mechanism of digital trade barriers on cross-border e-commerce exports from four indicators: digital trade barrier index, GDP, tariff level, and population. Finally, based on empirical results, policy recommendations are proposed on how China can respond to the restrictions of digital trade barriers to enhance the competitiveness of cross-border e-commerce exports.

Keywords: Digital Trade Barriers ;Cross border E-commerce; Export Benefits

1 INTRODUCTION

As human society enters the digital age, digital trade, as a link between global economic openness and cooperation, is increasingly becoming an important factor driving international trade and world economic growth. At the same time, cross-border e-commerce, as a concentrated form of digital trade, is also becoming an important content and driving force in China's foreign trade, making significant contributions to China's economic growth. Export trade accounts for the main proportion in China's foreign trade, and corresponding cross-border e-commerce also dominates the entire cross-border e-commerce trade. According to data from the General Administration of Customs, the export volume of cross-border e-commerce in China reached 1.44 trillion yuan in 2021, and China is leading the global market. The global economic growth has shown a sluggish trend, and trade protectionism has begun to prevail. Due to significant differences in the development level of the digital industry among countries, problems such as the digital divide and network privacy security have emerged. In this context, exploring the impact of digital trade barriers on the export efficiency of cross-border e-commerce has profound significance for promoting the further prosperity and development of China's cross-border e-commerce.

2 LITERATURE REVIEW

Based on the review and analysis of existing research literature on related topics, this study conducts literature review from three aspects: research on digital trade barriers, research on cross-border e-commerce, and research on the impact of digital trade barriers on cross-border e-commerce.

2.1 Research on Digital Trade Barriers

For the definition of the concept of digital trade, USITC (2014) has clearly classified it into seven categories: localization requirements, market access restrictions, data privacy and protection requirements, intellectual property protection, uncertain legal liability rules, review, and customs measures. Each type of digital trade barrier has been clearly defined.¹

In the current economic situation, countries have strengthened restrictions on cross-border data flow management and are also seeking synergies in rules. Wang Zihan (2022)^[5] conducted empirical analysis and research using the "diamond model" to measure the competitiveness level of digital service trade in sample countries, and conducted a more in-depth analysis of the impact mechanism of digital trade barriers.

2.2 Research on cross-border E-Commerce

In the context of the COVID-19, cross-border e-commerce also faces the opportunities and challenges of Digital transformation. Hong Yong and Li Yi (2022)^[1] proposed relevant countermeasures and suggestions for e-commerce integrity, risk prevention, and branding construction in the cross-border e-commerce field, taking into account the new situation of century long changes and the interweaving of the world epidemic. In terms of empirical analysis. Song Dongjie (2022)^[4] constructed an indicator system from five aspects: internet development level, logistics development level, technology development level, policy support, and cross-border e-commerce usage intensity. Using principal component analysis, he calculated the comprehensive index of China's cross-border e-commerce development level.

2.3 Research on the Impact of Digital Trade Barriers on Cross border E-commerce Exports

In the context of the COVID-19, cross-border e-commerce also faces the opportunities and challenges of Digital transformation. Hong Yong and Li Yi (2022)^[1] proposed relevant countermeasures and suggestions for e-commerce integrity, risk prevention, and branding construction in the cross-border e-commerce field, taking into account the new situation of century long changes and the interweaving of the world epidemic. In terms of empirical analysis.

2.4 Summary

Overall, the existing research results and policy recommendations of domestic and foreign scholars provide strong theoretical support for this article, but there are also some areas that

¹Chen Weitao, Zhu Shiyong. Research Progress in Digital Trade Theory and Rules [J]. Economic Dynamics, 2019, (09): 114-126

can be improved, namely, domestic and foreign scholars have less detailed connections between the impact of digital trade barriers and cross-border e-commerce exports, and there are also few empirical models in analyzing the relationship between the two. Based on the current situation, this article will take the shortcomings of existing literature research as a breakthrough point, and continue to conduct in-depth research and exploration on the impact of digital trade barriers on the export benefits of cross-border e-commerce on the basis of previous studies.

3 DIGITAL TRADE BARRIERS AND THE CURRENT DEVELOPMENT OF CROSS BORDER E-COMMERCE

3.1 Global digital trade barriers are increasing, and developing countries have higher levels of restrictions

The Organization for Economic Cooperation and Development (OECD) has released the Digital Services Trade Restriction Index (DSTRI) for 45 major economies and 22 service sectors worldwide. The OECD database establishes an evaluation system for five areas of DSTRI classification: infrastructure connectivity, electronic transactions, payment systems, intellectual property rights, and other barriers to digital trade. The measurement of system indicators is based on the binary scoring principle, and measures in each field are assigned points and weights.² According to OECD statistics, the average value of DSTRI has continued to rise in the past five years, and global regulation of digital service trade has become increasingly strict, with barriers to digital service trade gradually increasing.

3.2 The scale of cross-border e-commerce transactions maintains a high-speed growth trend

In the context of the COVID-19 sweeping the world, the global offline retail chain has been severely impacted, consumer demand has accelerated to shift online, and global e-commerce sales have seen a high growth against the trend. Nowadays, international trade policies are constantly changing, and cross-border e-commerce

platforms are experiencing frequent "lockdowns". As shown in Figure 1, the scale of cross-border e-commerce transactions in China has continued to grow since 2014, with a transaction size of 4.2 trillion yuan that year. Since then, it has maintained a steady upward trend year by year.

² Guo Meitong. Research on the ternary marginal impact of digital service trade barriers on digital service exports [D]. Northeastern University of Finance and Economics, 2022

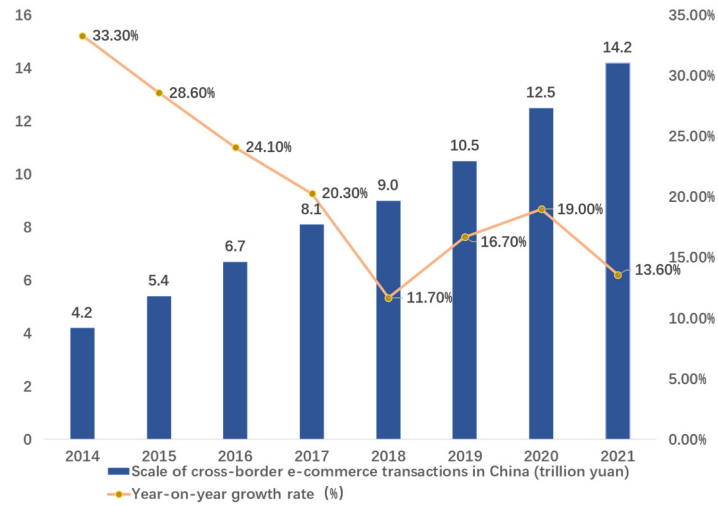


Figure 1 The scale and growth rate of cross-border e-commerce transactions in China

Data source: Online Economic and Social E-commerce Research Center

3.3 China's cross-border e-commerce exports account for nearly 80%

As shown in Figure 2, in terms of the import and export structure of cross-border e-commerce, since 2015, the export value of cross-border e-commerce has been much higher than the import value.

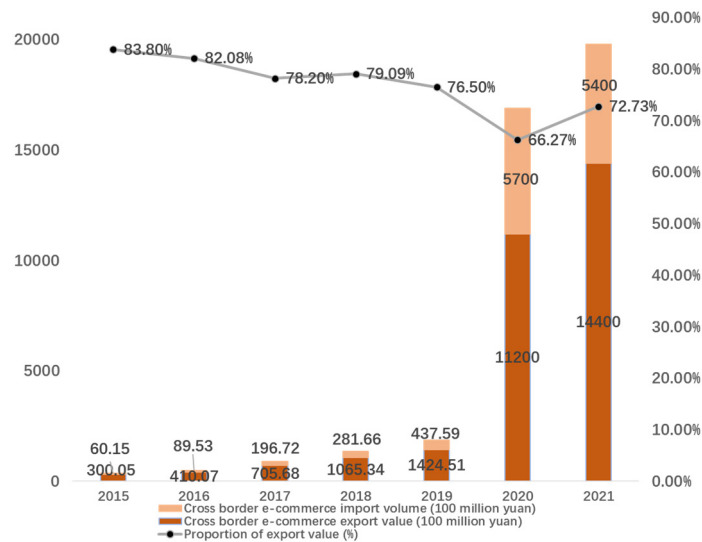


Figure 2 China's cross-border e-commerce import and export volume and export proportion

Data source: General Administration of Customs

4 EMPIRICAL ANALYSIS OF THE IMPACT OF DIGITAL TRADE BARRIERS ON THE EXPORT BENEFITS OF CROSS BORDER E-COMMERCE

4.1 Data source and variable selection

Based on the Holonomic system and accessibility of the data, the data selected in this paper are mainly from the National Bureau of Statistics, the Ministry of Commerce of the People's Republic of China, the Electronic Commerce Research Center, the World Bank database and the Organization for Economic Cooperation and Development (OECD) database, with a time span of 2014-2020. Due to the incomplete acquisition of certain data and the partial missing sample size, this article adopts the method of taking the average of the two years before and after to supplement. This article selects relevant data from 10 representative countries among G20 countries from 2014 to 2020 as samples, including 5 developed countries (the United States, the United Kingdom, Japan, South Korea, Germany) and 5 developing countries (China, Russia, Brazil, India, Mexico).

4.2 Explained Variable

This article refers to Liu Wei's (2022)^[2] research, using the indicator of cross-border e-commerce export efficiency (ED) to measure the impact of various independent variables on cross-border e-commerce export efficiency, which includes sub indicators such as product price, product structure, and export scale.

2. Core explanatory variables

Based on previous research by scholars, this article uses the Digital Trade Barrier Restrictive Index (DSTRI) as the explanatory variable. The DSTRI index value is between 0 and 1, where 0 represents free and open digital trade, with no or almost no restrictions on digital trade; 1 represents complete non openness, with the highest degree of restrictions on digital trade. The larger the value, the more severe the digital trade barrier. The expected sign is negative.

4.3 Control variable

As a key indicator for measuring a country's economic development level, a country's GDP can also indirectly reflect the scale of cross-border e-commerce development. Therefore, this article selects the gross domestic product (GDP) of 10 countries from 2014 to 2020 as the control variable, with a positive expected sign.

According to Chinese scholar Wang Xiaofeng's classification of digital trade barriers, they are divided into two categories: tariff and non-tariff. Therefore, as one of the restrictive measures of digital trade barriers, tariffs reflect the strength of a country's digital trade barriers. This article uses the weighted average tariff rate (TAX) of 10 countries from 2014 to 2020 as the control variable, with an expected sign of negative.

The growth of population can to some extent promote the development of a country's economy. On the other hand, the population is directly proportional to internet users, and the increase in online consumers is also driving the rapid development of cross-border e-commerce exports. Using the population (POP) of 10 countries from 2014 to 2020 as the control variable, the expected sign is positive.

4.4 Model Settings

Based on the impact mechanism mentioned earlier, the following assumptions are proposed:

H0: Digital trade barriers have a significant negative impact on cross-border e-commerce exports.

Based on previous research findings, this article conducts empirical analysis and incorporates control variables that have an impact on cross-border e-commerce exports. Based on hypothesis H0, the following model is established

$$ED_{i,t} = c + \beta_1 DSTRI_{i,t} + \beta_2 GDP_{i,t} + \beta_3 TAX_{i,t} + \beta_4 POP_{i,t} + \varepsilon \quad (1)$$

Among them, the subscripts i and t represent the country and year, ED represents the cross-border e-commerce export efficiency of country i in year t , $DSTRI$ represents the digital trade barrier restrictive index of country i in year t , GDP represents the annual gross domestic product of country i , TAX represents the tariff level of country i in year t , POP represents the population of country i per year, c is a constant, and β_i is a coefficient ($i=1, 2, 3, 4$), ε is a random perturbation term.

5 EMPIRICAL RESULT ANALYSIS

The data selected in this paper is short panel data, so it is necessary to select the best model for regression estimation through F-test and Hausman test.

5.1 F test

The F-test is used to determine whether the model has individual effects, that is, to judge whether the panel model should choose a mixed estimation model or a fixed effect model. According to Eviews8 operation, in the panel data, $F=27.97713$, $F_{(9,56)}=7.563477$, $N=10$, $T=7$, $K=4$. According to formula (2), $F=27.97713$ is greater than $F_{(9,56)}=7.563477$, so the original hypothesis is rejected, the mixed estimation model is excluded, and the fixed effect model is selected.

5.2 Hausman test

The original hypothesis of the Hausman test is a random effects model. From the test results, it can be seen that the P-value is 0.0009, which rejects the original hypothesis at a 1% confidence level, so a fixed effects model was chosen

5.3 Fixed effects regression estimation

Table 1 Benchmark Regression Results

| variable | Coefficient | Std.Error | t-Statistic | Prob |
|----------|-------------|-----------|-------------|-------|
| DSTRI | -3.319*** | 0.962 | -3.448 | 0.001 |
| GDP | 0.455*** | 0.015 | 30.499 | 0.000 |
| TAX | 0.008 | 0.025 | 0.312 | 0.756 |
| POP | -0.036 | 0.026 | -1.377 | 0.173 |
| C | 0.317 | 0.191 | 1.655 | 0.103 |

Note: ***representative $p < 0.01$,

**representative $p < 0.05$, *representative $p < 0.1$

Data source: Eviews8 operation

Therefore, at a confidence level of 1%, the regression equation between the export benefits of cross-border e-commerce and its influencing factors can be obtained:

$$ED_{i,t} = 0.316831 - 3.318579 \text{ DSTRI}_{i,t} + 0.455119 \text{ GDP}_{i,t}$$

$$R^2 = 0.943879 \quad \bar{R}^2 = 0.940425 \quad F = 273.3004$$

Using R^2 to measure the fitting degree of the model to the sample, it can be seen from above equation that $R^2 = 0.943879$, and the adjusted coefficient of certainty \bar{R}^2 is 0.940425, which is close to 1, indicating a good overall fitting degree.

According to the revised model, there is a significant negative and positive correlation between the export benefits of cross-border e-commerce and digital trade barriers (DSTRI) and GDP, which is consistent with the expected direction of change. And TAX shows a positive correlation with ED, while POP shows a negative correlation with ED. The specific explanations for each variable are as follows:

The coefficient between DSTRI and ED is negative, indicating that digital trade barriers hinder and inhibit the export of cross-border e-commerce. Under other unchanged conditions, for every 1% increase in digital trade barriers, the export benefits of cross-border e-commerce will decrease by 3.318579%. This indicates that, excluding interference from other factors, digital trade barriers have a significant negative impact on cross-border e-commerce exports, inhibiting cross-border e-commerce exports.

The positive coefficient between GDP and ED indicates that GDP has a promoting effect on cross-border e-commerce export benefits. Under other unchanged conditions, for every 1% increase in GDP, the export efficiency of cross-border e-commerce increases by 0.455119%, indicating that an increase in GDP will promote the growth of export efficiency of cross-border e-commerce.

The coefficients of TAX and ED are positive, while the coefficients of POP and ED are negative, which does not match the expected sign. The possible reason is that these two variables have significant fluctuations in reality, leading to bias in the model. Therefore, we chose to exclude them from the model. However, in real life, the benefits of cross-border

e-commerce exports may be suppressed due to the increase in tariff levels among countries, and may also promote the improvement of export benefits due to the increase in population size among countries.

5.4 Robust Test

Due to the potential lag in the impact of the digital trade barrier index on the export efficiency of cross-border e-commerce, this article conducts a lag period treatment on the core explanatory variable DSTRI to test its robustness. The previous model is still used, as follows:

$$ED_{i,t} = c + \beta_1 DSTRI_{i,t-1} + \beta_2 GDP_{i,t} + \beta_3 TAX_{i,t} + \beta_4 POP_{i,t} + \varepsilon \quad (4)$$

Table 2 Regression results of core explanatory variable lagging for one period

| variable | Coefficient | Std.Error | t-Statistic |
|----------|-------------|-----------|-------------|
| DSTRI | -2.920*** | 0.799 | -3.651 |
| GDP | 0.469*** | 0.012 | 38.993 |
| TAX | 0.004 | 0.019 | 0.187 |
| POP | -0.038 | 0.022 | -1.742 |
| C | 0.284 | 0.155 | 1.831 |

Note:***representative $p < 0.01$,

**representative $p < 0.05$, *representative $p < 0.1$

Data source: Eviews8 operation

According to the regression results in Table 2, the impact direction of DSTRI and GDP on cross-border e-commerce exports has not changed, and both have passed the 1% significance test. This indicates that the benchmark regression results calculated by shortening the sample interval and lagging the core explanatory variable by one period remain robust.

6 CONCLUSIONS

The digital economy is thriving, and China is also facing significant challenges. Future market opportunities and challenges coexist. In response, this article proposes the following suggestions for reducing digital trade barriers and enhancing the export competitiveness of cross-border e-commerce:

1. Actively participate in the formulation of digital trade rules and raise China's demands

At present, the level of economic development in various countries is uneven, and there is still a significant "digital divide" in the field of the digital economy. China should shoulder the responsibility of a major country, actively participate in the formulation of global digital trade rules, fully clarify China's position in addressing issues such as intellectual property protection, cross-border digital flow, and localized storage, contribute China's wisdom, promote consensus through cooperation, and jointly explore greater development space in the field of digital trade

2. Strengthen the construction of digital infrastructure and create a good business environment

Creating a good business environment requires not only valuing the high-quality development of industries such as big data, software, and information communication, but also accelerating the implementation of infrastructure in the digital field, optimizing resource allocation, accurately acquiring customers, reducing transaction costs, improving operational efficiency, and gradually establishing a more comprehensive cross-border e-commerce integrated overseas service network system.

3. Creating a new ecosystem of the internet and stimulating new vitality in cross-border e-commerce

Cross border e-commerce needs to stimulate new vitality and accelerate its transformation and upgrading towards branding, compliance, and refinement. Cross border e-commerce enterprises should strengthen their R&D and design capabilities, attach importance to patent applications and trademark registration rights, improve the integration of digital technology with products and users, and thus enhance their competitiveness and influence.

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