

Research on the Impact of Digital Service Trade Barriers on Domestic Manufacturing Productivity

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Abstract: This article selects the data of 210 listed companies in Shanghai and Shenzhen A-shares from 2014 to 2019, measures the digital service trade barriers and productivity growth of electronic information manufacturing enterprises, and uses a two-way fixed effect model to analyze the impact of digital service trade barriers on electronic information manufacturing enterprises. Its impact on productivity and mechanisms, and provide policy recommendations. The research results show that: (1) Digital service trade barriers for electronic information manufacturing enterprises are generally on an upward trend. (2) Digital service trade barriers for electronic information manufacturing enterprises have a significant inhibitory effect on their productivity.

Keywords: Manufacturing, Barriers to trade in digital services, productivity.

1. Introduction

Improving manufacturing efficiency is an important way to promote high-quality economic development. Our country's economy has shifted from a stage of rapid growth to a stage of high-quality development. It is now in a critical period of transforming development methods, optimizing economic structure, and transforming growth momentum. Building a modern economic system is an urgent requirement to cross the threshold and a strategic goal of my country's development, and manufacturing Improving industrial efficiency is an important way to promote high-quality economic development. Digital service trade has developed extensively around the world and has become an indispensable part of the digital economy of various countries. According to relevant data from the United Nations Conference on Trade and Development report, the proportion of global digital services trade increased from 48% in 2011 to 63.6% in 2020. Among them, information and communication services trade has the highest growth rate among digital services trade. From 2011 to 2020, the average growth rate of information and communication services trade was 7.7%; in 2020, information and communication services trade accounted for 22.2% of digital service trade. But at the same time, with the development of new trade models, global trade protectionism has gradually emerged. In addition to being affected by "endogenous technology", manufacturing productivity is also affected by many external factors, especially "systems" and "policies". Based on the above background, this article analyzes the impact of digital service trade barriers on the productivity of Chinese electronic information manufacturing enterprises by sorting out the relevant literature on manufacturing productivity and digital service trade barriers and puts forward countermeasures and suggestions.

2. Situation Analysis

2.1. Current status of digital service trade barriers for domestic electronic information manufacturing enterprises

By constructing the penetration of digital service trade barriers for each enterprise, this article can better study the impact of digital service trade barriers on the productivity of electronic information manufacturing enterprises. Based on this, this article refers to the practices of Zhou Nianli and Bao Yanan (2022) and Zhang Yage (2023), by constructing an index of penetration of enterprise digital service trade barriers. The specific formula is:

$$DSTR_{et} = dstr_{it} \times \frac{ICT_{pi}}{INPUT_{pi}} \times \frac{M_{epit}}{mM_{pit}} \quad (1)$$

The e represents the enterprise, t represents the year, p and i represent the province and industry in which the enterprise is located respectively. $DSTR_{et}$ is China's digital services trade restriction index corresponding to year t published by the OECD, $\frac{ICT_{pi}}{INPUT_{pi}}$ is the proportion of information transmission, software and information technology service investment in province p and industry i corresponding to the input-output table of Chinese provinces in 2017 to the total input in the input-output table. M_{epit} is the ratio of the input cost in year t corresponding to industry i in province p to the total cost of the enterprise; mM_{pit} is the median input cost proportion of electronic information manufacturing enterprises corresponding to industry p in year t in each province. The above data comes from the enterprise database in the wind database.

On the whole, the penetration of digital service trade barriers among my country's electronic information manufacturing enterprises is generally on an upward trend. Through the calculation formula, the overall situation of the penetration of digital service trade barriers for Chinese

electronic information manufacturing enterprises can be obtained. From the intuitive view of the bar chart in Figure 1, the penetration of digital service trade barriers for China's electronic information manufacturing enterprises from 2014 to 2018 showed an increasing trend year by year. The average penetration of digital services trade barriers for China's electronic information manufacturing enterprises from 2014 to 2018 was respectively 0.0337, 0.0337, 0.0401, 0.0519, 0.0564, with the most obvious growth in 2016 and 2017, with year-on-year growth of 18.8% and 29.5% respectively; the year-on-year growth in 2018 narrowed, falling to 8.7%, but the digital services of Chinese electronic information manufacturing enterprises The penetration of trade barriers is still on an upward trend. In 2019, the penetration of digital service trade barriers for Chinese electronic information manufacturing enterprises dropped to 0.0555, turning from positive to negative year-on-year, with a year-on-year growth of -1.5%.

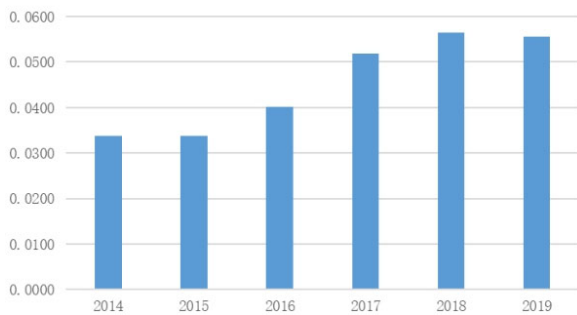


Figure 1. Penetration of digital service trade barriers among Chinese electronic information manufacturing enterprises from 2014 to 2019

2.2. The current situation of productivity of domestic electronic information manufacturing enterprises

This article measures the productivity of China's electronic information manufacturing enterprises through total output and intermediate input, which is more consistent with the actual situation. Therefore, this article refers to the measurement method of single factor productivity to construct productivity indicators of manufacturing enterprises that are consistent with this article. The specific formula is:

$$PR_{et} = \frac{Y_{et}}{M_{et}} \quad (2)$$

The e represents a listed company and t represents the year. PR_{et} represents the productivity of listed enterprise e in year t . Y_{et} is the total output of listed company e in year t , expressed by the income in the financial statements of listed companies; M_{et} is the intermediate investment of listed company e in year t , represented by the cash paid for goods purchased and services received in the financial statements of the listed company. The higher the value, the higher the productivity of listed companies e .

The overall productivity of my country's electronic information manufacturing enterprises has declined slightly. Judging from the average productivity of electronic information manufacturing enterprises, as shown in Figure 2, the productivity of my country's electronic information manufacturing enterprises does not continue to decline, but fluctuates from year to year, but the productivity is always

higher than 1.7. Among them, the productivity of my country's electronic information manufacturing enterprises has increased in the two time periods of 2015-2016 and 2018-2019. Among them, it reached 1.7621 in 2016, which was the highest value in the past six years. After 2016, the productivity of my country's electronic information manufacturing enterprises has declined year by year, reaching 1.7226 and 1.7026 in 2017 and 2018 respectively. It rose slightly to 1.7145 in 2019, but is still lower than the level in 2014.

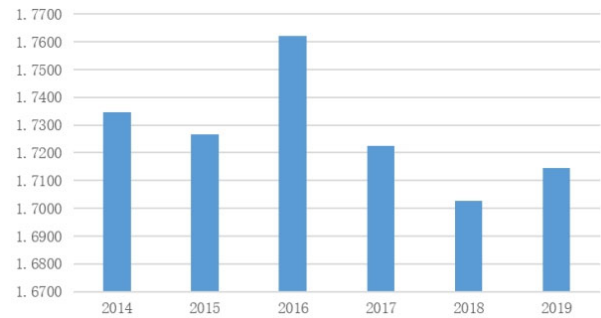


Figure 2. Productivity of China's electronic information manufacturing enterprises from 2014 to 2019

3. Analysis of the Impact of Digital Service Trade Barriers on The Productivity of My Country's Electronic Information Manufacturing Enterprises

This article believes that there is a linear relationship between the impact of digital service trade barriers on the productivity of electronic information manufacturing enterprises, so we first build a model to test this linear relationship. The specific model is as follows:

$$PR_{et} = \alpha_0 + \alpha_1 DSTRI_{et} + \rho Control + \mu_i + \varphi_t + \varepsilon_{it} \quad (3)$$

The PR_{et} is the productivity of electronic information manufacturing enterprise e in year t , $DSTRI_{et}$ is the enterprise digital service trade barrier, which is the explanatory variable of this article. $Control$ is the set of control variables, μ_i are local fixed effects, φ_t is a time fixed effect, ε_{it} is a random disturbance term.

Based on the assumptions and model settings proposed above, the baseline model is first verified, and Table 1 below presents the regression results. Column (1) shows the results without control variables. It can be seen that digital service trade barriers have a significant impact on the productivity of electronic information manufacturing enterprises and play a significant hindering role. The regression of digital service trade barriers The coefficient is -0.265 and is significant at the 1% confidence level. Columns (2) to (4) are regression results after adding control variables, single fixed effects and two-way fixed effects models. Judging from the results in the last column, the impact coefficient of digital service trade barriers on the productivity of electronic information manufacturing enterprises is -0.861, and is significant at the 1% level, which proves that hypothesis 1 of this article is established. Digital service trade barriers can indeed significantly inhibit the productivity improvement of electronic information manufacturing enterprises.

Table 1. Baseline regression results

	(1) lnPR	(2) lnPR	(3) lnPR	(4) lnPR
lnDSTRI	-0.2651*** (0.0120)	-0.6074*** (0.0178)	-0.5440*** (0.0173)	-0.8616*** (0.0141)
lnage	-0.0554*** (0.0096)		0.2063*** (0.0167)	-0.0238* (0.0129)
size	0.0192** (0.0089)		0.0989*** (0.0142)	0.0315*** (0.0096)
dta	-0.5430*** (0.0524)		-0.2235*** (0.0596)	-0.3274*** (0.0391)
IR	0.2647*** (0.0742)		0.6667*** (0.0558)	1.1298*** (0.0384)
CF	0.1427*** (0.0222)		-0.0096 (0.0143)	-0.1243*** (0.0098)
_cons	-0.1167** (0.0517)	-1.4904*** (0.0579)	-2.1413*** (0.0958)	-2.2637*** (0.0644)
Id_fe	No	Yes	Yes	Yes
Year FE	No	Yes	No	Yes
N	1260	1260	1260	1260
adj. R2	0.4241	0.8358	0.8440	0.9340

4. Conclusion

Based on the relevant conclusions drawn from the above empirical analysis, this section provides corresponding countermeasures and suggestions for weakening the inhibitory effect of digital service trade barriers on the productivity of the electronic information manufacturing industry. This is not only of unique significance to the electronic information manufacturing industry, but also to the national manufacturing industry. Ideas for contribution to corporate productivity improvement.

4.1. The country should continue to promote the opening up of service trade

The state should minimize restrictions on cross-border digital services trade, lower barriers to digital services trade, provide a free macro-environment for the transnational supply of digital services and the international exchange of digital technologies, and activate corporate innovation. Without affecting data security and national security, our country should promote full coverage of digital infrastructure as much as possible, support the free flow of data to form a widely shared information network, promote the deep integration of production factors and digitalization, and strive to build a complete intellectual property protection law system, reduce the obstacles and concerns of overseas digital service providers, and leverage my country's advantages in network coverage, information storage, population and market size to expand the international digital service market share. Introducing more advanced foreign digital services into the domestic market will enhance the company's own R&D and innovation level, reduce transaction costs, and thus promote the continuous improvement of the productivity of electronic information manufacturing companies.

4.2. Enterprises need to continuously maintain innovation momentum and further improve productivity

Enterprises need to start from R&D, intelligent manufacturing, cooperation and sharing, employee training and green manufacturing, and continue to work hard and innovate. Enterprises can improve product quality and

technical content by strengthening R&D investment and technological innovation, thereby increasing product added value and increasing market competitiveness; secondly, enterprises can realize production automation and intelligence by adopting intelligent manufacturing systems, reducing manual operations and error rates. , improve production efficiency and quality, and improve enterprise production benefits; furthermore, enterprises can achieve common development in technology, experience, resources, etc., and improve innovation capabilities through cooperation and sharing. At the same time, they must continuously train and improve employee skills so that employees can master The latest production technology and processes, thereby improving work efficiency and productivity; finally, because the electronic information manufacturing industry requires a large amount of resource investment, companies can reduce resource waste by promoting green manufacturing and recycling, thereby improving resource utilization efficiency and reducing corporate costs. , to further improve enterprise productivity and competitiveness.

4.3. Enterprises need to reduce transaction costs to maintain their competitiveness and increase productivity

Electronic information manufacturing is a capital-intensive industry, and transaction costs between enterprises are high. Therefore, how to reduce transaction costs and improve productivity is the key for enterprises to cope with market competition. Enterprises can use e-commerce platforms for transactions, saving costs in transportation, mailing, storage, etc. At the same time, the payment and logistics services of e-commerce platforms can also reduce enterprises' transaction costs and improve production efficiency. At the same time, companies can strengthen supply chain management and reduce inventory costs. Enterprises can establish long-term partnerships with suppliers, implement on-demand production, reduce inventory, avoid stranded funds, reduce unnecessary costs, and improve production efficiency. Finally, companies can optimize production processes and improve equipment utilization. By optimizing the production process, enterprises can reduce equipment idle rates and improve equipment utilization, reduce production costs, and improve

enterprise production efficiency.

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