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Research on the Relationship Between Export Trade Network Centrality and Foreign Direct Investment: A Nonlinear Empirical Test Based on Panel Smooth Transition Regression Model

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Abstract

As an important force in economic globalization, foreign direct investment is an important means for a country or region to integrate into the global economy in the context of economic opening. Through foreign direct investment, it can promote the economic development of the country and strengthen the political influence of the country. Combining the variables of international financial risk level, this paper adopts the nonlinear panel smooth transition regression model (P STR model) to empirically test the nonlinear smooth gradual evolution relationship between the centrality of export trade network and the flow of foreign direct investment . The research finds : (1) Under different global financial risk levels, a country's export trade network and foreign direct investment show a nonlinear and smooth evolution relationship. (2) When the global financial risk level is low, the higher the centrality of a country's export trade network, the greater the flow of foreign direct investment. (3) With the rise of the global financial risk level, when it exceeds a certain threshold, the promotion effect of export trade network centrality on foreign direct investment turns into a hindrance, and shows a significant increase trend.

Keywords

Export trade network centrality; Foreign direct investment; PSTR model.

1. INTRODUCTION

With the deepening of global economic integration, the large-scale flow of commodities and capital on a global scale is an important driver for the economic and economic development of countries around the world. International trade and international direct investment, as important carriers of global commodity flows and capital flows, have also made great contributions to the development of the global economy. Under the wave of economic globalization, transnational operation has become an important choice for the survival and development of a country's enterprises, and foreign trade and foreign direct investment will be two different forms of enterprises' transnational operation. In these two forms, each country, based on its own advantages, uses two markets, the domestic market and the international market, as well as the two resources of commodities and capital, to continuously open up its own market, actively integrate into the international market, and drive its own economic development. .

With the changes in the global economic environment and the development of global economic integration, the relationship between international trade and foreign direct investment has also undergone major changes. There is an alternative, complementary and uncertain relationship between the two.

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202205_8(5).0019

The main theories that support the substitution relationship are Mundell 's trade and investment substitution theory, Feinon's product life cycle theory, and Dunning's "eclectic" theory of international production. Mundell (1957) argues that in free trade, only product trade is required. However, when there are obstacles between the two countries that affect free trade, international trade is completely replaced by international investment. Since this substitution is due to tariffs, it is also known as tariff-induced investment. These are the two extremes of the mutual substitution of international trade and international investment. Fenon (1966) divides the product into three production cycles. In the first stage, the product innovation stage, the product production technology is not yet fully mature, the company has a monopoly advantage, the product price demand elasticity is small, and the difference in production cost has little effect on the choice of product production location. At this time, it is suitable for domestic production and export to meet the needs of the international market. In the second stage, the mature stage, the production technology of products tends to be stable, but the standardized production of products has not yet been realized. Competitors and imitators began to emerge, and companies still pursued differentiated production in order to avoid direct price competition. The price elasticity of demand for products becomes larger, and the company has the motivation to reduce product costs at this time. Companies will choose countries or regions with similar income and technology level to their home countries and lower labor costs for foreign direct investment. In the third stage, the product standardization stage, the product production technology is fixed and fully diffused. Price is particularly important to expand the competitive advantage of products. The location of the company's foreign direct investment is a country or region with low labor costs, and the product is imported to meet the needs of the domestic market. The compromise theory of international production proposed by Dunning (1981) considers the three factors of ownership advantage, internal advantage and location advantage, and examines the choice of trade or investment. If a manufacturer has a location advantage on top of its ownership and internal advantages, it can choose to invest abroad; but if the manufacturer lacks a location advantage, it chooses to produce domestically and then export to meet the needs of the international market. On the basis of having three advantages at the same time, it reflects the substitution effect of foreign direct investment on trade.

The main theories supporting the complementary relationship are Kojima Kiyoshi 's marginal industrial expansion theory, Bhagwati and Dinopoulos' compensation investment model. Kiyoshi Kojima believes that foreign direct investment should start from the industry in which the country is at or will be at a comparative disadvantage, and the host country of foreign direct investment has a significant or potential comparative advantage in this industry. Industries with comparative advantages produce domestically, thereby further expanding the magnitude of comparative advantage. The result will lead to an increase in free trade and an optimization of the industrial structure, thereby improving the country's welfare level, further improving the level of technology and innovation of products, and continuously expanding the scale of foreign direct investment. Based on this, it can be seen that direct investment and trade are mutually complementary and mutually reinforcing relationships. Bhagwati and Dinopoulos constructed a compensation investment model from the perspective of political economy to illustrate the interrelationship of trade and investment. From the perspective of a single period, investment cannot maximize profits for firms in that period, but investment can reduce the possibility that the host country will implement trade protection policies in the next period. Maximize profits. The loss of the investment in the first period can be compensated in the second period, which is the compensation investment.

The main theorists who believe that there is an uncertain relationship between trade and investment are Markuson and Svensson (1985). Markuson and Svensson 's (1985) trade-investment complementarity theory uses factor scale models to point out that the relationship between trade and non-trade factors determines the relationship between international trade

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202205_8(5).0019

and factor flows. If trade factors and non-trade factors are non-cooperative, then international trade and factor flows present a mutually substitutable relationship; if trade and non-trade factors are cooperative, then international trade and factor flows are a mutually complementary and mutually reinforcing relationship . In addition, Markuson and Svensson (1985) also examined five situations, namely production technology differences, taxation of production, monopoly, external economies of scale and factor market distortions, and further demonstrated the complementary situation of international trade and factor flows.

Although both trade and global financial risk levels have an impact on OFDI, the nonlinear relationship between the interactive effects of various influencing factors has not been deeply studied, such as how trade and global financial openness interact with OFDI or global financial The threshold effect of development level on foreign direct investment. As the level of global financial risk changes, whether the substitution effect and the complementary effect will alternately change, this is an important question studied in this paper. In fact, if changes in the level of global financial risks will change the relationship parameters of the impact of trade on OFDI flows, the relationship parameters between trade network centralization and OFDI will not be static. So it is very necessary to use nonlinear model to estimate and analyze the influencing factors of foreign direct investment. The main contributions of this paper are as follows: 1. This paper overcomes the shortcomings of traditional trade indicators by constructing a more representative indicator of the degree of centralization of the trade network. 2. Although previous studies have studied the relationship between trade and foreign direct investment, they have ignored the role of global financial risk levels in the relationship between trade and foreign direct investment. In this paper, the panel smooth transition regression model can effectively solve this problem.

2. THE CHOICE OF NONLINEAR MODEL AND VARIABLE SELECTION

2.1. Selection of Nonlinear Model

2.1.1. Model setting

Between export trade network centrality and OFDI under different global financial risk levels.

$$OFDI_{it} = \alpha_i + \beta_1 QC_{it} + \beta_2 QC_{it} g(q_{it};\gamma,q_c) + \beta_3 controls_{it} + \varepsilon_{it} \quad (1)$$

where N and T represent the number of countries and the time dimension of the panel, respectively. $OFDI$ It represents a country's foreign direct investment flow ; QC it is the centrality of the export trade network and $controls$is a control variable. $\alpha_i$is the individual fixed effect and $\varepsilon_{it}$is the error term. $g(q_{it};\gamma,q_c)$In order to characterize the transformation function of the nonlinear smooth transition of the P STR model , it is assumed that the transformation function $g(q_{it};\gamma,q_c)$follows the logistic transformation function (Terasvirta (1994)), the functional form is as follows:

$$g(q_{it};\gamma,q_c) = (1+\exp(-\gamma\prod_{c=1}^{m}(q_{it}-q_c\ ))^{-1}, \gamma>0\ and\ q_1<q_2<\cdots<q_m \quad (2)$$

Among them, q_{it} the global financial risk index VIX is used to measure , which $q=(q_1,\cdots q_m)'$is an m-dimensional position parameter vector, which $\gamma$is a smoothing parameter, which measures the smooth transformation degree of the logistic function and determines the transformation speed of different intervals.

2.1.2. Linearity test

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202205_8(5).0019

We followed research convention and $H_0: \gamma = 0$ performed linearity tests using the null hypothesis. The first-order Taylor expansion is performed at $g(q_{it}; \gamma, q_c)$Eq. (1), $\gamma = 0$ and after reparameterization, the auxiliary regression function is constructed as follows :

$$OFDI_{it} = \alpha_i^* + \beta_1^* QC_{it} + \varphi_1 QC_{it} q_{it} + \cdots + \varphi_m QC_{it} {q_{it}}^m + \beta_3^* controls_{it} + \varepsilon_{it}^* \quad (3)$$

where , $\varepsilon_{it}^* = \varepsilon_{it} + R_m X_{it}$, $X_{it} = \{QC_{it}, controls_{it}\}$ is R_m the remainder of the Taylor expansion. Therefore, testing in equation (1) is $H_0: \gamma = 0$ equivalent to testing the null hypothesis in this equation $H_0: \varphi_1 = \cdots = \varphi_m$. To this end, we construct three test statistics as follows :

$$LM = \frac{TN(SSR_0 - SSR_1)}{SSR_0} \sim \chi_{mk}^2 \quad (4)$$

$$F = \frac{(SSR_0 - SSR_1)/mk}{SSR_0/(TN - N - mk)} \sim F(mk, TN - N - mk) \quad (5)$$

$$pseudo - LRT = -2\left[\log\left(\frac{SSR_{ur}}{SSR_0}\right)\right] \sim \chi_{mk}^2 \quad (6)$$

Among them, $SSR_0$is the panel residual sum of squares under the condition that the null hypothesis holds , and SSR_1 is the panel residual sum of squares under the alternative hypothesis , and is the residual SSR_{ur} of the auxiliary regression equation (linearized unconstrained regression model) under unconstrained conditions sum of square. During testing, the LM statistic and the $pseudo - LRT$statistic follow an asymptotic χ_{mk}^2distribution, while the F statistic follows an asymptotic $F(mk, TN - N - mk)$distribution.

2.1.3. Residual nonlinearity test

In the case where the linear test rejects the null hypothesis, we need to perform a residual nonlinear test to determine the number of transfer functions in the PSTR model. Consider a PSTR model with two transition functions in the PSTR framework as follows

$$OFDI_{it} = \alpha_i + \beta_1 QC_{it} + \beta_2^1 QC_{it} g(q_{it}^1; \gamma_1, q_c^1) + \beta_2^2 QC_{it} g(q_{it}^2; \gamma_2, q_c^2) + \beta_3 controls_{it} + \varepsilon_{it} \quad (7)$$

Among them, the transformation variable $q_{it}^1$and $q_{it}^2$are not necessarily the same. The null hypothesis that there is no residual nonlinearity in a two-mechanism PSTR model can be formulated as $H_0: \gamma_2 = 0$. As before, $\gamma_2 = 0$ perform a $g(q_{it}^2; \gamma_2, q_c^2)$ first-order Taylor expansion at , and after reparameterization, construct an auxiliary regression regression function

$$OFDI_{it} = \alpha_i^* + \beta_1^* QC_{it} + \beta_2^{1*} QC_{it} g(q_{it}^1; \gamma_1, q_c^1) + \varphi_1 QC_{it} q_{it} + \cdots + \varphi_m QC_{it} {q_{it}}^m + \beta_4^* controls_{it} + \varepsilon_{it}^* \quad (8)$$

The significance of the PSTR model with two transfer functions was tested using the LM statistic, the F statistic and the statistic. $pseudo - LRT$ If the null hypothesis $H_0: \gamma_2 = 0$is rejected, it is necessary to further test whether there are three or more transfer functions in the PSTR model. Further on the null hypothesis $H_0: \gamma_n = 0$（$n \geq 3$）, the alternative hypothesis is to $H_1: \gamma_n \neq 0$be tested, if the null hypothesis is rejected, the null hypothesis is continued to be

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tested and the $H_0: \gamma_{n+1} = 0$ alternative hypothesis is $H_1: \gamma_{n+1} \neq 0$ tested until the null hypothesis cannot be rejected.

2.1.4. Parameter estimation

Parameter estimation for PSTR models is a direct application of individual fixed effects and nonlinear least squares. We first remove individual effects by shifting the individual-specific means , obtain starting values for the coefficients of the $u_i$transfer function by grid search $g(q_{it}; \gamma, q_c)$, and use them as starting values for the nonlinear least squares estimation method such that the residual sum of squares is minimized .

2.2. Variable Selection

Based on the availability of data, this paper selects 58 countries and regions from 1996 to 2018 as the research objects .

2.2.1. Explained variable

The research object of this paper is the scale of foreign direct investment flows .

2.2.2. Core explanatory variables

Export trade network centrality . The trade network centrality index used in this paper is defined by Haoyuan Ding et al. (2019) . Trade network centrality, also known as "neighbor quality centrality", is an indicator constructed by Haoyuan Ding et al. (2019) based on the social network analysis method to describe the relative importance of a country or region in the global trade network. Using the bilateral export trade data of 214 countries in the world, this paper uses matlab software to measure the centrality of the country's export trade network , and constructs a global export trade network based on 214 countries. The calculation formula is as follows:

$$QC_i = \sum_{j \neq i} wo_{ij} wi_{ji} TC'_j + TC_i \tag{9}$$

where

$$TC_i = \log[\left(\sum S_{ij}\right)^{1-\alpha} * \left(\sum K_{ij}\right)^{\alpha}]$$

$$wo_{ij} = K_{ij} / \sum_k K_{ik}$$

$$wi_{ji} = K_{ij} / \sum_k K_{jk}$$

$$TC'_j = \log[(\sum_{k \neq i} S_{jk})^{1-\alpha} * \left(\sum_{k \neq i} K_{jk}\right)^{\alpha}]$$

$S_{ij}$is defined as the export trade relationship between country i and country j . If there is an export trade flow relationship between country S_{ij}i and country j , it is equal to 1, otherwise it $S_{ij}$is equal to 0. K_{ij}It is defined as the size of bilateral export trade flows between country i and country j.

TC is defined as degree centrality, which is the product of the number of nodes connected by a focal node and the average weight of those nodes, the relative importance of the number of nodes and the node weight being adjusted by the tuning parameter α. QC is defined as " near-neighbor quality centrality " , also known as export trade network centrality in this paper.

2.2.3. Transform variables

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202205_8(5).0019

Global financial risk level, measured by VIX. The VIX is compiled by the CBOE and obtained by calculating the implied volatility of options on the S&P 500 . It is an indicator of the volatility of the U.S. stock market, used to measure the degree of uncertainty and risk in the global financial market, and an indicator used to describe changes in global investors' risk awareness.

2.2.4. Control variables

Capital account openness : Chinn-Ito indicator . Capital account openness in this paper is measured using the Chinn-Ito indicator calculated by Menzie Chinn and Hiro Ito and published regularly .

Economic development level: per capita GDP growth rate. According to the investment development cycle theory proposed by Dunning (1981) , the level of a country's foreign direct investment is closely related to its economic development level, and foreign direct investment has different performances at different economic development levels.

The real interest rate level. The level of interest rates represents the price of capital, and the level of interest rates can measure the abundance of capital in a country.

Real exchange rate change rate : Calculate the real exchange rate change rate based on the nominal exchange rate of the local currency against the US dollar and excluding the influence of the inflation rate .

Debt level of a country: public debt/GDP.

Level of foreign exchange reserves: foreign exchange reserves/GDP.

Inflation rate: CPI change rate.

The descriptive statistics of each variable are shown in Table 1.

Table 1. Descriptive statistics of each variable

variable	mean	standard deviation	maximum value	minimum
Foreign Direct Investment	11,205.652	47,970.549	523,890.000	-151,298.000
trade network centrality	9.757	18.175	351.087	3.205
Capital Account Openness	0.579	0.348	1.000	0.000
global financial risk	20.180	5.981	32.652	11.096
GDP per capita growth rate	2.518%	3.743%	23.075%	-15.396%
real interest rate	6.961%	11.802%	139.812%	-93.513%
real exchange rate change	-0.382%	10.249%	98.583%	-36.751%
public debt /GDP	53.304%	36.681%	249.114%	3.890%
Foreign exchange reserves /GDP	18.503%	15.002%	109.154%	0.397%
Inflation rate	8.213%	35.293%	1058.374%	-3.093%

3. EMPIRICAL RESULTS AND ANALYSIS

3.1. Correlation Analysis

Since there may be multicollinearity among the variables , it will lead to errors in the estimation of model parameters. Therefore, in order to ensure the reliability and rationality of the model, the multicollinearity test is performed on the sample data. Table 2 shows the correlation coefficient matrix of each variable. It can be seen that the correlation coefficient between each variable is small, and there is no high linear correlation, so the selection of variables is statistically significant.

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202205_8(5).0019

Table 2. Correlation coefficient matrix of each variable

	Foreign Direct Investment	trade network centrality	Capital Account Openness	global financial risk	GDP per capita growth rate	real interest rate	real exchange rate change	public debt/GDP	Foreign exchange reserves/GDP	Inflation rate
Foreign Direct Investment	1.000									
trade network centrality	0.220 [0.000]	1.000								
Capital Account Openness	0.188 [0.000]	0.042 [0.132]	1.000							
global financial risk	-0.012 [0.669]	-0.030 [0.286]	-0.015 [0.606]	1.000						
GDP per capita growth rate	-0.021 [0.449]	0.010 [0.717]	-0.046 [0.099]	-0.205 [0.000]	1.000					
real interest rate	-0.069 [0.014]	-0.019 [0.510]	0.067 [0.017]	0.060 [0.032]	-0.029 [0.302]	1.000				
real exchange rate change	0.008 [0.770]	-0.003 [0.903]	-0.046 [0.105]	0.084 [0.003]	-0.292 [0.000]	0.256 [0.000]	1.000			
public debt/GDP	0.184 [0.000]	0.014 [0.625]	0.036 [0.206]	-0.009 [0.752]	-0.164 [0.000]	0.010 [0.716]	0.126 [0.000]	1.000		
Foreign exchange reserves/GDP	-0.093 [0.001]	-0.017 [0.537]	0.155 [0.000]	-0.059 [0.035]	0.043 [0.124]	-0.058 [0.038]	-0.014 [0.621]	0.020 [0.486]	1.000	
Inflation rate	-0.018 [0.527]	-0.003 [0.908]	-0.067 [0.018]	0.000 [0.996]	0.020 [0.485]	-0.320 [0.000]	0.000 [0.989]	0.082 [0.003]	-0.040 [0.158]	1.000

3.2. Linearity Test and Residual Nonlinearity Test

Table 3. " Linearity Test " and " Residual Nonlinearity Test "

Model Statistics	LM		LMF		LRT	
	m=1	m=2	m=1	m=2	m=1	m=2
H 0: r =0 VS H1: r =1	3.588 [0.058]	8.880 [0.012]	3.410 [0.065]	4.235 [0.015]	3.593 [0.058]	8.911 [0.012]
H 0: r =1 VS H1: r =2	1.710 [0.191]	11.515 [0.003]	1.620 [0.203]	5.494 [0.004]	1.711 [0.191]	11.568 [0.003]
H 0: r =2 VS H1: r =3		8.606 [0.014]		4.093 [0.017]		8.636 [0.013]

First, we test and analyze whether there is a nonlinear relationship between export trade network centrality and foreign direct investment. To ensure the robustness of the results , this paper uses LM statistics, LMF statistics and LRT statistics to test. It can be seen from Table 3 that the P values of the three statistics are less than 10% in the case of m=1, indicating that the linear null hypothesis can be rejected at the 10% significant level; in the case of m=2, the three The P-values of all statistic are less than 5%, indicating that the null hypothesis of linearity can be rejected at the 5% significant level. This shows that with the rise of global financial risk level , there is a nonlinear relationship between the centrality of export trade network and foreign direct investment.

On the basis that the linearity test rejects the linear null hypothesis, in order to further examine the characteristics of the nonlinear transformation, we carry out the residual nonlinearity test to explore the optimal number of transformation functions . It can be seen from Table 3 that when m=1, the null hypothesis of r =1 cannot be rejected at the 10% significant level , indicating that there is a transfer function when m=1; when m=2, the The p-value is the smallest, so there are 2 transfer functions when m=2.

3.3. Determination of Position Parameters

Secondly, according to the research of Granger and Terasvirta (1993), we adopt Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) to determine the number of model location parameters. As shown in Table 4 , the AIC when m=1 and m=2 are equal, but the BIC when m=1 is smaller than that when m=2, so the optimal number of position parameters is 1.

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202205_8(5).0019

Table 4. Determination of the number of position parameters

	m=1	m=2
number of conversion functions	1	2
AIC	20.317	20.317
BIC	20.357	20.375

Based on the above analysis, it can be determined that the optimal mechanism combination of the model is 1 position parameter and 1 conversion function.

3.4. Parameter Estimation of Nonlinear Models

After determining the number of positional parameters and transformation functions, parameter estimation of the model is performed. Parameter estimation for PSTR models is a direct application of individual fixed effects and nonlinear least squares. We first remove individual effects by shifting the individual-specific means , obtain starting values for the coefficients of the $u_i$transfer function by grid search $g(q_{it};\gamma,q_c)$, and use them as starting values for the nonlinear least squares estimation method such that the residual sum of squares is minimized . The estimated results are shown in the following table:

Table 5. Parameter estimation of panel smooth transformation regression model

	OFDI
smoothing parameter γ	16.36
positional parameter q c	19.655
QC	18.65 ***
	(5.405)
QC it g (q it ;γ ,q c)	-431.707 **
	(182.599)
KAOPEN	2534.882 **
	(1186.032)
PGDP	-195.948
	(125.644)
IR	24.283
	(29.948)
EX	-84.935 *
	(50.173)
DEBT	102.246 **
	(44.454)
FR	177.689 ***
	(55.38)
CPI	-1.522
	(1.597)
number of conversion functions	1
AIC	20.317
BIC	20.357

Note: *, ** and *** represent passing the test at the 10%, 5% and 1% significance levels, respectively, and the values in parentheses are the corresponding standard deviations of the estimated coefficients.

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202205_8(5).0019

From the regression results, it can be seen that a country's capital openness , public debt/ GDP , foreign exchange reserves/GDP are positively correlated with foreign direct investment flows, and the real exchange rate change rate is negatively correlated with foreign direct investment flows, which is consistent with the theory; the level of domestic economic development , interest rate level, inflation rate and foreign direct investment flow have no significant relationship.

From the estimation results in Table 5 , we can see that with the global financial risk level as the conversion variable, the impact of export trade network centrality on foreign direct investment has the characteristics of a single threshold. The smooth transition speed of the two intervals is γ=16.36, which means that with the rise of the global financial risk level, the centrality of the export trade network will show a nonlinear relationship of gradual evolution. The position parameter qc=19.655, where the transfer function g is divided into two smoothly transformed parts. The estimated coefficient of linear part of the influence of export trade network centrality on foreign direct investment is 18.65, and the estimated coefficient of nonlinear part is -431.707 , and both are significant. When 11.0965 (minimum value) ≤ VIX<19.655, the conversion function g=0, the estimated coefficient of export trade network centrality is 18.65, that is, when the centrality of a country's export trade network increases by 1 unit, the foreign direct investment flow will increase by 18.65 million dollars; but when the global financial risk level exceeds the threshold point, that is, when 19.655<VIX ≤ 32.6525 (maximum value), the conversion function g=1, and the coefficient of the centrality of the export trade network is 18.65-431.707=-413.057, that is, when The centrality of a country's export trade network increases by 1 unit, and the foreign direct investment flow will decrease by 413.057 million US dollars. This means that the rise of global financial risk level offsets the positive effect of export trade network centrality on foreign direct investment flow , and thus forms a non-linear smooth transition between export trade network centrality and foreign direct investment .

4. CONCLUSION

This paper constructs a PSTR model within a nonlinear framework, and uses the global financial risk level as a conversion variable to empirically test the nonlinear relationship between export trade network centrality and OFDI. The main conclusions are as follows: (1) Under different global financial risk levels, a country's export trade network and foreign direct investment show a nonlinear and smooth evolution relationship. (2) When the global financial risk level is low, the higher the centrality of a country's export trade network, the greater the flow of foreign direct investment. Global commodity demand is strong when global financial risk levels are low. If a country or region is at the center of the export world trade network, first of all, the country has closer real economic exchanges with foreign countries, then the country can obtain relevant information on foreign markets through trade, making it easier for domestic investors to see them as foreign customers. Potential opportunities for providing services ; secondly, the continuous export of a country’ s products in foreign markets may increase brand value, and in order to further expand its market share, it will conduct foreign direct investment for the purpose of occupying resources and expanding markets; thirdly, trade Opening up can attract foreign direct investment, allowing companies to acquire new technologies and absorb new knowledge through international suppliers operating in their home countries , while developing learning capabilities and flexibility to adapt to changing local conditions. By enhancing technological capabilities, local companies will better leverage spillover effects, improve productivity levels and other core competencies, and facilitate OFDI. (3) With the rise of the global financial risk level, when it exceeds a certain threshold , the promotion effect of export trade network centrality on foreign direct investment turns into a hindrance, and shows a significant increase trend . Countries with higher centrality of export trade network, when the

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level of global financial risk is low , have larger outward direct investment flow and accumulated a large amount of outward direct investment stock at the same time. Therefore, when the global financial risk level rises , the development of the global real economy is seriously affected , and the economy is in a downward trend, which seriously affects a country 's foreign direct investment . For countries with a higher status in the global export trade network, the reduction in FDI flows is larger . The centrality of trade network links international trade and international direct investment, and reveals the relationship and evolution trend of the two under different international financial risk levels, which is conducive to the coordination of international trade policies and international direct investment policies formulated by countries. In different economic environments, due to changes in the relationship between trade and investment, it is suggested that countries should adjust their international trade policies and international direct investment policies in a timely manner.

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