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Institutional Quality of Importing Countries, Intellectual Property Protection and China's Export of the High-tech Products

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Abstract— *With the continuous progress of science and technology and the rapid development of high-tech industries in the world, the role of high-tech products in national foreign trade has been becoming important. In order to study the impact of institutional quality and intellectual property protection of importing countries on China's export of high-tech products, a trade gravity model including the protection of the countries is constructed on the basis of theoretical analysis. The export data of China's high-tech products from 2007 to 2018 are selected for regression analysis by using random effect model and System GMM. The results show that the improvement of the institutional quality of the importing country can promote the export of China's high-tech products, while the improvement of the intellectual property protection level of the importing country is not conducive to the export of China's high-tech products, and the intermediary role of the intellectual property protection of the importing country between the institutional quality and the export of high-tech products is "masking effect". At the same time, due to the different economic development levels of importing countries, the inhibitory effect of intellectual property protection on the export of high-tech products is more significant in high-income countries.*

Keywords— *System quality; Intellectual property protection; Export of high-tech products; System GMM.*

I. INTRODUCTION

Since the reform and opening up, especially after China's accession to the world trade organization, China's foreign trade has developed continuously and rapidly. Promoting the export of high-tech products with high added value and high quality is an important path to promote the "stability and quality" of China's foreign trade development. According to the data of the National Bureau of statistics, the total trade export of China's high-tech products reached 743.04 billion US dollars in 2018, accounting for 30% of the country's total foreign trade export. At present, China's economy is in a critical period of transforming the mode of development, optimizing the economic structure and transforming the driving force of growth. The characteristics of the high-tech industry, such as innovation, strategy, high added value, intensive knowledge and technology and low resource and energy consumption, play an irreplaceable role in promoting the upgrading of China's industrial structure and improving labor productivity and economic benefits. At the same time, the export of high-tech products will help promote China's industry to move towards the middle and high-end of the global value chain and enhance China's voice and influence in the international community. It can be seen that the export of high-tech products is very important for national development. What are the factors affecting the export of high-tech products? Many scholars have put forward their views on this issue.

The system quality of importing countries determines the export environment of high-tech products. Countries with high institutional quality have diversified and inclusive political systems. Their political stability, economic prosperity and relatively perfect legal system are important factors to ensure the export of high-tech products. In recent years, more and more scholars have begun to pay attention to the relationship between institutional factors and export trade. Just as the viewpoint of New Institutional Economics: High institutional quality plays a significant role in trade growth. Araujol & Mion G confirmed that there is a positive correlation between the institutional quality of trading partner countries and their exports by establishing a dynamic incomplete contract model [1]. Based on the new trade theoretical framework, á lvarez et al investigated the impact of institutional quality on bilateral trade, and believed that the institutional conditions of destination countries and the institutional distance of importing and exporting countries are important factors affecting the trade, and the improvement of the quality can reduce the difficulty of bilateral trade and stimulate the export of enterprises [2]. Jessie Letal based on the global political governance indicators of the World Bank, investigated the specific impact of institutional quality on bilateral coconut trade, and found that the improvement of government efficiency can promote the trade of high-value products [3]. Gani A & Prasad B C selected four political indicators and used the fixed effect model to study the impact of institutional quality on the trade of Pacific island countries [4]. Using the fixed effect model, Zhao Jiazhang & Chi Jianyu found that the formal system of trading partner countries has a greater impact on China's foreign trade, and the impact is obvious for OECD countries [5]. Zheng Youyuan & Liu Yanping used the gravity model to study the institutional quality factors of foreign trade in China and countries along the "the Belt and Road", and concluded that there was a positive "U" characteristic between institutional quality and foreign trade [6]. Kang Yimin et al. built a panel threshold regression model to empirically test the threshold effect of institutional quality on foreign trade between China and major countries along the "the Belt and Road" [7]. The conclusions of most scholars have confirmed the important role of institutional factors in international trade, but there is less literature on the institutional quality of importing countries and the export of high-tech products. These provide some ideas for this paper.

Intellectual property protection is closely related to the export of high-tech products. In the short term, the strengthening of intellectual property protection in importing countries will increase the production costs of China's high-tech enterprises dominated by imitation, thus increasing the risk of infringement in trade, so enterprises will reduce the export of high-tech products. In the long run, the improvement of intellectual property protection in importing countries can stimulate the R & D and technological innovation of China's high-tech products, so as to increase exports. From the existing literature, many scholars have found the importance of intellectual property protection for international trade. Branstetter letter found that with the improvement of the level of intellectual property protection in the host country, multinational corporations will increase their production tasks in the host country and promote the development of the manufacturing industry in the country [8]. Zhang Xiaodong et al. conducted an empirical test using systematic GMM and quantile regression and found that the improvement of intellectual property rights in importing countries directly promoted the export of China's creative products [9]. Shen guobing & Chu can used the panel Tobit model and found that reinforcing the protection of industrial intellectual property rights can improve the quality of general trade export products [10]. Some scholars also focus on the export of high-tech products. Delgado M et al & ivus O both found that the strengthening of intellectual property protection in developing countries is conducive to the export of high-tech products [11], [12]. Kabir M & Salim R also found that the strengthening of intellectual property protection in importing countries has promoted the export of China's high-tech products. Yu Changlin &Tang Baoqing found that the intellectual property protection of importing countries plays a far greater role in promoting high-tech industries than other industries through the study of China's export trade [13], [14]. These conclusions provide a useful reference for this paper.

It can be seen from the above literature that the research of domestic and foreign scholars has made great contributions to the analysis of the relationship between institutional quality, intellectual property protection and one country's trade, but they have not analyzed the export of high-tech products from the two aspects of institutional quality and intellectual property protection at the same time. First of all, the research literature on institutional quality pays less attention to the trade of high-tech products; Secondly, whether the institutional quality of the importing country will affect the export of China's high-tech products through intellectual property protection; Finally, China's exports of high-tech products are mostly based on imitation and processing trade, lacking independent intellectual property rights and international competitiveness. What will be the impact of the continuous strengthening of intellectual property rights in importing countries on the export of these imitation-based high-tech enterprises to China? In short, under the background that developed countries force developing countries to sign high-standard intellectual property protection agreements with them by virtue of their technological advantages, it is of practical significance to study the impact of institutional quality and intellectual property protection of importing countries on China's export of high-tech products.

To sum up, based on the internal relationship between the institutional quality, intellectual property protection and high-tech product export of importing countries, this paper examines the impact of institutional quality and intellectual property protection on high-tech product export among different countries, and empirically tests the theoretical model by using static model and System GMM.

II. Mechanism Analysis

1. The impact of the institutional quality of the importing country on the export of high-tech products.

The improvement of the institutional quality of the importing country can directly promote the export of high-tech products. From the macro level, the improvement of the system quality of importing countries can provide a better macroeconomic environment for export trade, reduce the difficulty of export trade between the two countries, and promote the development of import and export trade. From the micro level, first, the improvement of the system quality of the importing country means that the country has the characteristics of political stability and perfect laws. When choosing the importing country, a rational enterprise will take the maximization of its interests as the goal. Therefore, the higher the political stability of the importing country and the more perfect the legal system, the lower the risk of export and the smaller the probability of loss, so the higher the expected income of the enterprise. It can be seen that the improvement of system quality can reduce the export risk of enterprises and attract more enterprises to export, so as to expand the export volume of high-tech products. Second, the improvement of the system quality of importing countries means the improvement of the business environment. The improvement of the business environment means that the cost of enterprises entering the market and transactions is reduced, so as to increase the profits of enterprises, expand production, increase exports and promote the increase of the export volume of high-tech products.

2. The impact of intellectual property protection in importing countries on the export of high-tech products

The improvement of intellectual property protection levels in importing countries has uncertainty about the export of high-tech products. With the continuous strengthening of intellectual property protection in importing countries, on the one hand, the imitation difficulty of China's enterprises focusing on processing and imitation will increase, and the imitation cost will increase, and the probability of infringement in the international market will also increase, so as to face high litigation fees or infringement fines, reduce exports and even withdraw from a country's market. On the other hand, in order to enter the international market, enterprises must increase R & D investment and technology introduction expenses, which will increase the production cost of products and reduce the price competitive advantage of China's high-tech products. Although it may form a coercion mechanism for China's high-tech product export enterprises in the long term, so as to promote the development of the high-tech industry, it will still lead to the

decline of high-tech product exports in the short term. In addition, the impact of intellectual property protection in importing countries on China's export of the high-tech products has country differences and industry differences.

3. Institutional quality, intellectual property protection and export of high-tech products in importing countries

The improvement of the system quality of importing countries can have an indirect impact on the export of high-tech products through the improvement of the level of intellectual property protection. On the one hand, the improvement of the system quality of the importing country means the improvement of the country's legal system, which will not only improve the law enforcement of intellectual property protection, but also increase the illegal cost of infringing intellectual property rights, so as to improve the level of intellectual property protection, which will have an impact on the export of high-tech products. On the other hand, the improvement of the system quality of the importing country will improve the market economic system of the country, that is, the number of enterprises providing professional services in the market will increase. With the increase of enterprises related to intellectual property protection, the level of intellectual property protection in importing countries will also improve. It can be seen that the improvement of the system quality of importing countries can promote the improvement of the level of intellectual property protection through the above paths, thus affecting the export of high-tech products.

Based on the above analysis, this paper puts forward the following three hypotheses:

Hypothesis 1: The improvement of the institutional quality of importing countries can promote the export of China's high-tech products.

Hypothesis 2: The impact of the improvement of intellectual property protection on China's export of high-tech products is uncertain.

Hypothesis 3: The improvement of the system quality of importing countries can affect the export of China's high-tech products through the improvement of the level of intellectual property protection.

III. MODEL SETTING AND VARIABLE SELECTION

1. Model setting

In order to further study the relationship between the three, this paper extends the traditional gravity model. The traditional gravity model usually constructs bilateral trade flows as some basic characteristic elements of importing and exporting countries, such as economic development level, distance and other trade distorting factors, that is, the function of trade cost:

$$\ln X_{ijt} = \alpha_0 + \alpha_1 \ln GDP_{it} + \alpha_2 EDL_{jt} + \alpha_3 \ln DIS_{ij} + \alpha_4 \ln A_{ijt} + \varepsilon_{ijt} \quad (1)$$

The variable X_{ijt} indicates the export volume of high-tech products from China (i) to the other countries (j) in the period t. Variable GDP_{it} and EDL_{jt} refers to the economic development level of China (i) and the importing country j respectively. Variable DIS_{ij} represents the geographical distance between the two countries. Variable A_{ijt} refers to the trade cost factors in the bilateral trade between the two countries except the distance factor, such as population size. Variable ε_{ijt} is the error term.

Considering that the current international intellectual property barriers are often combined with technical standards to prevent the export of developing countries with backward technology, and China's technological innovation ability will also affect the production and export of high-tech products, this paper will add the variables representing China's technological innovation ability(LT_{it}) into the model, and add the two core explanatory variables of the institutional quality(SQ_{jt}) and the level of intellectual property protection(IPP_{jt}) of the importing country, and draw the following model:

$$\ln X_{ijt} = \gamma_0 + \gamma_1 \ln SQ_{jt} + \gamma_2 \ln IPP_{jt} + \gamma_3 \ln GDP_{it} + \gamma_4 EDL_{jt} + \gamma_5 \ln POP_{jt} + \gamma_6 \ln DIS_{ij} + \gamma_7 F_{ijt} + \gamma_8 \ln LT_{it} + \varepsilon_{ijt} \quad (2)$$

The variable POP_{jt} represents the population size of the importing country in the t period. Variable F_{ijt} is a dummy variable of whether China has signed a free trade agreement with its partner countries.

2. Variable selection

Based on the availability of data, this paper selects 2007-2018 as the sample interval, and selects 59 representative countries or regions from China's major trading partners as the research object of high-tech product export. The relevant variables are described as follows:

(1) Export volume of high-tech products (X_{ijt}). It refers to the export volume of high-tech products from China (I) to the other countries (j) in the period t, in millions of US dollars. The classification of high-tech products in this paper refers to China's statistical classification catalogue of high-tech industries. The statistical scope includes five categories of products: pharmaceutical manufacturing, aerospace manufacturing, electronic and communication equipment manufacturing, electronic calculator and office equipment manufacturing and medical equipment manufacturing. By matching the product codes of national economic industry classification (GB/T4754-2002) and international standard industrial classification (SITC Rev.3) to sort out the specific statistical codes of high-tech industries and subdivided industries. The trade data is the Hs six digit statistics of the United Nations Trade Statistics Database (Un Comtrade).

(2) System quality (SQ_{jt}). Based on the research of previous scholars such as Cui Na [15], this paper examines institutional quality, including the political system and economic system, and constructs an institutional quality index system (Table 1), including rule of law, corruption control, regulatory quality, voice and accountability, government efficiency, political stability and non violence, The original data of these six indicators comes from The World Bank's global governance index (WGI). The indicators successively reflect the host country's regulation and norms related to political, legal and economic systems, the government's integrity and control of corruption, the intensity and fairness of enterprise supervision, the citizens' political voice and participation in public affairs, the efficiency and policy effectiveness of public services, and the stability of the political situation. The original data of business freedom, labor freedom, currency freedom, trade

freedom, investment freedom and financial freedom come from the heritage foundation. The assignment range of WGI is [-2.5, 2.5] and the assignment range of American Heritage Foundation is [0,100]. The size of the score symbolizes the quality. According to the index system in Table 1, the original data is standardized and non-negative, and the weight of each index is calculated by the entropy weight method to obtain the comprehensive index of system quality.

TABLE 1. comprehensive evaluation index system of system quality

Primary index	Secondary index	Tertiary indicators
System quality	political system	Rule of law
		Corruption control
		Supervision quality
		Government efficiency
		Discourse power and accountability
		Political stability and absence of violence
	economic system	Commercial freedom
		Labor freedom
		Monetary freedom
		Trade freedom
		Investment freedom
		Financial freedom

(3) Intellectual property protection level (IPP_{jt}). The G-P index calculated every five years is usually used as the measurement index of a country's intellectual property protection level internationally, but the G-P index only focuses on the legislative level of a country's intellectual property, and the sample data is discontinuous. Therefore, this paper decides to use the intellectual property protection (IPP) index in the global competition report released by the World Economic Forum (WEF) to calculate the intellectual property protection level of various countries over the years. The index is based on the questionnaire survey of enterprise executives in each target country. It can well reflect the influence of a country's intellectual property protection intensity on trade behavior and measure the actual protection of intellectual property.

(4) China's economic development level (GDP_{it}). Based on the trade gravity model, this paper adopts the per capita GDP, expressed in Yuan/person. The original data came from the China Statistical Yearbook.

(5) Economic development level of importing country (EDL_{jt}). There may be a high correlation between institutional quality and per capita GDP, there will be multicollinearity in empirical research, and the results are biased. Therefore, this paper uses mortality as an alternative variable of per capita GDP, and the data came from the World Bank.

(6) Geographical distance (DIS_{ij}). Geographical distance determines the transportation cost of China's export of high-tech products. The greater the geographical distance, the higher the transportation cost, and generally speaking, the smaller the export volume. Its original data comes from the French Center for international economic research.

(7) Population size ($\ln POP_{jt}$). The population size of the importing country represents the market size and market demand of the importing country. The original data is from the World Bank.

(8) Technological innovation ability (LT_{it}). Technological innovation can improve productivity and product quality, and is conducive to the export of high-tech products. This paper selects the number of patent applications as the variable to measure the technological innovation ability of China's high-tech industry. The data comes from the statistical yearbook of China's high-tech industry.

(9) Dummy variable (F_{ijt}) indicates whether China has signed a free trade agreement with its partner countries. If it is true, it is assigned as 1. Otherwise, it is assigned as 0.

TABLE 2. Descriptive statistics of variables

Variables	Mean value	Standard deviation	Maximum	Minimum
X_{ijt}	4173155	4062632	9261189	793871.1
SQ_{jt}	0.48	0.14	0.74	0.21
IPP_{jt}	4.31	1.23	6.35	4.6
GDP_{it}	43897.30	13619.79	65253.54	21973.42
EDL_{jt}	0.18	0.23	1.46	0.02
DIS_{ij}	8323.33	4411.43	19297.47	955.65
POP_{jt}	77.06	169.89	1353	3
LT_{it}	131530	70272.04	264736	34446
F_{ijt}	0.25	0.44	1	0

IV. Empirical Analysis

1. Benchmark regression

The commonly used panel data models include mixed regression model, fixed effect model and random effect model. The basic assumption of mixed regression is that there is no individual effect, that is, ignoring the influence of individual effect and time effect, which is inconsistent with the research object of this paper. Through the Hausmann test, it is concluded that using the random effect model is more effective, and there are distance variables and dummy variables that do not change with time in the model considered in this paper, so the fixed effect model will fail. Therefore, this paper decides to use the random effect model for regression analysis. The improvement of the system quality of importing countries may increase the export of products. On the contrary, the increase in export volume may also promote the improvement of the system quality of importing countries. Similarly, there is a two-way causal relationship between the level of intellectual property protection in importing countries and the export volume of China's high-tech products. Therefore, due to the existence of endogenous problems and the continuity of the export of high-tech products, in order to ensure the effectiveness of the estimation results, this paper also brings the lag term of the export volume of high-tech products into the model and uses the System GMM to estimate. The institutional quality and intellectual property protection level of the importing country are taken as endogenous variables, the economic development level of the importing country is taken as the pre-determined variable, and the other control variables are exogenous variables. The regression results are shown in Table 3 benchmark model (1). In order to ensure the robustness of the

regression results, this paper selects the economic freedom of American Heritage Foundation as the alternative variable of institutional quality, and uses the IPRI index calculated in the report of the international property rights index as the alternative variable of intellectual property protection level. The static panel regression and System GMM regression are also carried out. The results are shown in (2) and (3) of Table 3.

TABLE 3. Regression results of static panel and system GMM

Variable	Benchmark model(1)		Economic freedom(2)		Property right intensity(3)	
	RE	GMM	RE	GMM	RE	GMM
$L.\ln X_{ijt}$		0.578***		0.429**		0.562*
		(0.227)		(0.354)		(0.038)
$\ln SQ_{jt}$	0.397**	0.656***	0.738**	0.356**	0.457**	0.448**
	(0.195)	(0.172)	(0.354)	(0.194)	(0.188)	(0.192)
$\ln IPP_{jt}$	-0.006*	-0.002**	-0.002*	-0.002	-0.071*	-0.063*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.038)	(0.038)
$\ln GDP_{it}$	0.017	0.034	0.089	0.097	0.032	0.010
	(0.731)	(0.730)	(0.722)	(0.778)	(0.722)	(0.717)
EDL_{jt}	-0.199	-0.146	-0.247	-0.199	-0.188	-0.141
	(0.231)	(0.235)	(0.217)	(0.232)	(0.233)	(0.242)
$\ln DIS_{ij}$	-0.299***	-0.295***	-0.345***	-0.283***	-0.288***	-0.295***
	(0.080)	(0.082)	(0.075)	(0.086)	(0.076)	(0.076)
$\ln POP_{jt}$	0.066*	0.032*	0.071*	0.072*	0.063*	0.066*
	(0.039)	(0.019)	(0.038)	(0.039)	(0.037)	(0.037)
$\ln LT_{it}$	-0.005	-0.032***	-0.041	-0.041	-0.011	-0.012
	(0.381)	(0.002)	(0.410)	(0.411)	(0.382)	(0.379)
F_{ijt}	0.040	0.029	0.056	0.055	0.038	0.044
	(0.105)	(0.069)	(0.380)	(0.105)	(0.102)	(0.102)
R^2	0.3015		0.3174		0.3128	
AR(1)		0.000		0.000		0.000
AR(2)		0.1326		0.1208		0.1349
Sargan		0.3584		0.4157		0.5214
N	708	590	780	590	780	590

Note: *, * *, * * * indicates that the estimated value of parameters is significant at the level of 10%, 5% and 1%.The values in brackets are standard errors; The reported results of AR (1), AR (2) and sargan tests are p values.

It can be seen from table 3 that the random effect model does not take into account the endogenous problem and the characteristics of export continuity of high-tech products, resulting in the insufficient significance of the core explanatory variables. When the model is re estimated by using the System GMM, the symbol of each explanatory variable does not change, but the significance of the core explanatory variables is improved. The export volume of high-tech products lagging behind the first phase is significantly positive at the level of 1%, indicating that high-tech products do have the characteristics of continuity. The regression coefficient of the institutional quality of the importing country is 0.656, which has passed the significance test at the 1% level, which proves that the improvement of the institutional quality of the importing country can promote the export of China's high-tech products. The regression coefficient of the intellectual property protection level of the importing country is -0.002, which has passed the significance test of the 5% level, indicating that the strengthening of the intellectual property protection of the importing country has a negative effect on the export of China's high-tech industry, which is consistent with China's reality: China has long lacked independent intellectual property rights, the technology in the field of high-tech industry is mainly imitation, and the export proportion of high-tech products with independent brands and core technologies is very low. The strengthening of intellectual property protection in importing countries will curb the imitation behavior of Chinese enterprises. At this time, huge patent fees must be paid to obtain foreign advanced technology, otherwise the possibility of intellectual property infringement litigation will be greatly increased, which will increase the production cost, weaken the price competitive advantage of China's export products and affect the export of high-tech products.

The coefficient of the economic development level of the importing country is -0.146. Since this paper selects mortality as the alternative variable of the economic development level of the importing country, its regression coefficient is negative. The improvement of economic development level is conducive to the improvement of per capita income and consumption level, so as to increase the import of high-tech products. The distance variable is significantly negative at the 1% level, indicating that the increase of geographical distance will hinder the export of China's high-tech products to a certain extent. The increase in geographical distance will increase the transportation costs. The farther the distance between the two countries, the more transportation costs are borne by enterprises. In addition, the farther the distance is, the greater the risk borne by the enterprise in the transportation process. The sign of the coefficient between the population size of the importing country and China's economic development level is positive, and the population size has passed the significance test of 10%. Therefore, the population size of the importing country will also have a slight impact on China's high-tech products. The symbol of technological innovation capability coefficient is negative. Considering that some developed countries use intellectual property protection as a cover, raise the market access threshold with high-tech standards and adopt disguised import restriction policies, although the number of patent

applications in China is increasing every year, in fact, the main business income is still low, the R & D efficiency and the technical content of innovation achievements are low, and the technical competitiveness in the field of high-tech industries is impotent, Not enough to increase market share in export destinations. The dummy variable f coefficient is positive, which shows that the signing of free trade agreements between China and its partner countries can reduce the transaction cost to a certain extent, reduce trade barriers as much as possible, and improve the export of China's high-tech products. The correlation result AR (2) statistic set by the model is not significant, indicating that there is only first-order autocorrelation in the difference of the disturbance term. results of the sargan test show that "the selection of all tool variables is effective" is acceptable at the significance level of 5%, indicating that the model setting of System GMM is reasonable. The core explanatory variables are replaced by economic freedom and property right intensity. There is no significant difference in the regression results, which proves that the results are robust.

2. Intermediary effect

This paper refers to the causal stepwise analysis method proposed by Wen Zhonglin et al. to test the intermediary effect [16]. According to the intermediary effect test method, the following equation is established:

$$\ln X_{ijt} = \gamma_0 + \gamma_1 \ln X_{ij,t-1} + \gamma_2 \ln SQ_{jt} + +\gamma_3 \ln GDP_{it} + \gamma_4 EDL_{jt} + \gamma_5 \ln POP_{jt} + \gamma_6 \ln DIS_{ij} + \gamma_7 F_{jt} + +\gamma_8 \ln LT_{it} + \mu_{ijt} \quad (3)$$

$$\ln IPP_{jt} = \gamma_0 + \gamma_1 \ln SQ_{jt} + +\gamma_2 \ln GDP_{it} + \gamma_3 EDL_{jt} + \gamma_4 \ln POP_{jt} + \gamma_5 \ln DIS_{ij} + \gamma_6 F_{jt} + +\gamma_7 \ln LT_{it} + \mu_{ijt} \quad (4)$$

$$\ln X_{ijt} = \gamma_0 + \gamma_1 \ln X_{ij,t-1} + \gamma_2 \ln SQ_{jt} + \gamma_3 \ln IPP_{jt} + \gamma_4 \ln GDP_{it} + \gamma_5 EDL_{jt} + \gamma_6 \ln POP_{jt} + \gamma_7 \ln DIS_{ij} + \gamma_8 F_{jt} + +\gamma_9 \ln LT_{it} + \mu_{ijt} \quad (5)$$

TABLE 4. Regression results of mediating effect

Variable	Basic model			Property right intensity		
	(3)	(4)	(5)	(3)	(4)	(5)
L. $\ln X_{ijt}$	0.502***		0.578***			0.562*
	(0.147)		(0.227)			(0.038)
$\ln SQ_{jt}$	0.468***	0.553***	0.656***	0.468***	0.491***	-0.448**
	(0.150)	(0.0289)	(0.172)	(0.150)	(0.0247)	(0.192)
$\ln IPP_{jt}$			-0.002**			-0.063*
			(0.001)			(0.038)
$\ln GDP_{it}$	0.0153	0.247*	0.034	0.0153	0.0540	0.010
	(0.719)	(0.138)	(0.730)	(0.719)	(0.118)	(0.717)
EDL_{jt}	-0.196	-0.185***	-0.146	-0.196	-0.397***	-0.141
	(0.215)	(0.0413)	(0.235)	(0.215)	(0.0353)	(0.242)
$\ln DIS_{ij}$	-0.287***	-0.108***	-0.295***	-0.287***	-0.0576***	-0.295***
	(0.0747)	(0.0144)	(0.082)	(0.0747)	(0.0123)	(0.076)
$\ln POP_{jt}$	0.0626*	0.0383***	0.032*	0.0626*	0.0296***	0.066*
	(0.0367)	(0.00705)	(0.019)	(0.0367)	(0.00603)	(0.037)
$\ln LT_{it}$	-0.0109	-0.0470	-0.032***	-0.0109	-0.00643	-0.012
	(0.382)	(0.0734)	(0.002)	(0.382)	(0.0627)	(0.379)
F_{ijt}	0.0364	0.0344*	0.029	0.0364	0.0578***	0.044
	(0.101)	(0.0194)	(0.069)	(0.101)	(0.0166)	(0.102)
R^2		0.102			0.241	
AR(1)	0.0000		0.000	0.0000		0.0000
AR(2)	0.1278		0.1208	0.1278		0.1349
Sargan	0.2458		0.4157	0.2458		0.5214
N	708	708	708	708	708	708

Note: *, * *, * * * indicates that the estimated value of parameters is significant at the level of 10%, 5% and 1%.The values in brackets are standard errors; The reported results of AR (1), AR (2) and sargan tests are p values.

Table 4 shows the regression results of the intermediary effect model. In equation (3), the coefficient of institutional quality in China is 0.468, and passed the significance test of 1%, indicating that the total effect of institutional quality on the export of high-tech industries is significant. In equation (4), the regression coefficient of institutional quality on the level of intellectual property protection is still significant, and after adding the variable of intellectual property protection in equation (5), the regression coefficient of institutional quality of importing country on the export of high-tech products is still significantly positive, but the sign of the coefficient of intellectual property protection level is negative. Considering the possible intermediary effect of intellectual property protection, it is shown as "masking effect". There is a main effect between institutional quality and the export of high-tech products, but the indirect effect of intellectual property protection is negative, indicating that there may be a greater positive mechanism between institutional quality and high-tech products, which is not included in the research vision. Replace the variable of intellectual property protection with property strength for robustness test. Similarly, the system quality coefficient is significantly positive and the sign of property strength coefficient is negative, which is consistent with the test results above.

3. Sub national return

As countries with high levels of economic development have good systems and perfect intellectual property protection systems, as well as the most advanced technologies in the world, the strengthening of intellectual property protection

intensity in these countries will make it more likely that China's high-tech products will encounter intellectual property barriers, but economically backward countries may be at the level of imitation of China's technology, These countries often relax the restrictions of intellectual property protection system to imitate imported high-tech products. Therefore, the sensitivity of China's export of high-tech products to institutional quality and intellectual property protection of importing countries may change with the different levels of economic development of importing countries. According to the income grouping standard published by the World Bank in 2005, this paper divides the sample countries into three groups: high-income countries, middle high-income countries, middle low-income countries and low-income countries. Group System GMM was used for regression analysis.

TABLE 5. Systematic GMM regression in different countries

Variable	High-income countries	Middle high-income countries	Middle low-income countries and Low-income countries
$lnSQ_{jt}$	1.520***	1.107***	1.567*
	(0.294)	(0.358)	(0.224)
$lnIPP_{jt}$	-2.657***	-0.188	0.0631
	(0.614)	(0.322)	(0.272)
$lnGDP_{it}$	0.493	0.0103	0.438
	(1.123)	(1.128)	(0.816)
EDL_{jt}	-11.91*	-2.881***	-1.079***
	(7.092)	(0.795)	(0.191)
$lnDIS_{ij}$	-0.113	-0.988***	-0.292**
	(0.144)	(0.149)	(0.115)
$lnPOP_{jt}$	0.142**	0.214***	0.638***
	(0.0666)	(0.0657)	(0.0469)
$lnLT_{it}$	-0.250	-0.0231	-0.0802
	(0.594)	(0.595)	(0.432)
F_{ijt}	0.718**	0.369**	0.664***
	(0.188)	(0.184)	(0.128)

Note: *, * *, * * * indicates that the estimated value of parameters is significant at the level of 10%, 5% and 1%.

It can be seen from table 5 that the regression results of institutional quality of high-income countries and middle and high-income countries are significantly positive at the level of 1%, indicating that the impact of institutional quality of countries with high income on China's export of high-tech products is greater than that of low-income countries; The regression coefficient of intellectual property protection level in high-income countries is significantly negative, indicating that when the importing country is a high-income country, the strengthening of intellectual property protection level in the importing country is not conducive to the export of China's high-tech products. For low-income or low-income importing countries with backward technology, on the one hand, improving the level of intellectual property protection will increase the import cost and imitation cost. On the other hand, it will also protect the independent intellectual property rights of China's high-tech products export enterprises and enhance the confidence of export enterprises, so as to increase exports to these countries. The regression coefficient of intellectual property protection level in low-income and middle-income countries is not significant, which may be because the sample size is small, or the technology imitation ability of these countries is weak, and the imitation threat to China's high-tech products export is small. Therefore, increasing the intensity of intellectual property protection will not have a significant impact on exports. The regression coefficients of other control variables are basically consistent with the above, which will not be repeated here.

V. Conclusions and Suggestions

1. Main conclusions

In order to study the impact of institutional quality and intellectual property protection of importing countries on China's export of high-tech products, based on the theoretical analysis and the trade gravity model, this paper selects the panel data of 59 countries and regions from 2007 to 2018, and discusses the relationship between institutional quality, intellectual property protection and export of high-tech products by using random effect model and System GMM. The conclusions are as follows:

The improvement of the system quality of importing countries can promote the export of China's high-tech products. The improvement of system quality can promote the increase in the export volume of high-tech products by reducing the export risk of enterprises and improving the business environment of enterprises. However, there are differences in the impact of institutional quality on the export of high-tech products in countries with different income levels. The improvement of institutional quality in countries with higher income can effectively promote the export of China's high-tech products.

Generally speaking, the improvement of intellectual property protection level in importing countries is not conducive to the export of China's high-tech products. And the impact is more obvious in high-income countries. When the importing country is a high-income or middle and high-income country, the strengthening of its intellectual property protection will increase China's technology imitation cost and the possibility of suffering from intellectual property barriers, which are not conducive to the export of China's high-tech products. When the importing countries are low and middle-income or low-income countries, the export of high-tech products to these countries by Chinese enterprises with pairs of technological advantages will increase. Moreover, the sensitivity of the export of different types of high-tech products to the strengthening of the intellectual property protection level of the importing country will also be different.

The level of economic development, population size and geographical distance of importing countries are all important factors affecting China's export of high-tech products. Improving the level of economic development and expanding the population of importing and exporting countries is conducive to increasing China's exports of high-tech products.

2. Suggestions

China should play a leading role in promoting the improvement of the regional institutional environment. Promote the cooperation of international organizations led by China, build a multilateral and bilateral trading system, promote institutional exchanges and institutional construction with other

countries, jointly improve the quality of the system and promote exports.

Relevant state departments and export enterprises will gradually improve and improve the export risk monitoring and evaluation system, and release the system level information of the importing country in real time and accurately, including real-time data such as the degree of corruption, government efficiency and supervision quality, so as to provide information reference for export enterprises. At the same time, pay attention to factors such as the population size and economic development level of partner countries, and adopt targeted strategies to better promote the export of high-tech products.

At the international level, China should join other developing countries to actively participate in the legislative process of international intellectual property protection; At the domestic level, China must vigorously strengthen the training of high-level talents and improve the quality of human capital; Guide enterprises to strengthen scientific and technological innovation, improve the technical level of export products to meet the technical standards of importing countries, reduce the adverse impact of the continuous improvement of international intellectual property protection, and promote the export of China's high-tech products.

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