

The Impact of Advanced Manufacturing Agglomeration on the Complexity of Export Technology

-- Take the Yangtze River Delta as an Example

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Abstract

Summary of content: Based on the panel data of 35 cities in the Yangtze River Delta region of China from 2005 to 2021, the fixed effect model and static threshold model are used to empirically inspect the influence mechanism and hypothesis of the complexity of the advanced manufacturing export technology of the long triangle region. From the perspective of economic openness, explore the threshold effect of advanced manufacturing agglomeration in the Yangtze River Delta region. Studies based on the fixed effect model found that the advanced manufacturing agglomeration of the Yangtze River Delta region has a positive role in promoting the improvement of the complexity of manufacturing export technology. Studies based on the static threshold model found that the improvement of advanced manufacturing agglomeration in the Yangtze River Delta region has a significant single threshold effect. When the economic openness is less than or equal to the threshold value, the advanced manufacturing agglomeration has a negative effect on the improvement of regional all -factor productivity; when the economic openness is greater than the threshold value, the advanced manufacturing agglomeration has a positive effect on the improvement of regional full factor productivity. The conclusion of research has certain policy meaning in the context of provinces and cities and cities in the Yangtze River Delta region to optimize advanced manufacturing agglomeration and improve the complexity of manufacturing export technology.

Keywords

The Yangtze River Delta Region; Economic Openness; Advanced Manufacturing Agglomeration; Export Technology Complexity; Static Threshold Model.

1. Introduction

At present, China's manufacturing industry is in a critical period of transformation and upgrading, and has gradually transformed from a large manufacturing country to a manufacturing power. In the 19th National Congress of the Communist Party of China in 2017, the goal of developing world -class advanced manufacturing clusters was proposed. Subsequently, in November 2022, the Ministry of Industry and Information Technology announced the list of 45 national advanced manufacturing clusters and emphasized the importance of accelerating the cultivation of these clusters. The development of advanced manufacturing helps China to the mid -to -high -end in the global value chain division, and it is of great significance to the transformation of China into a strong manufacturing country; vigorously cultivating advanced manufacturing clusters can solve the " The problem of stuck neck is of great significance for the advanced technology blockade of western countries. Since

joining the WTO in 2001, the import and export of goods in my country has undergone significant changes: the total import and export value of China's goods trade has achieved rapid growth, and the export product structure has undergone significant changes. However, compared with developed countries, the largest export share in my country is still concentrated in low value -added areas (Wang Siyu et al., 2023). The overall export technology has a low level of complexity and low export profits. The cultivation and development of advanced manufacturing clusters can enhance the overall production and innovation level of my country's manufacturing industry, and improve the technical complexity of my country's export products. At present, in the face of some technological barriers in the high -tech field, in -depth research on the role of advanced manufacturing agglomeration for improving the complexity of manufacturing export technology is particularly critical to the quality of China's export quality. This not only helps enhance China's innovation ability, but also helps break through external technical restrictions. The improvement of the level of manufacturing technology in China will help improve the quality of Chinese products and innovate independently, thereby laid a solid foundation for my country's goal of becoming a powerful country.

2. Literature References

There are three main aspects of the research dynamics of advanced manufacturing agglomeration pairs of export technology complexity.

2.1. The Impact of Industrial Agglomeration on the Complexity of Export Technology

The results of most scholars show that industrial agglomeration can increase the technical complexity of product exports. Research by Yu Shan and Fan Xiufeng (2022) found that the agglomeration and innovation of high -tech industries can effectively promote the improvement of export technology complexity, and the combination of the two has a coordinated effect on improving the complexity of export technology. In addition, when the high -tech industrial agglomeration reaches a certain threshold, the promotion effect of innovation on export technology complexity will be strengthened. Liu Lin (2021) research shows that the agglomeration of the productive service industry mainly promotes the upgrade of the local manufacturing exports by providing a variety of external effects. However, the competitive externality brought about by the agglomeration of the productive service industry has produced a certain inhibitory effect on export upgrades. On the other hand, Liu Zhuqing et al. (2014) analyzed the micro -impact on China's export trade through HECKMAN selected a model. In terms of increasing export probability and export volume, it has promoted the "binary margin" development of China's export trade. Liu Honguo (2016) Based on the analysis framework of "heterogeneous enterprises" and "cost discovery" to build the theoretical model, it is a hypothesis: the higher the degree of industrial agglomeration in a region, the more conducive to reducing the production cost of export manufacturers in the region and reducing the production cost of exporters in the region and reducing Its productivity threshold enters the export market, which in turn has promoted the upgrading of the complexity of export technology in the area. Sun Et Al (2018) Study from 1998-2007 China Manufacturing Data found that: Chinese manufacturing agglomeration increases the probability and export of enterprises.

2.2. The Effects of Different Agglomeration Types on Export Technology Complexity

From multiple perspectives, we can divide industrial clusters in the same area into multiple types. According to the nature of the industry's industry, industrial clusters can be classified as professional clusters, diversified clusters, and market competitive clusters, and then study how

these different types of clusters affect the technical complexity of export products. Zhou Yi and He Canfei (2018) used the statistics of the import and export of China Customs by 2000-2011 to build different types of agglomeration economy and product technology complexity indicators to study the micro mechanism of different types of agglomeration economy influenced the evolution of China's export products. Way and function. Studies have found that diversified agglomerations are not only conducive to increasing the probability of high-tech complex products, but also significantly reduced the risk of exit of high-tech complex products, and specialized agglomeration increases the risk of exit of high-tech complex products. Gong Xinshu (2019) deeply analyzed the specific impact of different types of high-tech industrial cluster models on export technology complexity. It is found that professional clusters can bring positive knowledge and technology overflow, thereby positive promotion of the technical complexity of export products.

2.3. The Impact of Industrial Collaboration on the Complexity of Export Technology

Some researchers have discussed the role of industrial collaboration on export technology complexity. For example, Fu Jianyuan and Liu Honguo (2017) discovered that the development of financial agglomeration helps to promote the development of the industrial structure in a more reasonable and high-end direction, which in turn has promoted the improvement of regional export technology complexity, although this effect exists between different regions in different regions difference. The study of Yao Zhanqi (2020) pointed out that human capital has a significant impact on improving the complexity of China's export technology, and the collaborative agglomeration of the intellectual dense service industry and the manufacturing industry. It has an important role. The research of Qi Junyan and Xiang Ontin (2020) revealed that the degree of opening up in the financial industry has a different impact on the complexity of industries with different dependence of finance. Especially for industries that rely on finance, financial openness can significantly promote it to promote it. The technical complexity of export products increases. Xu Ziyang et al. (2021) used provincial panel data to analyze how the collaborative agglomeration of knowledge-intensive services and manufacturing industries affect the complexity of export technology. As a result, this collaborative agglomeration has enhanced regional innovation capabilities to enhance the technical complexity of export products to improve the technical complexity of export products. Among them, regional innovation plays an intermediary. Yao Zhanqi (2021) used the analysis method of structural equation model and intermediary effects to conduct empirical research on the collaborative agglomeration effects of the intellectual dense service industry and the manufacturing industry. positive influence. The research by Liu Chi and Lu Tingting (2023) found that the combination of productive service industry and high-tech manufacturing can improve technological innovation capabilities, thereby promoting the improvement of export technology complexity. opposite sex.

Through the comprehensive analysis of existing literature, the three main deficiencies of the research on industrial clusters on export technology complexity can be summarized. First of all, although there are many literature on industrial cluster, export technology complexity, and their interrelationships, the research on advanced manufacturing clusters and its complexity on manufacturing export technology is relatively small. At the same time The angle analysis of its influence is not sufficient. In addition, the current research has not been detailed in explaining the specific mechanism of industrial clusters on the complexity of manufacturing export technology. In particular, the lack of in-depth research on the impact mechanism is lacking to deepen the impact mechanism by using intermediary effects. Finally, most research focuses on the linear effects of industrial clusters on the complexity of export technology, and insufficient attention on potential non-linear effects.

Based on the above research review, this study will use panel data in 35 cities in the Yangtze River Delta region from 2005 to 2021 to focus on the phenomenon of advanced manufacturing agglomerations in the Yangtze River Delta -level city -level cities. Studies will start from two aspects: First, study the direct effect of the advanced manufacturing agglomeration of the long triangle region to the complexity of export technology. Non -linear effect. The marginal contribution of the article is mainly reflected in the following two aspects: (1) In terms of research content, it enriches the literature on the influence of advanced manufacturing agglomeration pairs of export technology of the manufacturing industry; As a threshold variable, the impact of the advanced manufacturing agglomeration of the Yangtze River Delta region on the complexity of the export technology of the manufacturing industry.

3. Mechanism Analysis

Advanced manufacturing agglomeration pairs of the mechanism of complex improvement of manufacturing exports, as well as the mechanism of role in the process of economic openness in advanced manufacturing agglomeration affecting the complexity of manufacturing export technology as follows: as follows:

(1) The mechanism and hypothesis of the improvement of the complexity of the export technology of the manufacturing industry

1) The mechanism of action. There are three main aspects:

① Human capital agglomeration effect. Human capital agglomeration effects are divided into three aspects, one is the reduction of the cost of matching talents in enterprises. Advanced manufacturing agglomerations will attract a large number of talents. A large number of talents of talents are conducive to the two -way choice between enterprises and talents, reduce the matching time costs between the two parties, and also help enterprises find the most suitable talents at the same salary level. Cost investment. The reduction of cost investment has enabled enterprises to have more abundant funds to invest in R & D and production activities, improve the level of production technology of the enterprise, and enhance the international competitiveness of export products. The large number of talents in the agglomeration area and the shortened geographical distance, which facilitates the communication, communication, learning, knowledge and technology can spread faster, which can cause the influence effect of knowledge technology, improve the level of technological innovation in the region; The gathering of talents to produce collaboration and competitive effects, which is conducive to the technological innovation activities of the enterprise. The cooperation between different enterprises and the internal talents within the enterprise, and the mutual competition formed by the talents in virtue will cause them to work hard to achieve better results. Overall innovation.

② Multiple scale economic effects. Enterprises sharing transportation, water supply, sewage treatment, large manufacturing equipment, R & D centers and other public facilities and infrastructure in advanced manufacturing agglomeration areas can obtain the benefits of the industrial cluster economy. With the expansion of the enterprise scale, the economic effect of the static scale is prominent, the fixed costs of each product have decreased, and the cost of unit product costs decreases. At the same time, the advanced manufacturing cluster has a significant dynamic scale economic effect, and the accumulation of "dry middle school" and experience accumulation are positively related to the production efficiency of enterprises.

③ Multiple economic externality. The agglomeration of enterprises in a certain geographical space is conducive to the interaction and exchanges between enterprises, which can accelerate the overflow and spread of knowledge and technology, and promote technological progress of enterprises. According to knowledge or technology overflow, whether it occurs in the same industry or different industries, and externality is divided into MAR external nature (1920) and

Jacobs external nature (Jacobs, 1969). In addition, companies that produce homogeneous or similar products in the agglomeration area will continue to innovate due to competitive pressure. This technological innovation brought by competition is called Porter externality (Porter, 1990).

2) hypothesis. According to the influence of the influence of the complication of the export technology of the manufacturing industry, hypothesis 1 is proposed.

Hypothesis 1: Advanced manufacturing agglomeration can promote the improvement of the complexity of the export technology of manufacturing.

(2) Economic Openness in the process of the complexity of the export technology of manufacturing exports in advanced manufacturing industry

1) The mechanism of action. The mechanism of economic openness in the process of the complexity of the export technology of manufacturing exports in advanced manufacturing industry has both positive and negative effects.

① Positive effect: There are two main effects. The first is the factor agglomeration effect. Opening to the outside world is an important factor affecting technological progress and research and development innovation (Feng Delian et al., 2020). With the improvement of economic openness, the cost of free entering and leaving a country or region of enterprises has decreased, and the low-cost driving force for advanced manufacturing agglomeration has increased. Foreign-funded enterprises can bring advanced technology, human capital and management experience to advanced manufacturing clusters. Elementation and learning innovation atmosphere can promote the integration and creation of new ideas, new ideas, new technologies, and new knowledge, and promote technological innovation of enterprise. The second is the market competition effect. With the improvement of economic openness, the positive impact of high-tech industry agglomeration on industrial efficiency will increase (Yang Shouyun et al., 2019), and high-efficiency enterprises in foreign countries have entered more and more domestic markets. Increased competition in corporate competition caused by the expansion of clusters will increase the demand for production factors of the enterprise, and rising factors demand will cause rising factor prices. Rising element prices will inevitably increase corporate production costs and decline in operating profits, and low-efficiency enterprises in the cluster will be eliminated. With the withdrawal of low-efficiency companies in the cluster, the overall efficiency of the industry has improved.

② Negative effect: There are two main effects. The first is the protection effect of the mother country. The protection effect of the mother country refers to the economic protection of the domestic enterprises through a lower economic open policy, which is exempted from the impact of foreign enterprises. However, enterprises are rarely faced with competitive pressure in the international market, which may cause enterprises to be at ease and forge ahead, and lack the motivation and pressure to improve the complexity of export technology. Imported competition can inspire enterprises to invent and innovate, improve the quality of innovation of enterprises, and stimulate enterprises to carry out high-level innovation (Li Wenjing and Zheng Manni, 2018). In the international market, the competitive pressure of competitors is an important driving force for enterprises to continuously improve their technical level and product quality. The second is the technological innovation effect. Low economic development means that companies have less opportunities to contact and learn the latest international technology and management experience, which is not conducive to the introduction of advanced foreign technology and management experience in Chinese companies, which may lead to the lack of technological innovation environment and conditions for enterprises. At the same time, low economic development will not be conducive to domestic enterprises using foreign capital to carry out technical research and development innovation (Qi Junyan and Xiang Ontin, 2020). Technological innovation is one of the important means for enterprises to

improve export technology complexity. Lack of technological innovation will directly affect the complexity of the export technology of the enterprise.

2) hypothesis. According to the mechanism of economic openness in the process of the complexity of the export technology of the manufacturing industry, hypothesis 2 is proposed.

Hypothesis 2: The impact of advanced manufacturing agglomeration pairs of the complexity of the export technology of the manufacturing industry has the threshold effect of economic openness. When the economic openness is less than or equal to the threshold value, the advanced manufacturing agglomeration is inhibited by the complexity of the manufacturing export technology; when the economic openness is greater than the threshold value, the advanced manufacturing agglomeration is promoted by the complexity of the manufacturing export technology.

4. Model Construction and Variable Description

(1) Model setting

In order to verify that the advanced manufacturing agglomeration of the Yangtze River Delta can promote the improvement of the complexity of the export technology of the manufacturing industry (hypothesis 1), and build a panel regression model. In order to verify the impact of the advanced manufacturing agglomeration of the Yangtze River Delta's advanced manufacturing industry, the effect of the complexity of the export technology of the manufacturing industry has the threshold effect of economic openness (hypothesis 2), refer to the static threshold model proposed by Hansen (1999) to establish the TFP threshold regression model. Panel regression models and static threshold regression models are as follows (1) and formula (2), respectively.

$$LNEF_{it} = A + \alpha_1 LQ_{it} + \sum \alpha_j X_{it}^j + \mu_{it} \quad (1)$$

$$LNEF_{it} = B_1 + \beta_1 LQ_{it} I(OP_{it} \leq \tau) + \beta_2 LQ_{it} I(OP_{it} > \tau) + \sum \beta_j X_{it}^j + \mu_{it} \quad (2)$$

In the formula (1) and formula (2), the bidding i represents a city in the Yangtze River Delta. T represents the time of time. $LNEF_{it}$ is the explanatory variable, indicating the complexity of the export technology of the manufacturing industry; LQ is the core explanation variable, and it is also a threshold dependency variable, indicating the agglomeration of advanced manufacturing; OP is a threshold variable, indicating economic openness; Indicator function, τ is threshold estimation value; X_{it}^j is Control variables, including government technology investment TI , financial development level FD , infrastructure level $INFR$ and economic development level ED ; μ_{it} is Random error item, A and μ_{it} is the interception item.

(2) variable explanation

1) Explained variables. It is the complexity ESF of urban manufacturing export technology ESF in the Yangtze River Delta region. Based on the above -mentioned research on the complexity of the calculation of export technology, this article refers to the research method of Hausmann et al (2007), and according to the HS dual-digit-coding product classification and the National Economic Industry Classification Notes released by the National Bureau of Statistics Matching, there are 28 export data in the manufacturing industry. In order to measure the complexity of the export technology of different products, this study adopts a method of calculating the complexity of the export technology: first determine the proportion of a certain product in the export of a specific country, and and and and. With reference to the country's share of the global export of the same product, it is calculated to calculate a weighted coefficient. Then, the

application of this coefficient weighted the technical index of each exporter, and then obtained the complexity of the overall export technology of the product. Drawing on the study of XU & LU (2009), you can use the per capita national GDP (GNP) to represent labor productivity. Through this method, the product export technology complexity ($prody_h$) of the year of the year can be estimated, which reflects the technical level and international competitiveness of a country in the export of specific product exports.

$$prody_h = \sum_{q=1}^n \frac{\frac{X_{q,h}}{X_q} Y_q}{\sum_{q=1}^n \frac{X_{q,h}}{X_q}} \tag{3}$$

In Formula 3, the bidding H and Q are products and exporters, respectively. $X_{q,h}$ means the export amount of products in countries of Q, and X_Q is the total export of national products value. At the same time, refer to the calculation method of Zhou Mao et al. (2019). After obtaining the data at the product level, we will add it to the province (city) level at the level of the product export, and then obtain the exports of exports of the three provinces and one city in the Yangtze River Delta region. Technical complexity data, the specific method is shown in 4 Gong 4:

$$ES_f = \sum_{h=1}^n \frac{X_{f,h}}{X_f} prody_h \tag{4}$$

In Formula 4, the bidding F represents the province (or city), ES_f is the complexity of export technology at the provincial (city) level. $X_{f,h}$ is the export amount of the province H products. Export amount.

$$ESF_i = Z_i \times ES_f \tag{5}$$

In Formula 5, the bidding i represents the city. ESF_i is the complexity of export technology of i cities. Z_i is the proportion of the added value of the tertiary industry in cities I. Finally, the practice of reference to the banknote small Jing et al. (2020) uses the value -added of the third industry at the urban level of the Yangtze River Delta region to multiply with the complexity of the provincial (city) level export technology to obtain the prefecture -level city -level export of the Yangtze River Delta region Technical complexity data.

2) Core explanation variables. It is the Advanced Manufacturing Industry (LQ) in the Yangtze River Delta region. The practice of Fan Xiufeng and Kang Xiaoqin (2013) was used to use location business to calculate advanced manufacturing agglomeration, such as models (6).

$$LQ_{it} = \frac{f_{it} / p_{it}}{F_t / P_t} \tag{6}$$

In the formula (6), LQ_{it} is the advanced manufacturing agglomeration of the first year of the Ichi city in the Yangtze River Delta region. The total number of employment of the first year of the city; F_t and P_t respectively indicate the total number of advanced employees in the 25

cities in the Yangtze River Delta region in the Yangtze River Delta region in the T -years and the total number of employment in the year T. Among them, the number of advanced manufacturing practitioners is the annual average number of employees in industrial enterprises above designated size. According to the "New Industry and New Business Model Statistics Classification Classification (2018)" (Guo Tongzi [2018] No. 111), the advanced manufacturing industry and the industry of the National Economic Industry (GB/T 4754-2017) industry (GB/T 4754-2017) Classified standards (Wu Bin, 2021), select 14 advanced manufacturing, namely: chemical raw materials and chemical products manufacturing, pharmaceutical manufacturing, chemical fiber manufacturing, rubber and plastic products (2002 national industry classification The standards are divided into two independent industries: "rubber product industry" and "plastic products industry"). Non -metal mineral products, black metal smelting and pressure -delay industry, non -ferrous metal smelting and extension industry, metal products, universal equipment, universal equipment, universal equipment Manufacturing, dedicated equipment manufacturing, railway, ships, aerospace and other transportation equipment manufacturing (the "transportation equipment manufacturing industry"), electrical machinery and equipment manufacturing, computers, communications and other electronic equipment manufacturing industries , Instrument Manufacturing.

3) Threshold variables. It is the urban economic openness (OP) in the Yangtze River Delta region. With reference to the National Development and Reform Commission International Cooperation Center's Open Research Group (2018) calculation ideas for economic openness indicators, select export dependence (the proportion of total exports accounted for GDP), import dependence (total imports accounted for national production of national production) The proportion of total value), the actual use of foreign capital accounts (the proportion of foreign investment in the total of foreign investment), and the number of receiving the number of foreign tourists are calculated and measured the economic openness. The average exchange rate of RMB in the "China Statistics Yearbook" converts the import or export trade amount measured by US dollars in the US dollar, and uses the GDP flat reduction index in 2005 as the converted import trade amount, export trade volume, actual use of foreign capital, and actual use of foreign capital and investment. The total product value of the country is settled.

4) Control variables. There are 4 variables. Government Science and Technology Input (TI): The proportion of scientific and technological investment in general public budgets in general public budgets is measured. The level of financial development (FD): The proportion of RMB deposit loans accounted for GDP. The development of the financial market is conducive to the reasonable allocation of factor, facilitates enterprises to make financing and production, and improves the production efficiency of enterprises. Infrastructure level (INFR): The proportion of a certain urban highway mileage accounted for the sum of all the mileage of all urban highways. The continuous improvement of infrastructure levels is conducive to improving the production efficiency of enterprises and reducing costs. It also promotes the improvement of production technology by attracting industrial agglomeration to promote the level of production technology, thereby increasing the complexity of export technology. Economic Development level (ED): Measured the per capita GDP level. Places with high level of economic development often have higher scientific and technological innovation capabilities and a more open economic environment, which are conducive to promoting the improvement of export technology complexity.

(3) Data source and descriptive statistics

Using 35 cities in 35 cities in the Yangtze River Delta 2005-2021 balanced panel data. The data comes from the Chinese customs import and export statistics database, CNDRS China Research Data Service Platform, National Research Network Trade Database, UN Comtrade Database (Un Comtrade Database), China Economic Network Long Triangle City Group and Urban Annual Statistics Database, "China Statistics Statistics "Yearbook" and statistical yearbooks and

statistical bulletin in various cities. To ensure the integrity and accuracy of the data, some missing data is filled with interpolation method.

5. Empirical Analysis

(1) The reference regression results

The panel regression model is the type (1) to do the Haosman test. The test results show that the original assumptions are rejected at a significant level of 1%, indicating that the panel regression model here is more appropriate to use a fixed effect model. Table 1 (1)-(5) is listed as a gradual benchmark return result with the complexity of the manufacturing export technology as the complexity of the manufacturing export technology. It can be seen that in columns of gradual benchmark regression (1)-(5), advanced manufacturing agglomeration (LQ) has passed at least 1% of the significant level, and the coefficients are positive. The collection of karma has significantly promoted the improvement of the complexity of the export technology of the manufacturing industry, and the gradual return results are relatively stable, and the hypothesis 1 is verified. In columns (1)-(5) in the return results, all the fitting advantages value of the fitting is around 0.98, indicating that the backfitting effect of the model return is very good, and in the result (1) Can well explain the improvement of the complexity of the export technology of manufacturing.

Table 1. benchmark regression results

Explanatory variables	(1)	(2)	(3)	(4)	(5)
LQ	0.048***	0.054***	0.053***	0.049***	0.042***
	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)
FD		0.065***	0.071***	0.066***	0.051***
		(0.015)	(0.016)	(0.016)	(0.017)
TI			0.930**	0.927**	1.193***
			(0.443)	(0.441)	(0.452)
INFR				-2.047**	-1.663*
				(0.887)	(0.896)
ED					-0.010**
					(0.004)
C	8.708***	8.572***	8.559***	8.629***	8.675***
	(0.018)	(0.037)	(0.037)	(0.048)	(0.051)
Time fixation	yes	yes	yes	yes	yes
Urban fixation	yes	yes	yes	yes	yes
N	595	595	595	595	595
R2	0.979	0.980	0.980	0.980	0.980

Note: The values in brackets are the standard deviation, and *, **, and *** represent 10%, 5%, and 1% significant levels, respectively.

Study control variables. After adding the control variable financial development level (FD), the FD coefficients of FD in the model (2)-(5) are positive, and they have passed the significant level of 1%, indicating that the improvement of financial development level is in the Yangtze River Delta at the Yangtze River Delta at the Yangtze River Delta. The region has a positive impact on the technical complexity of the manufacturing export. Government technology input (TI) has passed the significant inspection at 5% level in the regression results (3) and (4), and passed a significant inspection at 1% level in the return result (5), and The coefficients in the return results (3), (4), and (5) are positive, indicating that increasing government investment in the

field of technology has a positive effect on improving the technology content of manufacturing export products. The coefficient of infrastructure level (INFR) is negative, and 5% and 10% of the significant level inspection is passed in the return results (4) and (5), indicating that the optimization of urban infrastructure has not improved the export of manufacturing exports. Technical complexity has a positive effect. This may be because infrastructure construction requires a lot of capital investment, and the increase in government expenditure in infrastructure may lead to relatively reduced scientific research funding. The reduction of scientific research input may have a negative impact on innovation activities, thereby curbing scientific and technological progress, and adversely affecting the improvement of the technology complexity of the manufacturing industry. The coefficient of economic development (ED) is negative, and inspection is passed at a significant level of 5%, which indicates that economic growth may not be conducive to the improvement of the complexity of manufacturing export technology. This phenomenon may stem from the improvement of the economic development level of the country, which has led to the appreciation of the currency in the country, affecting export competitiveness, and is not conducive to export trade, which has a negative impact on the technical complexity of manufacturing export products.

(2) Stability analysis

In order to ensure the reliability of the renovation result of this article, a stable test was performed. Test three methods: replacement core interpretation variables, division division, and clustering division. The first is to use replacement core explanation variables. In the previous reference, the number of advanced manufacturing agglomerations is measured by the number of advanced manufacturing employees above the designated size of the city level above designated size in the Yangtze River Delta region. The degree of agglomeration in the manufacturing industry is shown in Table 2 "replacement core interpretation variables" columns. The coefficient of advanced manufacturing agglomeration is positive and passed a significant test at 10% level, indicating that the advanced manufacturing agglomeration of the Yangtze River Delta region has promoted the improvement of the complexity of the manufacturing export technology. The reference regression results are basically consistent. The second is to use the division division to replace the sample. Adopting the division division method to explain the core explanation variables of the advanced manufacturing industry to divide the three parts: low, medium and high, and only retain the core interpretation of the two parts of the high and low part of the core explanation. Sub-column. The coefficient of advanced manufacturing agglomeration is positive and passed a significant test at 10% level, indicating that the advanced manufacturing agglomeration of the Yangtze River Delta region has promoted the improvement of the complexity of the manufacturing export technology. The results are basically consistent with the reference regression results. The second is to use clustering to replace samples. The clustering method was adopted to analyze the advanced manufacturing agglomeration, and the KMEAMS cluster was analyzed, three groups were produced, and a group was removed for regression. The coefficient of advanced manufacturing agglomeration is positive, and passed a significant test at 10% level, indicating that the advanced manufacturing agglomeration of the Yangtze River Delta region has promoted the improvement of the complexity of the manufacturing export technology. The results of the benchmark regression are basically consistent.

Therefore, from the above series of stable test results, we can think that the rear regression results obtained in this article are relatively stable.

Table 2. Stable test results

Explanatory variables	Replace the core explanation variable	Division division	Cluster
LQ	0.038*	0.042**	0.038*
	(0.021)	(0.017)	(0.020)
TI	1.220***	2.106***	0.838
	(0.456)	(0.647)	(0.575)
FD	0.042**	0.018	0.053**
	(0.017)	(0.025)	(0.026)
INFR	-1.813**	-3.124**	-1.097
	(0.899)	(1.347)	(1.369)
ED	-0.012***	-0.013**	-0.013**
	(0.004)	(0.005)	(0.005)
C	8.709***	8.793***	8.608***
	(0.050)	(0.073)	(0.075)
Time fixation	yes	yes	yes
Urban fixation	yes	yes	yes
N	595	397	357
R2	0.980	0.977	0.979

(3) Endogenous Analysis**Table 3.** endogenous test results

Explanatory variables	System GMM
L.LNESF	0.935***
	(0.009)
LQ	0.019**
	(0.009)
TI	1.151***
	(0.308)
ED	0.009***
	(0.002)
FD	-0.071***
	(0.004)
INFR	0.030
	(0.043)
C	0.799***
	(0.070)
Time fixation	yes
Urban fixation	yes
AR(1)	0.000
AR(2)	0.330
N	560
F	19610

Because the regression model (1) There may be endogenous issues such as two -way cause and effect between the omitted interpretation variables or the advanced manufacturing agglomeration and the complexity of export technology. This article adopts a broad torque estimation method -the system GMM, which will be explained by the lag of the interpretation

variable LNESF. The period is used as a tool variable to perform a two -step system GMM estimation. The return results are shown in Table 3. The results of Table 6 show that the coefficient of advanced manufacturing agglomeration LQ is positive and passed a significant test at a level of 5%, indicating that the advanced manufacturing agglomeration of the Yangtze River Delta region has promoted the improvement of the complexity of the manufacturing export technology. The value of AR (1) is less than 0.05, and the value of AR (2) is 0.33, greater than 0.1, and F has 19610, indicating that the selection of tool variables is reasonable. Therefore, endogenous testing shows that under the circumstances of endogenous problems, the advanced manufacturing agglomeration of the Yangtze River Delta region still promotes the improvement of the complexity of the manufacturing export technology. The reference result of this article is reliable.

(4) Back to the static panel threshold with economic openness as a threshold variable

Based on the static threshold model of economic openness as a threshold variable, the regression analysis. The threshold regression model is the type (2), with economic openness as the threshold variable, and the accumulation of advanced manufacturing as the core to explain variables, and the static threshold model returns to the complexity of the manufacturing export technology. The return of the formula (2) is shown in Table 4.

Table 4. Taking economic openness as a static threshold model of the threshold variables return results

Explanatory variables	Threshold regression model
LQ	-0.087***
($OP \leq 0.0443$)	(-3.953)
LQ	0.035***
($OP > 0.0443$)	(2.707)
TI	1.352***
	(3.174)
FD	0.057***
	(3.565)
INFR	0.448***
	(5.291)
ED	-0.003
	(-0.698)
C	8.871***
	(0.039)
Time fixation	yes
Urban fixation	yes
N	595
R2	0.982

Table 10 shows that the fitting advantage value of the threshold regression is 0.982, which shows that the interpretation variables explain the interpretation variables. When the economic openness (OP) is less than or equal to the threshold value of 0.0443, the advanced manufacturing agglomeration (LQ) passes the test at a significant level of 1%, but the coefficient is negative, indicating that the advanced manufacturing agglomeration of the Yangtze River Delta region is in the manufacturing industry. The improvement of export technology complexity has played a negative effect; when OP greater than the threshold value 0.0443, LQ passes the test at a significant level of 1%, and the coefficient is positive, indicating that the

advanced manufacturing industry of the Yangtze River Delta region is aggregate pairing in pairs. The improvement of the complexity of the manufacturing export technology has played a positive positive role. The empirical results verify the hypothesis 2.

Study control variables. The coefficient of TI is positive, and the inspection is passed at a significant level of 1%, indicating that the more government technology investment is under economic openness, and the more the manufacturing export technology complexity increases. The FD coefficient is positive, and the inspection is passed at a significant level of 1%, indicating that the higher the level of financial development under economic openness, the more the manufacturing export technology has increased. The Infr coefficient is positive, and the inspection is passed at a significant level of 1%, indicating that the better the infrastructure construction under the effect of economic openness, the more complexity of manufacturing export technology increases. The coefficient of ED is negative, but it does not show that under the influence of economic openness, it cannot indicate that the level of economic development has an impact on the complexity of manufacturing export technology.

6. Conclusion and Policy Recommendations

(1) Research conclusion

This article studies the mechanism of influence mechanism of advanced manufacturing agglomeration in the Yangtze River Delta region, and the economic openness threshold effect mechanism of the influence of the regional all -factor productivity of advanced manufacturing agglomeration on the export technology complexity of the manufacturing industry, and conducts empirical verification. At the same time, analysis of the action path of advanced manufacturing agglomeration to regional all -factor productivity. The research conclusions are as follows:

- 1) hypothesis 1 and actual certification verification. Proposed hypothesis that advanced manufacturing agglomeration can promote the improvement of the complexity of manufacturing export technology, and use a fixed effect model to verify the hypothesis.
- 2) hypothesis 2 and actual certification verification. It is proposed that the impact of advanced manufacturing agglomeration in the Yangtze River Delta has a hypothesis of economic openness threshold effect. Taking economic openness as a threshold variable, the use of static panel threshold model studies have found that the effect of advanced manufacturing agglomeration in the Yangtze River Delta region has a single threshold effect. When the economic openness is less than or equal to the threshold value, the advancement of advanced manufacturing agglomeration to increase the productivity of the regional all -factor productivity to produce a negative inhibitory effect; when the economic openness is greater than the threshold value, the advancement of advanced manufacturing agglomeration to increase regional all -factor productivity is positive. Promotional role.

(2) Policy suggestions

The policy suggestions based on the empirical research conclusions are as follows:

- 1) Use advanced manufacturing clusters to help the effort of export technology to increase the complexity of export technology. In order to effectively promote the construction of national advanced manufacturing clusters, it is necessary to comprehensively evaluate the resource conditions, industrial strength and technical level of each region, and set a clear development direction and strategy accordingly to facilitate the combination of the resource agglomeration effect of advanced manufacturing agglomeration to fully form the formation. Essence Based on the bearing capacity and industrial foundation of the region, we can reasonably plan the distribution of the industry, guide the industry to concentrate to the areas with comparative advantages, give full play to the multiple economic effects and multiple economic externalities of advanced manufacturing agglomeration, and improve their functions by strengthening the

construction of the park through strengthening the construction of the park. And service quality, prevent problems caused by excessive concentration. At the same time, through various aspects of policy support, such as finance, finance, and talent training, enhance the development momentum of industrial clusters. In addition, pay attention to attracting and cultivating leading companies with core competitiveness to promote the overall progress of the cluster, and inspire enterprises to carry out brand building, and enhance product value and competitiveness.

2) Innovate the complexity of export technology through technological innovation. Enterprises need to pay attention to the cultivation and attraction of talents, build a strong technical team with strong professional quality. By absorbing the top technical talents in the industry, companies can not only enhance their technical strength and R & D level, improve the technical content and quality of production products, but also effectively promote the effects of production products. Improvement of export product technology. At the same time, companies are encouraged to establish R & D institutions overseas, actively participate in the formulation of international standards, and establish cooperative relationships with enterprises in global science and technology parks; enterprises should actively establish cooperative relationships with academic circles and research institutions. "The method of promoting technology jointly promotes the development and innovation of technology.

3) Promote the high level of regional economy. Improve the quality of business environment, streamline administrative procedures, reduce markets entering barriers, and ensure that various enterprises can compete in fair markets. At the same time, strengthen the maintenance of intellectual property rights, inspire innovation and technological development, thereby enhancing the competitiveness of the regional economy. It is unswervingly promoted the further opening up of various fields, especially finance, markets and technology. Actively integrate into the global economic system and actively participate in international trade and economic cooperation; inspire local companies to develop overseas, open up the international market, and enhance the global competitiveness and influence of regional economy in the world. Continue to relax market access conditions, reduce the threshold for foreign investment, and attract foreign investment to participate in a wider range of industries and fields. In the process of promoting the further opening up of the economy, we need to be alert to financial risks to ensure financial stability; at the same time, strengthen financial supervision and optimize the regulatory framework to ensure the stability and healthy development of the regional economy. In addition, it is necessary to strengthen the supervision and management of market access and maintain the fair competition in the market. Take the initiative to participate in the cooperation of international economic and trade, promote the process of trade and simplify the process; strengthen trade partnerships with various countries, promote the balanced growth of global trade, and continue to expand the scope of trade liberalization. At the same time, we strengthen multinational investment cooperation, inspire local enterprises to expand towards the international market, and establish closer investment partnership with international enterprises.

References

- [1] Banking Xiao Jing, Xue Zhixin, Sun Yiming. How does the new digital infrastructure affect the upgrade of foreign trade-experience evidence and evidence from Chinese prefecture-level and above cities [J]. *Economic Science*, 2020, (03): 46-59.
- [2] Fan Xiufeng, Kang Xiaoqin. The calculation of the manufacturing industry in Shaanxi Province and the analysis of its influencing factors [J]. *Economic and geography*, 2013,33 (9): 115-119+160.
- [3] Feng Delian, Wang Jin, Wang Ruomei. The impact of OFDI of the Yangtze River Economic Belt on the development of advanced manufacturing: Research on the threshold effect of openness to the outside world [J]. *Financial and trade research*, 2020,31 (8): 1-13.

- [4] Fu Jianyuan, Liu Hongduo. Financial gathering, industrial structure evolution and export technology complexity upgrade-Experience evidence of data from inter-provincial inter-provincial panel data [J]. *Financial and economy*, 2017 (03): 26-31+68.
- [5] Gong Xinshu, Han Junjie, Qiu Shanyun, etc. The industrial agglomeration model, knowledge overflow and its heterogeneity on the complexity of export technology [J]. *Production classical review*, 2019, 10 (05): 5-16.
- [6] The National Development and Reform Commission International Cooperation Center Open External Open Research Group. China has been open to the outside world for 40 years [M]. Beijing: People's Publishing House, 2018: 338-356.
- [7] Li Wenjing, Zheng Manni. Where to go: Trade protection or open competition? -The evidence from micro-enterprise innovation [J]. *Financial research*, 2018, 44 (03): 20-31.
- [8] Liu Chi, Lu Tingting. Industry collaborative agglomeration on the complexity of export technology - take high -tech manufacturing and productive services as an example [J]. 03): 137-146+187.
- [9] Liu Hongduo. Research on the Effects of Industrial Concentration on the complexity of export technology - Analysis of empirical analysis based on the perspective of foreign trade development methods [J]. *Journal of Graduate School of Chinese Academy of Social Sciences*, 2016 (04): 39-47.
- [10] Liu Lin. Product service industry agglomeration and city manufacturing export upgrade-empirical test based on space Dubin model [J]. *Technical and economic and management research*, 2021 (04): 122-128.
- [11] Liu Zhuqing, Tongjiadong, Xu Jiayun. Does Geographical gathering affect the export decision-making of the enterprise? -- Research based on product technology complexity [J]. *Industrial Economic Research*, 2014 (02): 73-82.
- [12] Qi Junyan, the opening of the financial industry, the complexity of external financial dependence and manufacturing export technology -Empirical analysis of different policies based on the service trade restriction index [J]. *International Business (Journal of Foreign Economic and Trade University)*, 2020 (06): 78-91.
- [13] Wang Siyu, Chang Zhongze, Han Ziyue. Since the reform and opening up, China's trade structure measurement, evolution and spatial pattern research [J]. *China Soft Science*, 2023 (02): 23-34.
- [14] Wu Bin. Statistical measurement of technological efficiency of advanced manufacturing in my country [J]. *Statistics and decision-making*, 2021,37 (5): 99-103.
- [15] Xu Ziyan,
- [16] Hansen B E. Threshold Effects in Non-Dynamic Panels: Estimation, Testing and Inference[J]. *Journal of Econometrics*, 1999, 93(2):345-368.
- [17] Hausmann R, Hwang J, Rodrik D. What you export matters[J]. *Journal of Economic Growth*, 2007, 12(1):1-25.
- [18] Jacobs J. *The Economy of Cities*[M]. New York: Random House, 1969.47-81.
- [19] Marshall A. *Principles of Economics*[M]. London: Macmillan, 1920:622-623.
- [20] Porter M E. *The Competitive Advantage of Nations*[J]. *Harvard Business Review*,1990, March-April:73-91.