

Research on the Impact of Digital Trade Rule Depth on China's Digital Services Trade

Hua Xu*, Quan Liu, Yuan Wang, Xin Chen

Shanghai University of Political Science and Law, Shanghai 201701, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: This paper empirically studies the impact mechanism of the depth of digital trade rules on China's digital service trade exports and explores the improvement paths for China accordingly. Based on the transaction cost theory and other foundations, this paper systematically classifies rule provisions into four categories: access and facilitation, cross-border data flow, digital intellectual property rights, and privacy protection and data security. It also uses the gravity model of trade to quantitatively analyze 22 Regional Trade Agreements texts involving China. The empirical results show that: the depth of digital trade rules as a whole significantly promotes digital service trade exports; the core driving factors include the gap in digital infrastructure, differences in higher education levels, urbanization levels, and GDP gaps; all four categories of provisions show a significant positive impact, among which access and facilitation provisions have the most prominent promotional effect. Heterogeneity analysis further reveals that the depth of rules has a significantly stronger promotional effect on trade partners in developed countries than in developing countries; sector-specific tests show that the financial services sector benefits the most, while the intellectual property sector is inhibited. Based on this, this paper proposes that China should actively participate in the construction of global rules, improve digital infrastructure, deepen the implementation of provisions, orderly expand opening-up in the digital field, strengthen intellectual property protection to balance innovation incentives and market expansion, and improve laws and regulations to ensure data security.

Keywords: Digital service trade; Digital trade rules; Gravity model of trade; Regional trade agreements (RTAs)

Online publication: October 14, 2025

1. Introduction

With the rapid development of the digital economy and digital service trade, the rules originally applicable to traditional trade can no longer address the new phenomena and problems emerging in economic development. Governments and regions around the world have successively introduced their own digital trade rules and formulated a series of such rules with varying depths to safeguard and maximize the development and interests of their domestic digital service trade. For example, the United States emphasizes the liberalization of digital trade, and its rules often include provisions such as cross-border data flow and non-mandatory localization of source

code ^[1]; while the European Union focuses more on “conditional freedom” and sets exception clauses related to digital trade in its rules ^[2].

China has currently signed Regional Trade Agreements (RTAs) with 22 countries or regions, and the digital trade rules in these agreements also show different focuses. However, there are relatively few studies on how China’s signed digital trade rules affect the development of its digital service trade. Therefore, this paper takes China as a case to further analyze the potential impact of the overall depth of regional digital trade rules and the depth of various sub-clauses on China’s digital service trade, aiming to provide a new perspective and enrich the theoretical research on the influencing factors of digital service trade.

2. In-depth measurement of digital trade rules in RTAs signed by China

Based on the analysis of the TAPED database, as of 2024, China has signed approximately 22 RTAs. Drawing on the research by Mao et al., digital trade clauses are categorized into four major types based on clause categories, representative clauses, and clause characteristics: “Market Access and Facilitation,” “Cross-Border Data Free Flow,” “Digital Intellectual Property Rights,” and “Privacy Protection and Data Security.”

Then, assign values based on whether the clauses are binding, with the value range being 0 to 3 points. 0 points means there is no content related to the issue. 1 point indicates that the issue is non-binding, i.e., a “soft” commitment. That is, when the other party fails to fulfill the commitment, these clauses only require the contracting parties to comply with the provisions or principles “on a best-efforts basis,” and no claims can be made against their non-compliance. 3 points mean the issue is binding, i.e., a “hard” commitment that can be enforced by the other contracting party. If the committing party fails to comply, a claim can be made, and it will be included in the dispute resolution mechanism of the agreement. 2 points indicate that the issue falls between binding and non-binding.

Subsequently, drawing on the measurement methods for the depth of digital trade rules proposed by Gao and Sheng, Li, and Monteiro, the depth of digital trade rules (Digitaldepth) is defined by the following formula:

$$Digitaldepth_H = \frac{\sum_{i=0}^n Index_L}{n(Index_L)}$$

Among them, the subscript H represents a high-level indicator, L represents the low-level indicators included in the high-level indicator, depth_H represents the calculated value of the high-level indicator (i.e., clause depth), Index_{L_i} denotes the i-th indicator in a set of low-level indicators, and n(Index_L) is the number of indicators in the set of low-level indicators.

Finally, the depth of digital trade rules in the bilateral trade agreements and regional trade agreements signed by China is calculated.

3. Empirical analysis of the impact of digital trade rules on China’s digital services trade

3.1. Research hypotheses

3.1.1. Depth of digital trade rules

The essence of trade rules is to regulate the trade behaviors and outcomes of trade entities by establishing an

institutional environment of incentives and constraints, so as to ensure the compliance and facilitation of trade activities. In the era of rapid digital economy development, digital trade rules can effectively reduce bilateral service trade barriers, boost the confidence of trade entities, and thus create a fair and convenient institutional environment. In addition, complex technical certification standards not only undermine the confidence of trade entities but also impose additional trade costs on enterprises. Therefore, the integration of regulatory and technical certification systems can not only enhance the confidence of trade entities, shorten institutional distance, but also reduce trade costs ^[3].

Accordingly, this paper proposes the following hypothesis:

Hypothesis 1: The depth of digital trade rules in RTAs has a promoting effect on China's digital services trade, and the depth of different types of digital trade rule clauses also plays a facilitating role in digital services trade.

3.1.2. Level of economic development

Generally speaking, there is a close relationship between economic scale and trade scale. Economic scale exerts varying degrees of influence on the starting point of foreign trade, foreign trade dependence, and the initiative in foreign trade. A larger economic scale indicates a larger potential demand scale in the country, and the market demand for digital service-related products is also greater. Although the digital services trade is a product of the integration of the digital era and trade, and its trade methods have changed significantly compared with traditional trade, it still follows the laws of traditional international trade theories. Differences in the level of digital economic development among countries are bound to have a certain impact on the scale of digital services trade ^[4].

Thus, this paper puts forward the following hypothesis:

Hypothesis 2: The impact of the depth of digital trade rules in RTAs on the digital services trade of economies with different levels of economic development is heterogeneous.

3.1.3. Industry differentiation

According to the UNCTAD report, among the 12 subcategories of services trade in the Extended Balance of Payments Services (EBOPS) classification, six are related to digitally deliverable services trade, i.e., digital services trade. They are insurance services, financial services, intellectual property services, ICT services, other commercial services, and personal, cultural, and recreational services. The corresponding industrial development and international division of labor among these six subcategories of digital services trade vary greatly, so their proportions in the digital services trade are different. At the same time, the depth of digital trade rules has varying degrees of impact on these six sub-sectors of digital trade ^[5].

Therefore, this paper proposes the following hypothesis:

Hypothesis 3: The impact of the depth of digital trade rules in RTAs on the six sub-sectors of digital services trade is heterogeneous.

3.2. Model construction and data sources

The gravity model of trade is widely applied in empirical studies on bilateral trade flows, and its theoretical foundation has become increasingly sophisticated. Based on the gravity model of trade, this paper constructs a model by integrating the characteristics of digital services trade and digital trade rules in regional trade agreements, as follows:

$$\ln Trade_{ijt} = \beta_0 + \beta_1 Depth_{ijt} + \beta_2 \ln GDPgap_{ijt} + \beta_3 \ln INT_{ijt} + \beta_4 \ln dist_{ij} + \beta_5 \ln EDU_{ijt} + \beta_6 Regu_{ijt} + \beta_7 Urban_{ijt} + \beta_8 comlang_{ij} + \varepsilon_{ijt}$$

Among them, the subscripts i, j , and t represent China, countries or regions that have signed RTAs with China, and the year, respectively. The explained variable “Trade” denotes the digital services trade flow between the two countries, with data sourced from the UNCTAD Services Trade Statistics Database and the OECD-ITSS Database. The core explanatory variable “Depth” refers to the depth of digital trade rules between the two countries, which is measured using the method mentioned above. Control variables include the following: the GDP gap between the two countries (GDPgap), with data from the World Bank’s WDI Database; the difference in network infrastructure between the two countries (INT), which is proxied by calculating the absolute value of the difference in broadband subscriptions between them, with data from the World Bank’s Telecommunication Indicators Database; the geographical distance between the two countries (dist), using data from the CEPII Database; the difference in educational levels between the two countries (EDU), proxied by calculating the absolute value of the difference in higher education expenditure between the trading parties, with data from the World Bank’s Education Data Indicators; the level of corporate regulatory quality among countries (regu), using data from the Regulatory Quality indicator in the World Bank’s WGI Database; the urbanization level of each country (urban), with data from the World Bank; and whether the two countries share a common language (comlang), which is assigned a value of 1 if they share a common official language and 0 otherwise, with data from the CEPII Database. β_0 is the constant term, β_1 – β_8 is the parameter to be estimated, and ε is the random error term.

3.3. Benchmark regression results

This paper uses the Hausman test for judgment. The results show that the P -value is 0.000, which is much less than 0.05, leading to the rejection of the null hypothesis. This indicates that the fixed effects model is superior to the random effects model.

According to the model, the regression coefficient of rule depth is 1.317, and the P -value is significant at the 1% level, meaning that an increase in the depth of digital trade rules can boost bilateral services trade flows.

To further verify the specific impact of each clause on the scale of digital services trade, this paper classifies the trade clauses covered by regional digital trade rules into four categories: “Access and Facilitation,” “Cross-border Data Free Flow,” “Digital Intellectual Property,” and “Privacy Protection and Data Security,” and conducts regression analysis again. The results are shown in **Table 4**. It can be seen that the digital trade rules in regional trade agreements still have a significant impact on digital services trade flows. Among them, the “Access and Facilitation” clauses have the greatest impact, followed by “Cross-Border Data Free Flow” clauses and “Privacy Protection and Data Security” clauses, with “Digital Intellectual Property” clauses coming last. The above analysis confirms that Hypothesis 1 holds.

4. Policy recommendations

4.1. Improving fundamental work for digital service trade

First, improve digital trade infrastructure. China should strengthen the top-level design and planning for network infrastructure construction, and formulate clear development strategies and action plans. This includes identifying priority areas for network infrastructure development, such as 5G, fiber optic networks, and data centers, as well

as formulating corresponding policies and regulations to guide and encourage investment in and construction of network infrastructure. Second, continuously enhance the level of higher education. In digital service trade, human capital is mainly reflected in workers' knowledge and skills, cultural and technical levels, and health status, among other aspects. These factors directly affect the ability to provide digital services and service quality. China should pursue the concept of building a strong education country, continuously promote educational reform, improve educational quality, attach importance to the cultivation of students' comprehensive quality and innovative ability, and train interdisciplinary talents; at the same time, the government should also formulate preferential policies to attract overseas talents, absorb advanced technologies and concepts from other countries, and facilitate China's own development ^[6].

4.2. Conditionally expanding opening-up in the digital sector

Among the secondary classification clauses of digital trade rules, the "Access and Facilitation Clauses" have the strongest positive promoting effect on digital service trade volume. Measures such as reducing e-commerce barriers, promoting paperless transactions, and strengthening the use of electronic authentication and electronic signatures not only improve the convenience of digital trade but also effectively reduce transaction costs, thereby driving the development of digital service trade ^[7].

The "Cross-Border Data Flow Clauses" also exert a positive impact on the development of digital service trade. While promoting the free flow of data, we should establish a hierarchical regulatory mechanism. For data involving national security, corporate privacy, and personal privacy, strict regulatory measures should be implemented to prevent potential risks; for normal commercial transaction data, its free flow should be ensured to boost the prosperity of digital service trade.

4.3. Strengthening intellectual property protection, expanding digital service trade markets, and stimulating innovation vitality

Most products in the digital service trade are knowledge-intensive, making intellectual property protection play a crucial role in this field. By providing economic incentives for innovators, intellectual property rights not only promote technological innovation but also create favorable conditions for optimizing the business environment and attracting foreign direct investment ^[8].

First, improve relevant laws and regulations, clarify the ownership and protection scope of intellectual property rights, and provide solid legal safeguards for right holders; second, strengthen law enforcement, crack down severely on infringement acts to safeguard legitimate rights and interests and boost market confidence; third, promote technological innovation, encourage enterprises and individuals to carry out R&D activities, thereby enhancing the practical value of intellectual property rights ^[9].

4.4. Improving relevant laws and regulations to safeguard national digital network security

The formulation of data security and privacy protection policies and rules directly affects consumers' acceptance and trust in digital services, and has become an important consideration in digital service trade. In formulating digital trade rules, it is necessary to strengthen international cooperation, upgrade data protection policies, and establish competitiveness and credibility in the global digital service market. Additionally, an effective network security regulatory mechanism should be established to ensure that digital services operate in a secure environment and reduce potential network risks ^[10].

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Zhou N, Chen H, 2020, Study on the Digital Trade Effect of American Digital Trade Rules under the Framework of RTAs. *The Journal of World Economy*, 43(10): 28–51.
- [2] Zhou N, Chen H, 2018, Typical Characteristics and Development Trends of the “European Model” of Digital Trade Rules. *International Economics and Trade Research*, 34(3): 96–106.
- [3] Gao L, Fan Y, 2020, New Progress in Global Digital Trade Rules and China’s Policy Choices. *International Economic Review*, (2): 162–173.
- [4] United States International Trade Commission (USITC), 2014, Digital Trade in the U.S. and Global Economies.
- [5] Peng Y, Yang B, Shen Y, 2021, How Do RTA Digital Trade Rules Affect Digital Service Exports?—From the Perspective of Heterogeneity of Agreement Clauses. *Journal of International Trade*, 2021(04): 110–126.
- [6] Zhou N, Li Y, 2021, Measurement and Heterogeneity Analysis of the Digital Trade Effect of Digital Intellectual Property Rules under the Framework of RTAs. *International Economics and Trade Research*, 37(05): 35–50.
- [7] Zhao J, 2021, Digital Trade Barriers and Policy Trends of Digital Transformation—Analysis Based on European and OECD Digital Trade Restriction Indices. *Journal of International Trade*, 2021(02): 72–81.
- [8] Zhou N, Chen H, 2019, Analysis of the Deepening and Expansion of the “American Model” of Digital Trade Rules Based on the USMCA. *Journal of International Trade*, 2019(09): 1–11.
- [9] Mao Y, Fang Y, 2023, Study on the Impact of the Evolution of Global Digital Trade Rules on the Export Value-added of ICT Products. *Journal of International Trade*, 2023(07): 84–96.
- [10] Li Y, 2021, Study on the Value Chain Trade Effect of Digital Trade Rules in FTAs. *International Economics and Trade Research*, 37(09): 99–112.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.