Academic Journal of Management and Social Sciences
ISSN: 2958-4396 | Vol. 9, No. 2, 2024

Research on the Influence of Digital Finance on the Technical Complexity of Manufacturing Export

Shuyu Gao *

Hangzhou Dianzi Univ, Hangzhou Zhejiang, 310018, China
*** Corresponding author Email:** 2823511364@qq.com

Abstract: Since China's accession to the WTO opened the door to global trade, the total export volume of China's manufacturing industry has continued to grow, and in 2023, China's manufacturing export volume ranks first in the world. However, in recent years, China's land, raw materials and labor costs have been rising, and foreign investment policy barriers have increased, making China's manufacturing industry face many challenges. Relying on the "quantity" alone to boost foreign trade is obviously not realistic, and improving the "quality" of export products has become a new foreign trade growth point. At the same time, digital finance, which is deeply integrated with digital technology and inclusive finance, has developed rapidly in China and achieved good practical results. Compared with traditional finance, digital finance has greatly improved the coverage and availability of financial services, and provided sufficient funds and technologies for all social strata with high efficiency and low cost. It provides a strong support for the improvement of the technical complexity of manufacturing exports, and makes a positive contribution to promoting the steady improvement of the status of China's manufacturing industry in the global value chain. To sum up, it is of great significance to study the impact of the development of digital finance on the technological complexity of manufacturing export and cultivate export competitive advantage.

Keywords: Digital Inclusive Finance; Export Technological Complexity; Manufacturing; Technological.

1. Introduction

Manufacturing is an important driver of national economic growth and has a profound impact on a country's employment, innovation capacity and social welfare. In 2023, China's manufacturing output value accounted for 35% of the world, ranking first in the world, and its export products accounted for more than 90% of the world's export products. Although the output value and export scale of the manufacturing industry are large, China's manufacturing products are still mainly labor-intensive and resource-intensive, and its independent innovation ability is weak. Many key components of high-tech products still need to rely on imports, and the manufacturing industry is located in the low-end link of the value chain, with low profit margins and low added value in the participation link. The export technical complexity is an important reflection of the quality of foreign trade, and greatly improving the export technical complexity of manufacturing industry is a key measure for China's foreign trade to achieve leapfrog development from a manufacturing country to a manufacturing power. Export is an enterprise behavior with obvious "financial threshold", especially for manufacturing enterprises, the support role of finance is crucial. The emergence of digital finance has improved the penetration rate and availability of financial services, the scope of financial services is wider, the products provided are more diverse, and more individuals benefit, prompting more manufacturing export enterprises to enjoy financial development dividends, expand financing channels, improve technology research and development capabilities, and sufficient funds are conducive to the introduction and training of talents, driving the continuous development of enterprises. Based on the existing research and simple theoretical and logical analysis, it can be preliminarily concluded that the improvement of technical complexity of manufacturing export may be closely related to digital inclusive finance. So how does digital finance affect the technical complexity of manufacturing exports? By what means? Is there any heterogeneity? It is of great experiential and theoretical significance to master the specific influence ways of digital finance on the technical complexity of manufacturing export, so as to better utilize digital finance to promote the healthy and sustainable development of manufacturing export trade.

Literature review: In recent years, artificial intelligence, big data, cloud computing and other digital technologies have developed rapidly, and digital finance has also developed rapidly under the drive of the Internet era. With the launch of Yu 'e Bao in 2013, digital financial services have come into public view, facilitating the financing of funds in the financial market. Most scholars generally believe that this marks a new period in the development of China's digital finance. Digital finance is a new financial model produced by the integration of information technology and traditional financial services. At present, scholars at home and abroad have not formed a unified definition of the connotation of digital finance. Foreign scholar Manyika (2016)[1] defined digital finance as financial services provided through mobile terminals, the Internet and other carriers. Gomber(2017)[2] believes that digital finance covers a wide range, including not only innovative financial products, financial services and finance-related software, but also multi-channel communication modes and interactive behaviors with customers provided by fintech companies and innovative financial service providers. Huang Yiping (2018)[3] believes that digital finance is the application of digital technology by traditional financial institutions and Internet companies to realize payment, investment and financing, insurance and other new financial business models. Duan Yongqin (2021)[4] divides emerging digital financial formats into five categories: third-party payment, network financing, network investment, digital assets and digital currency, and other digital financial

innovations. With reference to the research of Huang Yiping and Huang Zhuo (2018)[3], this paper argues that digital finance generally refers to the use of digital technologies by traditional financial institutions and Internet companies to realize financing, payment, investment and other new financial business models. Research on digital finance has mainly focused on the impact on the macro economy and the impact on micro enterprises. In the macroeconomic aspect, it mainly affects the economic growth, residents' consumption, income gap and so on. In terms of economic growth, Teng Lei and Ma Degong (2020)[5] establish a high-quality development evaluation system, and the empirical results show that digital finance can optimize the allocation of funds, guide funds from virtual to real, and promote the high-quality development of the real economy. Based on the data of Chinese household tracking survey, Peng Gang (2023)[6] found that the development of digital finance can significantly narrow the income gap in cities by affecting wage income and business income, which is more conducive to the income growth of low-income families. In terms of residents' consumption, He Zongyue, Song Xuguang (2020)[7] and Jiang Huiying (2024)[8] study the role of digital finance from the perspective of residents' consumption, and find that digital finance can change residents' consumption habits and behaviors and improve their consumption quality. In terms of innovation and entrepreneurship, Du Nianyu and Zhao Jian (2023)[9] and Xie Fuhui (2018)[10] conducted research using panel data of prefecture-level cities and provincial panel data respectively, and found that the development of digital finance can significantly promote innovation and entrepreneurship activities. The impact on micro enterprises is mainly to promote enterprise technological innovation and alleviate enterprise financing constraints. Yao, Yang(2020)[11] and Gao Lintong (2024)[12] found that digital finance has a significant direct promoting effect on enterprise innovation, and financing constraints and information constraints are important transmission mechanisms. Moreover, the three sub-dimensions of digital finance, namely coverage breadth, depth of use and digitization degree, are conducive to promoting enterprise innovation and development (Chen Yan, 2023)[13].

The technical complexity of export refers to the technical content of export products, which is used to reflect the composition of export commodities and the international competitiveness of export products of a country or region. Domestic and foreign scholars have done a lot of research on the export technical complexity. Hausmann (2007)[14] used the display comparative advantage to construct the export technical complexity index EXPY. First, the export technical complexity PRODY of a certain product was calculated, and then the display comparative advantage index was weighted with the per capita income of the country, and finally the export technical complexity EXPY at the national level was obtained. Schott (2008)[15] used the model of Hausmann (2007)[14] to measure the technical complexity of export of various countries and found that the technical complexity index of China's export was unusually high. Xu (2010)[16] found the reasons for the high technical complexity of China's export after exploration. First, there are significant differences in economic development among different regions. Second, the quality of export products is ignored when measuring the technical complexity of export. The calculation method of export technical complexity proposed by Hausmann (2007)[14] has been widely used by many scholars. Therefore, referring to the methods adopted by most scholars at present, this paper finally adopts the index construction method of Hausmann (2007)[14] to measure the export technical complexity of China's manufacturing industry. By combing domestic and foreign literature, it is found that there are many factors affecting the technological complexity of export, including human capital, foreign direct investment, etc. Fang Qiyun (2023)[17] found through research that the expansion of human capital can improve labor productivity and reduce the acquisition cost of highly skilled labor. Help enterprises to obtain high-quality R & D personnel to improve R & D efficiency, thereby increasing the technical content of products and improving the technical complexity of exports. Liu Sheng and Gu Naihua (2016)[18] found that the absolute and relative scale of FDI has a significant positive impact on the technical complexity of China's manufacturing export. At present, relevant studies mainly focus on the impact of digital finance on exports. Zhao Caixia (2021)[19] empirically-tested the relationship between digital inclusive finance and the development of export trade, and the research results showed that digital inclusive finance could promote the development of export trade by effectively easing the financing constraints of small and medium-sized export enterprises. Zhang Mingxin (2021)[20] and Geng Wei (2021)[21] both demonstrated that digital finance can promote the improvement of the quality of enterprises' export products. Many scholars have studied the impact of digital finance on export, but there are few studies on the impact of digital finance on the technical complexity of manufacturing export. Based on this, this paper connects digital finance with the technical complexity of manufacturing export for theoretical research and empirical test.

2. Theoretical Analysis and Research Hypothesis

Digital finance can provide rich financial services. In recent years, digital technologies such as big data, blockchain and artificial intelligence have widely penetrated into the financial field, greatly changing the traditional financial organizational structure, functional processes, business forms and product logic, and giving birth to financial services and financial products with higher quality, more choices and better combinations (Huang Yiping and Huang Zhuo, 2018)[3]. With the gradual emergence of a new generation of financial services such as intelligent payment, online investment and financing, digital currency, and supply chain finance, the process of financial business can be optimized and efficiency improved, and enterprises' demand for convenient and efficient financial services can be met. Enterprises can choose appropriate financial services and products according to their own development strategies. In addition, digital finance can use the competitive effect to accelerate the digital transformation of traditional financial institutions to improve service quality and efficiency. Digital finance can provide rich financing channels and financing schemes. Digital finance uses Internet technology to create a lot of scenes to provide financial services, such as supply chain finance, P2P, online banking and other Internet banks, and Ant Financial's online small loans. A large number of investors in the financial market have the characteristics of "many, small and scattered", and the traditional financial market needs costs to absorb these investors, while digital finance builds a digital capital storage model and a new

Internet investment model under the support of artificial intelligence, big data, distributed technology and blockchain, which effectively absorbs idle funds in the hands of retail investors and increases the supply of funds. Thus reducing the level of enterprise financing. Moreover, digital financial platforms usually have more flexible financing methods, which can customize financing plans according to the export orders and funds of enterprises, and reduce the financing costs of enterprises by adjusting the funds use and repayment methods of enterprises. Therefore, a hypothesis is proposed that the development of digital finance can promote the improvement of the technical complexity of manufacturing export.

3. Measurement Model and Data Source

3.1. Design of Measurement Model

Based on the previous analysis, this paper establishes a benchmark regression model to test the direct impact of digital finance on the technical complexity of manufacturing exports. The model is as follows:

$$\ln expy_{it} = \alpha + \beta \ln index_{it} + \gamma \sum control_{it} + \lambda_i + \eta_t + \varepsilon_{it} \quad (1)$$

Where, the subscript i represents the individual, this text represents the province, and t represents the time. $\ln expy_{it}$ is the explained variable, representing the technical complexity of manufacturing export at the provincial level, $\ln index_{it}$ is the explanatory variable, representing the digital financial level of each province, $\sum control_{it}$ represents a series of control variables, λ_i represents the fixed effect of the province, η_t is the fixed effect of the year, ε_{it} is the random disturbance term.

3.2. Construction and Description of Core Indicators

Explained variable: Chinese manufacturing export technical complexity (expy). With reference to hausmann (2007) 's [14] measurement method, the export technical complexity of the whole manufacturing industry and the sub-manufacturing industry is calculated from the provincial level.

Explanatory variable: Digital Finance index. Referring to the methods of most scholars, the digital finance index released by the Digital Finance Research Center of Peking University is adopted to measure the development level of digital finance.

Control variables: Trade openness (Open), foreign direct investment (FDI), industrial structure (Indu), government intervention (Gov), infrastructure level (Inf), and economic development level (PGDP).

3.3. Data Sources and Descriptive Statistics

The calculation data of the technical complexity of manufacturing exports comes from the foreign trade database of the National Research Network, the digital financial development index comes from the Peking University Digital Financial Inclusion Index compiled by the Digital Finance Research Center of Peking University, and the rest of the variable data are from the National Bureau of Statistics and the statistical yearbook of provinces and cities. As the dimensions of some indicators are inconsistent, in order to eliminate the influence of heteroscedasies and make the regression result more smooth, logarithmic processing is adopted for variables such as technological complexity of manufacturing exports, digital financial development index and technological innovation, while the original value of the ratio variable data is selected for regression. The descriptive statistics of each variable are shown in Table 1.

Table 1. Descriptive statistics of variables

Variable	Observed value	Mean value	Standard deviation	Minimum value	Maximum value
lnindex	360	5.338	0.666	2.909	6.133
lnexpy	360	10.95	0.264	10.38	11.49
Open	360	0.272	0.281	0.00758	1.472
Gov	360	0.259	0.111	0.105	0.758
Inf	360	1.000	0.535	0.0917	2.292
lnPGDP	360	10.87	0.461	9.682	12.15
FDI	360	0.0207	0.0186	6.10e-05	0.121
Indu	360	1.354	0.745	0.527	5.283
lnhum	360	2.932	0.831	0.157	4.354
lnInno	360	10.29	1.458	6.219	13.68

4. Basic Empirical Regression and Result Proof

4.1. Baseline Regression

In order to investigate the impact of digital finance on the technical complexity of manufacturing exports, this paper first conducted a separate regression between the digital finance index and the technical complexity index of manufacturing exports at the provincial level. The regression results are shown in column (1) of Table 2. The results show that after controlling the fixed effect of province and time, the regression coefficient of digital finance is significantly positive at 1%. On the basis of column (1), control variables that may affect the technical complexity of manufacturing exports are gradually added in (2) - (4). The results show that the core explanatory variable coefficient changes to a certain extent after the addition of control variables, but the correlation coefficient is still positive and significant at the 1% level. It shows that there is a significant positive relationship between digital finance and the technical complexity of manufacturing export, thus proving the point of view of hypothesis 1 of this paper. This shows that under the influence of digital finance, the export technology level of the manufacturing industry has been gradually strengthened, which helps Chinese manufacturing enterprises to improve their core competitiveness in the world.

From column (4), among the control variables, the coefficient of opening to the outside world is significantly positive, indicating that the implementation of opening to the outside world policy in a region helps enterprises to learn advanced production technology, and the quality of intermediate inputs increases, thus contributing to the technical complexity of export products. Government intervention (Gov) coefficient is significantly negative, indicating that government fiscal expenditure has not been effectively utilized by manufacturing enterprises, so it cannot play a role in promoting the technical complexity of manufacturing exports. There is a significant positive relationship between foreign direct investment (FDI) and the technological complexity of manufacturing export. The increase of foreign investment is conducive to accelerating the digital transformation and technological innovation of enterprises, thus achieving high-quality development and improving the technological complexity of manufacturing export. The industrial structure (Indu) is significant at the level of 5%, and the industrial structure can reflect the export product structure of the region to a certain extent. The higher the industrial structure, the higher the added value of the

exported products, and thus improve the technical complexity of the export products of the manufacturing industry.

Table 2. Results of baseline regression

	(1)	(2)	(3)	(4)
Variable				
lnindex	0.089***	0.082***	0.076***	0.073***
	(5.02)	(4.12)	(4.32)	(3.99)
Open		0.009	0.033	0.053**
		(0.35)	(1.23)	(1.99)
FDI		0.207**	0.271***	0.263**
		(2.19)	(2.97)	(2.39)
Indu			0.036**	0.037**
			(2.27)	(2.38)
Gov			-0.281***	-0.296***
			(-4.30)	(-4.35)
Inf				-0.029
				(-1.41)
lnPGDP				-0.005
				(-0.15)
Constant	10.472***	10.503***	10.547***	10.646***
	(110.77)	(102.08)	(110.99)	(29.74)
Provincial fixed effect	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES
Observations	360	360	360	360
R^2	0.993	0.993	0.994	0.994

Note: ***, ** and * are significant at the significance level of 1%, 5% and 10% respectively, and the t value is in parentheses, the same below.

4.2. Analysis of the Expanded Dimensions of Digital Finance Index

Table 3. Results of dimensional test

	(1)	(2)
Variable	lnexpy	lnexpy
lnbreadth	0.031***	
	(4.56)	
lndepth		0.038***
		(3.39)
Open	0.061**	0.086***
	(2.37)	(3.49)
FDI	0.272**	0.248**
	(2.49)	(2.22)
Indu	0.036**	0.039**
	(2.31)	(2.55)
Gov	-0.298***	-0.267***
	(-4.51)	(-3.95)
Inf	-0.029	-0.033
	(-1.40)	(-1.55)
lnPGDP	-0.017	0.032
	(-0.55)	(0.89)
Constant	11.001***	10.420***
	(33.06)	(26.67)
Provincial fixed effect	YES	YES
Year fixed effect	YES	YES
N	360	360
R^2	0.994	0.994

The digital finance index is divided into two symmetric levels: the coverage of digital finance and the depth of digital finance use. This paper will separately examine the impact of these two dimensions of digital finance on the technical complexity of manufacturing exports. The test results are shown in Table 3. Columns (1) and (2) of Table 3 show the regression results of the coverage breadth of digital finance and the use depth of digital finance on the technical complexity of manufacturing exports, respectively. The regression coefficients are 0.031 and 0.038 respectively, and both are significant at 1% level. By further observing and comparing the regression coefficients of these two dimensions, it is found that the depth of use of digital finance has a greater effect on improving the technical complexity of manufacturing exports. The depth of use mainly includes payment, insurance, monetary fund, credit service, investment, credit, etc., and the coverage breadth mainly includes the coverage of Alipay accounts. Compared with the breadth of coverage, the depth of use can better express the nature of financial inclusion brought about by the development of digital finance, and can better reflect the role of digital finance in easing financing constraints, thus generating more obvious export technology complexity enhancement effects.

4.3. Robustness Test

Above, the fixed-effect model is used to prove the impact of digital finance on the technical complexity of manufacturing exports. Now, robustness test is conducted to verify the reliability and accuracy of the above conclusions. This paper adopts three methods to conduct robustness test: one is to redefine the explanatory variables, the other is to exclude the influence of municipalities directly under the central government, and the third is to test the core explanatory variables with a delay of one period.

4.3.1. Redefine Core Explanatory Variables

The digital finance index is redefined with reference to the calculation method of Wang Zhixin (2022) [22], and the coverage breadth, use depth and digitization degree of the subdivision index are weighted 0.2, 0.5 and 0.3 respectively. The digital finance index is recalculated, and then regression is carried out. The regression results are shown in Table 4. This shows that the redefinition of the core explanatory variables will not change the positive promoting effect of digital finance on the technical complexity of manufacturing exports.

Table 4. Robustness test - Redefined core explanatory variable regression results

Variable	lnexpy
lnindex	0.050*
	(1.88)
Open	0.090***
	(3.53)
FDI	0.289**
	(2.53)
Indu	0.038**
	(2.43)
Gov	-0.297***
	(-4.33)
Inf	-0.038*
	(-1.82)
lnPGDP	0.015
	(0.43)
Constant	10.541***
	(25.97)
Provincial fixed effec	YES
Year fixed effect	YES
Observations	360
R^2	0.993

4.3.2. Exclude Municipalities

Compared with other cities, China's municipalities directly under the central government have greater economic particularity, higher level of economic development, frequent

foreign trade exchanges, and advantages such as the concentration of scientific and technological talents. Due to the strong policy support for relevant enterprises, bias caused by such factors as policy support, institutional environment and resource endowment may occur, which will affect the technical complexity of manufacturing exports and thus reduce the effectiveness of the estimated results. Therefore, the data of municipalities directly under the central government (Beijing, Tianjin, Shanghai and Chongqing) in the sample are excluded for regression, and the regression results are shown in Table 5.7. The regression coefficient of digital finance is still significant at the level of 1%, and the core conclusion of this paper that "digital finance can promote the technical complexity of manufacturing exports" remains unchanged.

Table 5. Robustness test - excluding regression results of municipalities

Variable	lnexpy
index	0.079***
	(0.019)
Open	0.031
	(0.031)
FDI	0.072
	(0.135)
Indu	0.040**
	(0.019)
Gov	-0.359***
	(0.075)
Inf	0.050
	(0.031)
PGDP	-0.026
	(0.036)
Constant	10.795***
	(0.400)
Provincial fixed effect	YES
Year fixed effect	YES
Observations	312
R^2	0.994

4.3.3. Replacement of Core Explanatory Variables

Table 6. Robustness test - core explanatory variable replacement regression results

	(1)	(2)
Variable	lnexpy	lnexpy
L.lnindex	0.058***	0.048***
	(4.05)	(3.24)
Open		0.030
		(1.01)
FDI		0.234**
		(2.10)
Indu		0.032*
		(1.90)
Gov		-0.250***
		(-3.63)
Inf		-0.018
		(-0.76)
lnPGDP		-0.010
		(-0.35)
Constant	10.680***	10.862***
	(141.76)	(34.15)
Provincial fixed effect	YES	YES
Year fixed effect	YES	YES
Observations	330	330
R^2	0.993	0.993

Digital finance is lagging, so the digital finance index (L.LEN Index) with a lag of one period is used to replace the original core explanatory variable (lnindex) for regression. The regression results are shown in the following table. The digital finance index with a lag of one period is still significantly positive, which verifies the reliability of the benchmark regression results.

5. Research Conclusion and Countermeasures

This chapter summarizes the influence of digital finance on the technical complexity of China's manufacturing export based on the previous theories and evidences, and provides corresponding targeted suggestions through summary, so as to provide relevant experience reference for China to grasp the new types of financial services in the digital economy era and promote the improvement of the technical complexity of manufacturing export. Based on the panel data of 30 provinces in China from 2011 to 2022, this paper first analyzes the development status of digital finance and manufacturing export technology complexity, and then carries out a theoretical analysis on the impact of digital finance on manufacturing export technology complexity and its influencing mechanism. Then, the econometric model is constructed to carry out empirical research on the impact of digital finance on the technical complexity of manufacturing export. Based on this, this paper draws the following conclusions: The application of digital finance improves the willingness of manufacturing enterprises to export. Compared with traditional finance, digital finance can provide abundant financing channels and financing programs, and greatly improve the trade facilitation of export enterprises. The use of embedded digital technology can also effectively identify transaction risks and improve risk management and control, with certain security and reliability. Through the empirical test, the development of digital finance can significantly promote the improvement of the technical complexity of manufacturing exports, and the conclusion is still reliable after a series of robustness tests, such as redefining core explanatory variables, eliminating municipalities and replacing core explanatory variables.

According to the research conclusions of this paper, combined with the development of digital finance and the technical complexity of manufacturing export in China, the following suggestions are put forward to make better use of digital finance to promote the high-quality development of manufacturing export: Promote the rapid development of digital finance and encourage enterprises to make use of digital finance. To improve Internet infrastructure construction and improve network coverage, the government should formulate relevant policies to increase investment in network infrastructure construction in less developed areas and small and medium-sized enterprises, so as to ensure that digital finance benefits more people and regions, so as to enjoy innovative financial services. Enhance users' financial education and awareness, carry out financial knowledge popularization activities, such as opening online financial knowledge lecture halls, inviting financial experts to explain, and providing free learning resources; offline, such as distributing financial knowledge publicity materials in community centers and enterprises; for enterprises, provide training on the use of digital finance. To help businesses better leverage digital financial services. The government,

enterprises and financial institutions should establish a cooperation mechanism to encourage cooperation and exchanges between financial institutions and technology companies, jointly promote the development and landing of new financial products, and promote the rapid development of digital finance. In addition, while promoting the rapid development of digital finance, it is necessary to guard against possible financial risks, technical risks and data leakage risks, and the government needs to strengthen supervision and formulate strict financial risk control policies to ensure user information security. Give tax incentives or deductions to enterprises that use digital financial instruments for financing and export, and encourage enterprises to embrace digital finance. Give full play to the inclusive, technical and financial nature of digital finance, stimulate the innovation vitality of manufacturing enterprises, and promote the improvement of the technical level of export products.

References

[1] Manyika J, Lund S, Singer M, et al. DigitalFinance for All: Powering Inclusive Growth in Emerging Economies[R]. USA: McKinsey Global Institute, 2016.

[2] Gomber P, Koch JA, Siering M. Digital Finance and FinTech: current research and future research directions[J]. Journal of Business Economics, 2017, 87(5): 537-580.

[3] Huang Yiping, Huang Zhuo. Digital finance development in China: Present and future [J]. Economics (Quarterly Review), 2018, 17(4): 1489-1502.

[4] DUAN Yongqin, HE Lunzhi, Ke han. Digital finance, technology-intensive manufacturing and green development [J]. Shanghai Economic Research, 2021(5): 89-105.

[5] Teng Lei, Ma Degong. Can digital finance promote high-quality development? [J]. Statistical Research, 2020, 37(11): 80-92.]

[6] Peng Gang, Lu Bing, Qian Jun, et al. Digital finance and income inequality [J]. World Economic Review, 2023(4): 38-57.

[7] He Zongyue, Song Xuguang. How the development of digital finance affects household consumption [J]. Finance and Trade Economics, 2020, 41(8): 65-79.

[8] Jiang Huiying, Zhou Yicheng, Li Chunfeng. Research on the impact of digital financial Inclusion on the consumption quality of Chinese residents [J]. Business Economics Research, 2024(8): 46-51.

[9] Du Nianyu, Zhao Jian. Can digital finance promote innovation and entrepreneurship? Evidence from 280 prefecture-level cities [J]. New Finance, 2023(3): 50-56.

[10] Xie Fuhui, Shen Yan, Zhang Haoxing, et al. Can digital finance boost entrepreneurship? Evidence from China [J]. Economic Journal (Quarterly Review), 2018, 17(4): 1557-1580.

[11] Yao L, Yang X. Can digital finance boost SME innovation by easing financing constraints?: Evidence from Chinese GEM-listed companies[J]. PLoS ONE, 2022, 17: 642-647.

[12] Gao Lintong, Meng Fei, Tian Qibo. The influence and spatial effect of digital finance on enterprise technological innovation [J]. Science Research Management, 2024, 45(6): 72-82.

[13] Chen Yan, Li Aihua, Zhang Haifeng. Does digital finance promote technological innovation among smes? -- Evidence from NEEQ enterprises [J]. Journal of Harbin University of Commerce (Social Science Edition), 2023(5): 18-33.

[14] Hausmann R, Klinger B. The Structure of the Product Space and the Evolution of Comparative Advantage[J]. 2007: 146.

[15] Schott PK. The relative sophistication of Chinese exports[J]. Economic Policy, 2008(53): 5-49.

[16] Xu B. The sophistication of exports: Is China special? [J]. China Economic Review, 2010, 21(3): 482-493.

[17] Fang Qiyun, Cheng Zi-Ang, Populus euphratica. Human capital expansion, industrial robots and enterprise export product quality [J]. International Trade Issues, 2023(6): 18-33.

[18] Liu Sheng, Gu Naihua. The impact of foreign direct Investment on the technological complexity of China's manufacturing exports [J]. Journal of Capital University of Economics and Business, 2016, 18(2): 11-18.

[19] Zhao Caixia, Wang Yuanyuan. An empirical study on the relationship between digital financial inclusion and export trade development [J]. Business Economics Research, 2021(17): 171-173.

[20] Zhang Mingxin, Wang Yanan, Zheng Lekai, et al. Study on the impact of the development of digital finance on the quality of enterprises' export products [J]. Finance and Trade Research, 2021, 32(6): 12-27.

[21] Geng Wei, Wang Xiaoyi, Li Wei. Whether digital Finance improves the quality of manufacturing enterprises' export products -- On the regulatory effect of financial vulnerability [J]. International Business (Journal of University of International Business and Economics), 2021(6): 102-120.

[22] Wang Zhixin, Han Chengbin, Zhu Wenqing. Study on the impact of digital finance development on export technology complexity [J]. World Economic Research, 2022(8): 26-42+135-136.