Analysis on the Influencing Factors of Financial Export under the Background of Global Value Chain—— Panel data based on 28 countries

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Abstract. At present, the trade pattern is changing quietly, and the international trade pattern has produced a new trade situation - Digital trade. Digital trade has greatly changed the traditional trade, not only promoted the reconstruction of global value chain and resource integration, but also brought fundamental changes to the global economy. Many industries are highly digitized and regarded as digital industries. Therefore, the development of Internet infrastructure and ICT sector in various countries is particularly important to promote digital trade. Based on the background of global digital trade, it is of great significance to take the digital export of financial industry as an example to study its influencing factors. The empirical results show that internet, economic, institutional and interest rate factors have significant positive effects on global financial exports. After grouping regression, the influence of Internet factors on financial export in developed and developing countries is different, and the promotion to financial export is greater than that in developing countries.

Introduction

With the popularity of the Internet and the penetration of digital technology, the world is currently launching an era change with the theme of Digital Trade and industrial interconnection. The development strategy of digital economy countries with digital trade as the core is gradually being attached great importance by the country. The rapid development of digital economy has promoted the birth and development of digital trade, a new form of trade. The development of digital trade is based on the Internet. The main body of trade includes enterprise users and individual users, and mainly individual users. Therefore, the content and scope of digital trade are related to Internet users. First, the number of Internet users worldwide is expanding rapidly. In 2000, there were only 361 million Internet users and only 5.92% Internet penetration, but by 2017, there were 3.886 billion Internet users worldwide, an increase of 976.4% over 2000, and an Internet penetration rate of 51.7%. Secondly, Internet penetration in developed economies is significantly higher than that in developing economies. In 2017, Internet penetration reached 89.69% in developed economies and 45.83% in developing economies. Moreover, the Internet penetration rate varies greatly among developing countries. The penetration rate of North Korea is only 0.10%, but that of most countries is between 40% and 70%. Finally, the number of individual Internet users in many developing economies has increased dramatically over the past 15 years. For example, the number of Internet users in Africa increased by 8503.1% from 2000 to 2017. The situation of Internet infrastructure construction among countries is different. 5G has become a new focus of infrastructure construction, but the digital divide still exists.

Literature Review

Domestic research on digital trade started relatively late, and most of the existing literature is qualitative research.

Qualitative research. Since Hamill (1997) put forward "The Internet and International Marketing", the impact of Internet and e-commerce represented by Internet technology on international trade has attracted scholars'attention. [1]Although the current research on the relationship between the Internet and international trade has been relatively rich, but whether the Internet will increase the volume of foreign trade, this is not fully agreed in the academic community. In theory, the mainstream economics tends to define the Internet as a kind of "information resources", that is, the application of the Internet in international trade can reduce the "noise" of trade choice and transaction, and the Internet as a means to reduce information asymmetry, reduce trade risks and improve market efficiency. Freund and Weinhold (2004) found that the Internet can reduce the search cost and entry cost of trade by establishing theoretical models of market segmentation, imperfect competitive market and trade entry cost. [2]Ferro (2011) pointed out that information has become a key factor to change the transaction mode and reduce transaction costs in the Internet era. [3]The Internet can achieve timely communication across time, space and distance constraints. This function can reduce the cost of information exchange, thus helping more enterprises to choose exports. But some scholars have questioned the idea that the Internet can reduce the cost of international trade. Head and Mayer (2013) pointed out that border barriers to trade far exceed tariffs or transport costs. [4]Although traditional trade barriers are weakening, indirect trade barriers are becoming more and more important, such as anti-dumping and countervailing trade barriers. Therefore, in theory, the relationship between the Internet and trade is not so close.

Quantitative study. Freund and Weinhold (2004) empirical results show that the growth rate of a country's

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network hosts increased by 10 percentage points, while the export growth rate increased by about 0.2 percentage points. [2]Similar studies include Vijay (2009), Hagsten and Kotnik (2017). [5][6]Abeliansky and Hilbert (2016) found that information and communication technologies (ICTs) affect global trade patterns in terms of supply and demand by reducing transaction costs through empirical analysis of 122 countries from 1995 to 2008. [7]The speed of data transmission is particularly important for developing countries. Therefore, it is proposed to attach great importance to broadband construction. The relevant documents are Lu Jing and Fu Nuo (2018). [8]On the basis of defining the connotation of digital trade, they use the improved gravity model to empirically analyze the development trend of trade network and the influencing factors of digital trade. In contrast, this paper subdivides the research object into highly digitized financial industry. Three variables, fixed broadband subscribers, fixed telephone subscribers and mobile phone subscribers, are selected as proxy variables of Internet factors for empirical analysis to explore the impact of the development of Internet infrastructure on the export of financial industry. In addition, Lan Qingxin and Dou Kai (2019) studied the influencing factors more subdivided. They selected six indicators for empirical analysis based on Michael Porter's "diamond model". [9]The empirical results show that technological level, openness of digital trade industry, labor productivity of secondary industry, labor productivity of tertiary industry and government policies have obvious positive effects on international competitiveness of digital trade, and human capital has obvious negative effects on international competitiveness of digital trade due to the mismatch of talent system.

After carefully studying the literature at home and abroad, scholars have made some theoretical and empirical studies on the impact of the Internet on international trade, but there are still some deficiencies in quantitative research. Therefore, this paper chooses the highly digitized service industry - financial industry as the object of follow-up empirical analysis to explore the impact of the Internet digital divide on financial exports, as well as the impact of economic factors, interest rate factors and institutional factors on digital financial exports.

Empirical Analysis

The U.S. International Trade Commission (USITC) first defined digital trade as "commercial activities providing products and services through Internet technology". Digital trade has the following characteristics: firstly, it is based on Internet technology; secondly, it is based on intangible knowledge, technology-intensive digital products or services; and thirdly, marginal production costs and transport costs are almost zero. Digital trade in this paper refers to the cross-border flow of intangible digital products and services through the Internet, excluding physical objects.

Research hypothesis. After reviewing the relevant literature, this paper puts forward the following hypotheses.

Hypothesis 1: A country's Internet infrastructure is perfect and its audience is wide, which is conducive to improving financial exports.

Hypothesis 2: The higher a country's real interest rate, the more conducive to improving financial transactions.

Hypothesis 3: A country's strong economic strength is conducive to promoting financial exports.

Hypothesis 4: A country's high degree of trade openness is conducive to promoting financial exports.

Hypothesis 5: Exporting countries have a high degree of intellectual property protection, which is conducive to improving digital trade.

Sample data and variable selection. Because of the availability of data, this paper chooses 23 developed countries and 5 BRICS countries in OECD countries (a total of 28 countries) as research objects, including Australia, Austria, Belgium, Canada, Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, etc. Japan, Korea, Latvia, New Zealand, Poland, Portugal, Slovakia, Slovenia, Sweden, United States, United Kingdom. Based on the above assumptions, the following dependent variables, explanatory variables and control variables were selected for regression analysis.

The dependent variable uses the bilateral financial export volume $fexport_{ijt}$. This paper uses OECD database to collect agent data based on USITC and BEA research. Due to the lack of data under EBOPS 2010 classification, only some countries'bilateral trade flows are counted. Therefore, this paper makes an empirical analysis based on the observations of 28 representative countries from 2001 to 2012 under the EBOPS 2002 classification.

Internet Digital Divide Variable: The core explanatory variable is Internet Digital Divide. The factors of Digital Divide are represented by three dimensions: Fixed Broadband Subscriber (x_1), Fixed Telephone Subscriber (x_2), and Mobile Phone Subscriber (x_3). The data are from the World Bank database, with 100 people per unit, and the expected impact is positive.

Interest rate factors, economic factors and institutional factors enter the regression model as control variables.

Interest rate variables: In this paper, the real interest rate rinterest in the World Bank database is used as a characteristic variable affecting the financial industry. The World Bank's interpretation of real interest rates is that real interest rates are inflation-adjusted lending rates measured by GDP deflation indices. The higher the real interest rate is, to some extent, restraining imports and promoting exports, with a positive expected impact.

Economic variables: GDP ($\ln GDP_{it}$) and trade $open_{it}$ are selected as control variables, which are consistent with the statistical caliber of trade volume. The data are from the World Bank. The GDP unit is millions of dollars (present value). The trade openness is measured by open = a country's exports of goods and services/a country's GDP. The greater the openness of GDP and trade in services, the stronger the economic strength and openness of a country. Both of them are expected to have a positive impact on the volume of digital trade.

Institutional variables: The payment fee of intellectual property in the World Bank database is selected as the proxy variable of the level of intellectual property protection. Because the intellectual property fee paid by a country is more

reflective of the country's awareness of intellectual property protection than the intellectual property fee charged to other countries, the unit is the current price of US dollars.

In this paper, Hausman test is carried out for the model with a p value of 0.0336. Fixed-effect model should be used.

Model Construction and Descriptive Statistics. Firstly, according to the existing literature and research model, this paper puts forward the research variables, and gives the corresponding specific definition and descriptive statistics.

Table 1 Variable Interpretation and Expectation Coefficient Symbols

Variable	Variable measure	Coefficient expectation
Dependent variable		
fexport	Annual total financial exports of bilateral countries	
Explanatory variable		
X_1	Fixed broadband subscribers (per 100)	+
X_2	Fixed-line subscribers (per 100)	+
X_3	Mobile cellular wireless communication system users (per 100 people)	+
Control variable		
rinterest	Real Interest Rate of a Country	+
gdp	Economic Strength of a Country	+
open	One country's trade openness	+
intell	Intellectual Property Level of a Country	+

Secondly, according to the research framework and related variable definitions, the models are as follows:

$$\ln f\exp ort_{ijt} = \beta_0 + \beta_1 x_{it} + \beta_2 x_{it} + \beta_3 x_{it} + \beta_4 r\,\mathrm{int}erest_{it} + \beta_5 \ln gdp_{it} + \beta_6 \ln open_{it} + \beta_7 \ln \mathrm{int}ell_{it} + \varepsilon_{ijt} \quad (1)$$

Finally, the descriptive statistics of the variables in the model are shown in Table 2.

Table 2 Descriptive statistics of major variables

variable	observation value	mean value	standard deviation	minimum value	maximum value
lnfexport	9072	.994	2.948	-9.210	9.253
X_1	9072	14.246	11.269	.005	38.847
X_2	9072	40.657	16.170	2.450	72.131
X_3	9072	89.637	32.234	.610	166.038
rinterest	4752	5.690	9.305	-2.335	48.340
lngdp	9072	26.958	1.538	22.846	30.413
lnopen	9072	3.531	0.545	2.201	4.672
lnintell	8424	21.412	1.522	17.042	24.463

Basic egrression. Four fixed effect models are established to gradually introduce economic factors, institutional factors, Internet factors and interest rate factors.

Table 3 Basic regression results of fixed effect model

Independent variable	Model 1	Model 2	Model 3	Model 4
lngdp	1.288*** （46.62）	1.458*** （20.35）	1.060*** （12.69）	0.780*** (6.88)
lnopen	0.745*** （9.54）	0.796*** （9.34）	0.571*** (6.34)	0.499*** (3.85)
lnintell		-0.163** （-3.05）	-2.223*** (-4.09)	0.158** (2.04)
X_1			0.015*** (7.84)	0.015*** (6.32)
X_2			0.010*** (3.65)	0.011*** (3.12)
X_3			0.005*** (5.15)	0.003** (2.19)
rinterest				0.037* (1.75)
Constant	-36.42*** （-50.92）	-37.76*** （-35.53）	-25.96*** (-15.16)	-26.26*** (-11.40)
Model	FE	FE	FE	FE
time effect	yes	yes	yes	yes
Individual effect	yes	yes	yes	yes
R^2	0.3044	0.2904	0.3138	0.4283

Description: (1)The levels of ***,*** and * are significant at 1%, 5% and 10% respectively; (2) the interpreted variable is $lnfexport_{ijt}$; (3)the t test value is in parentheses.

Data analysis: Firstly, in terms of Internet factors, fixed broadband subscribers (x_1), fixed telephone subscribers (x_2) and mobile phone subscribers (x_3) have positive effects at 1% and 5% respectively, indicating that the popularity of the Internet can significantly promote the export of digital finance, while the popularity of the Internet in a country is interconnected with it. The infrastructure construction of the network is inseparable. On the one hand, the popularization of the Internet improves the efficiency of financial trade export, reduces the cost of financial trade, provides a convenient communication and trading platform for enterprises and consumers, and expands the depth and breadth of financial trade, and brings financial trade rules. Module expansion. Therefore, the improvement of Internet infrastructure and the popularization of Internet are beneficial to the development of financial industry, which is the same as expected. Secondly, in terms of economic factors, lnGDP and the openness of trade in services have a positive impact at the 1% significant level. The countries with stronger economic strength and more open trade have better network finance. In terms of interest rate factors, rinerest has a positive impact on financial exports at the 10% significant level, which indicates that the higher the real interest rate under the control of the central bank, the higher the cost of loans, the lower the level of investment and consumption, the lower the price, the promotion of exports, and the expectation. Fourthly, in terms of institutional factors, the level of intellectual property protection (lnintell) has a positive effect on the total financial exports at a 5% confidence level, which indicates that the improvement of intellectual property protection in exporting countries will have a positive effect on financial exports, which is the same as expected. The higher the degree of intellectual property protection in a country, the more perfect the relevant laws and regulations of digital financial transactions will be. To a certain extent, it promotes the development of financial industry, improves digital financial transactions and increases financial exports.

Grouping regression. Most scholars have found that there are significant differences in the impact of Internet factors on trade in a country. Therefore, this paper divides the whole sample into developed and developing countries to continue empirical testing. Usually, OECD member countries are regarded as developed countries, while non-member countries are regarded as developing countries. The developing countries in the sample include China, South Africa, India, Brazil and Russia.

Table 4 Fixed-effect grouping regression results

Independent variable	Developed country	Developing country	Full sample
lngdp	1.021***	0.695**	0.780***
	（6.90）	（3.00）	(6.88)
lnopen	0.534**	0.573**	0.499***
	（3.06）	(2.03)	(3.85)
lnintell	0.115	0.228	0.158**
	（1.28）	(1.35)	(2.04)
X_1	0.011**	-0.016	0.015***
	（3.03）	(-0.66)	(6.32)
X_2	0.018***	-0.036**	0.011***
	（4.54）	(-2.39)	(3.12)
X_3	0.004*	0.005**	0.003**
	（1.91）	(2.03)	(2.19)
rinterest	-0.021	0.134***	0.037*
	（-0.78）	(3.68)	(1.75)
Constant	-31.81***	-25.98***	-26.26***
	（-9.94）	(-5.39)	(-11.40)
Model	FE	FE	FE
time effect	yes	yes	yes
Individual effect	yes	yes	yes
R^2	0.4119	0.0460	0.4283
sample size	7452	1620	9072

Description:The levels of ***,*** and * are significant at 1%, 5% and 10% respectively

The results show that the Internet has a stronger role in promoting the developed countries than in the developing countries. This is because the Internet penetration rate in developed countries is generally high. The financial industry and financial trade in developed countries are combined with the Internet earlier. The development of the financial industry in the background of digital trade is relatively mature. Therefore, the positive impact of Internet development in developed countries on financial exports is more significant.However, the impact of Internet development on export of services in most developing countries still has no scale effect. The regression results of developed countries are similar to the results of the whole sample regression. Internet factors still have a significant positive effect on the export of financial industry. Fixed broadband subscribers (x_1), fixed telephone subscribers (x_2) and mobile subscribers (x_3) have significantly promoted bilateral financial exports. The only difference is that the institutional factors and interest rate factors represented by the level of intellectual property protection (lnintel) are not significant at this time. The possible reason is that for developed countries, the level of intellectual property protection has been at the global leading level, and the actual interest rate level is stable. These two factors no longer have a significant impact on financial exports. There is a difference between the regression results of developing countries and full samples. On the one hand, it may be related to the limitations of data samples. On the other hand, for developing countries, the level of intellectual property protection has little impact on the digital trade temporarily. It shows that when developing countries' digital trade is in line with international standards, they need to strictly grasp the management and control of intellectual property rights and proceed step by step. Only Internet mobile subscribers (x_3) play a positive role in the 5% significant level, and fixed broadband subscribers (x_1) There was no significant effect, fixed telephone subscribers (x_2) had a negative inhibitory effect at 5% of the significant level, indicating that the development of Internet infrastructure in developing countries is still not perfect. We should increase investment in Internet infrastructure, improve the level of Internet infrastructure, improve Internet penetration and narrow the digital divide with developed countries.

Robustness Test

In order to test the robustness of the model, the core explanatory variable of this paper, the Internet factor, has three agent variables. By gradually deleting these three core agent variables, the stability of the model is tested.

Table 5 Stability test results for fixed-effect models

Independent variable	Model 4	Model 5	Model 6
X_1	0.015***	0.016***	0.014***
	(6.32)	（6.97）	（6.37）
X_2	0.011***	0.010**	
	(3.12)	（2.84）	
X_3	0.003**		
	(2.19)		
lngdp	0.780***	0.899***	0.917***
	(6.88)	（9.02）	（9.21）
lnopen	0.499***	0.484***	0.486***
	(3.85)	（3.74）	（3.75）
lnintell	0.158**	0.184**	0.176**
	(2.04)	（2.41）	（2.31）
rinterest	0.037*	0.037*	0.037*
	(1.75)	（1.71）	（1.74）
Constant	-26.265***	-29.700***	-29.567**
	(-11.40)	（-17.62）	（-17.53）
Model	FE	FE	FE
time effect	yes	yes	yes
Individual effect	yes	yes	yes
R^2	0.4283	0.4178	0.4021

Description:(1)The levels of ***,*** and * are significant at 1%, 5% and 10% respectively(2) the t test value is in parentheses.

It can be found that, by constantly deleting the core variables of Internet factors, the significance and direction of the regression results of the three models have not changed, indicating that the benchmark regression model has robustness, no serious endogenous problems, and the regression results are reliable.

Research Conclusion

Based on the above empirical analysis, the following conclusions can be drawn:

Internet factors have a significant positive impact on global digital financial exports. Fixed broadband subscribers, fixed telephone subscribers and mobile phone subscribers not only reflect a country's Internet audience, but also indirectly reflect a country's Internet infrastructure capacity. The level of Internet infrastructure among countries is uneven, and the digital divide still exists, which is an important factor affecting the digital economy.Economic factors have a positive impact on global digital financial exports. The stronger the economic strength and the more open the trade, the easier it is for countries to carry out digital trade. Because digital trade needs not only a large amount of materials to invest in Internet infrastructure, but also new international rules and order to restrict it, countries with stronger economic strength obviously have advantages in digital economy.Institutional factors play a significant positive role in promoting global digital financial exports. The higher the level of intellectual property protection, especially the rapid development of electronic intellectual property protection in recent years, which is conducive to the innovation of the Internet industry, greatly promoting digital trade.Interest rate has a significant positive effect on global digital financial exports. The higher the real interest rate, the higher the cost of loans, the lower the investment and consumption, and the lower the price. To a certain extent, it restrains imports and promotes exports.Economic factors, institutional factors and interest rate factors have more obvious promotion effects on global digital financial exports. Among the Internet factors, fixed broadband subscribers have the most obvious promotion effect. This shows that financial digital exports mainly rely on the Internet and trade through the Internet. Countries should promote Internet infrastructure. Increase the number of users accessing the Internet.There is a digital divide between developed and developing countries.

The level of Internet infrastructure construction in developing countries is still relatively backward. There are obvious differences in the degree of Internet penetration between developed and developed countries. The impact of the Internet on the developed countries and China is different, and it has a more obvious role in promoting the financial exports of the developed countries.

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