Empirical Study on the Effect of Trade Protection on Chinese Textiles Exporting based on Trade Gravity Model

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***Abstract*—Firstly, the paper reviews the study situation of trade gravity model at home and abroad, and points out that the trade gravity model is not widely applied in the industrial trade flow. Secondly, the paper takes the export of China's textile industry as an example to put forward export trade gravity model, and analyzes the influence of trade protection upon export of our textiles and other influencing factors. Finally, the paper provides some advices for our textiles exporting.**

***Index Terms*—export, textiles, trade gravity model, trade protection**

I. INTRODUCTION

One basic work of researching on the trade protection is the research on the impact on trade flows by trade barriers. The Trade Gravity Model is the most successful one in this calculation field and has been extensively used, so this paper is going to do some empirical studies on the impact on China's textile exports by trade protection based on the original Trade Gravity Model.

Gravity Model was first applied to the study of international trade flows by Tinbergen (1962) and Poyhonen (1963). Their separately found that [1-2], trade flows from one country to another depend on primarily on two forces: one is called attractive force, usually expressed by the country's scale economy measured by GDP, while the other is called exclusive force, usually expressed by the geographical distance between the two countries. The basic expression of Trade Gravity Model is:

$$T_{ij} = A\frac{G_i G_j}{D_{ij}} \tag{1}$$

T_{ij} is the trade flow from one country (assumed i) to another (assumed j). G_i and G_j are their GDPs. D_{ij} is the geographical distance between them and A is the proportion constant.

Although Tinbergen and Poyhonen didn't base on many theories in the research on Trade Gravity Model but on the experience estimation of the real trade relations, the basic theory of Trade Gravity Model has been gradually enriched in the subsequent studies [3-11]. In particular, Trade Gravity Model is unique in the interpretation of bilateral trade issues, and can explain many phenomena that the traditional trade theories can't answer to. Therefore, since the putting up in the early 1960s Trade Gravity Model has immediately concerned by many scholars and many expand researches. Different scholar brought a number of new variables based on the original model according to their own research purposes, such as population, per capita income, exchange rate, economic organizations, language, culture, the common border, and so on, greatly enhanced the intensity in practice of the model's explanation [12]. In application, Trade Gravity Model has been not only successfully applied to the trade-related fields, but also widely used in exchange rate, immigration, tourism and other economic and social fields, and even introduced by some scholars to explain the impacts on bilateral trade by the trade restrictions, for example, Otsuki, Wilson and Sewadeh (2001) used Trade Gravity Model to study the agricultural trade between European countries and African countries. And the results show that: the enhancement of technical inspection standards in agriculture (Aflatoxin Residue) by European countries would lead directly to the reduction of African agricultural exports volume [13]; Moenius (2004) divided industries into nine categories according to the international trade standard classification (ITSC), and divided into sharing standards, the imports deciding standards and the exports deciding standards according to the common characters of the two sides, and then Moenius used Trade Gravity Model to do some empirical studies on the impact on bilateral trade by industrial standards. The results showed that: in the non-manufacturing sector, imports deciding standards can become trade barriers, while can promote trade in the manufacturing sector [14]; IMF researchers added a number of dummy variables in the original model, which reflected that whether the two countries are sharing border, and whether they have similar culture and history as well as the regional integration, and in accordance with the average trade data from 1995 to 1999 calculated that the monetary union between trade partners, the colonial relationship and characteristic of border adjacent can promote the development of bilateral trade [15]; Carman (1999), Wall (1999) and Tamirisa (1999) also considered the impact on the bilateral trade by the measures of economic integration, the trade protection, the trade control system and other factors [16-17]. In

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addition, the model was applied to measure trade potential, to judge the effect of trade group, to analyze trade patterns and estimate the border costs of trade barriers, and to better explain some reality economic phenomena [18-20].

The research on Trade Gravity Model of domestic scholars is relatively late, but its unique research perspective and methods have made them gratifying achievements in both theoretical and empirical areas. For example, based on the practical situation in China of economic restructuring and rapid economic development, Gu Kejian (2001) proposed that we should add an export-oriented trade diversion variable to China's Trade Gravity Model, in order to reveal the impact on the trade flow rate and direction of China's transition economy. It is also necessary to do a special treatment of the original variable applied to a common market economy in developing countries to reflect the reality of our country [21]; Luo Xubei (2003) put forward the concept of "adjustment distance" to replace the "linear distance" or "actual distance", and compared the different effects on the model by both the factors based on the actual trade data of exports to Japan from every province in our country [22]; Zhang Yu and Tang Zhifang (2006) analyzed the main influencing factors of China's bilateral trade using this model and indicated that the trade policy factor (The text mainly focus on the macroeconomic policy of regional economic cooperation.) was the first factor impacting on China's bilateral trade, followed by the distance between trading partners and the scale of domestic economy. This was different with the traditional trade theory which contributed the international trade to differences in resources endowment and comparative cost advantage [23]; Sheng Bin and Liao Mingzhong (2004) using Trade Gravity Model tested the export trade flows between China and the other 40 major trading partners, estimated the country's potential export from the total and department levels, and analyzed that the primary factor affecting the relative shortage China's exports to other economies was the total economic scale of trade partners (relative to the total economic output of United States) using the export trade of United States and China for benchmark, and the geographical and regional trade arrangements played a relatively minor role, moreover, the matching degree of restrictions of import countries and China's trade policies was also an important factor impacting on China's exports [24]. In addition, there are many scholars did important researches in this fried [25-27].

In short, Trade Gravity Model has made great progress in both theoretical and empirical areas, and has become one of the most popular tools in the field of international trade for empirical research, particularly has made a lot of empirical research in the analysis of trade flows between countries and regions. However, the empirical research is relative short applying Trade Gravity Model to industry trade flows, and most industrial Trade Gravity Model only have general macroeconomic variables, lacking of explaining variable that reflects the industrial characteristics, making great similarity of results of different industrial empirical studies or difficulty in giving a reasonable explanation for the similar outcome. So that during the empirical process of researching the impact on China's textile exports by the trade protection measures using Trade Gravity Model, this paper adds some explaining variables which can reflect the characteristics of textile industry in various countries, except the ordinary explaining variables, such as the textile industry's competitiveness index and the textile industry's export growth rate, in order to reveal this trade protection measures' impact on China's textile export under different industrial backgrounds, and hope that this study can provide some theoretical bases and empirical experience for the industrial applications of Trade Gravity Model.

II. TRADE GRAVITY MODEL IN CHINA'S TEXTILE EXPORTS

A. Sample selection

Through the study on China's textile products subjecting to foreign trade protection measures and the characteristics of the countries, we can draw the conclusion that the countries have friction with us in textile trade are mainly concentrated in three types: the one owns larger markets; the one has rapid growth and the trade protection measures' conventional users. For this reason, this paper selected 20 countries and regions, Japan, EU, US, South Korea, Russia, Bangladesh, Australia, Singapore, Canada, Iran, Pakistan, Ukraine, Vietnam, Indonesia, India, South Africa, Malaysia, Brazil, Turkey and Taiwan, as samples in light of China's textile exports in the 1995-2004 trade. These samples have good representation which wholly reflected country-specific factors of trade friction impacting on China's textile export. In addition, it should be pointed out that Hong Kong is not alone considered as a trade partner to study despite it is one of the four major textile import and export markets of China, taking into account that Hong Kong is China's Administrative Region, the two sides have achieved liberalization in various trade areas including textiles, and moreover Hong Kong has mainly engaged in the re-exporting of textiles and garments, which means that the textiles' trade between China and Hong Kong are almost included in the textile trade statistics between China and other countries and regions.

B. Indicator settings and data sources

In addition to the two variables of basic model，the economic scale and the geographical distance, this paper also increased some following explaining variables: (1) The textile trade protection measures of the trade partners, which directly impact on China's textile products on the market in its competitiveness and export capacity, therefore in short term, the more stringent the foreign trade protection measures and the more harsh the trade terms are, the more narrow the trade space is, so that China's textile export trade will be inactive. In the long run, under the pressure of international trade protectionism, the level of China's textile technology will continually increase, the capacity of leaping trade barriers

will continuously be enhanced, and then the textile exports may not fall but up; (2) Regional trade organizations, namely whether the traders in one or more regional trade organizations with China. Many practices have proved that the regional trade organizations play roles in trade creation and trade diversion of internal members, conclude from which, if China and the trader belong to one regional trade organization, then all kinds of preferential measures arranged by regional trade will be helpful to China's textile export trade; (3) Population, this factor indirectly reflect the scale of textile demand market and the growth potential. In general, the more the population is the larger our country's textile market trade space is; (4) Per capita income, on the one hand, it's a symbol of a country's economic development level. With the improvement of people's living standards, not only the consumption ability of textiles and garments will be continually enhanced, but the feature demand of personalization, diversification and high gradation will be more prominent. The textile consumption level will be gradually developed from the middle and low to the middle-high and high-end; On the other hand, the index also indirectly reflects a country's level of labor costs. In terms of the view of international labor division and comparative advantage, if the other side's relatively high in per capita income, which indicates that the other side is lake of cost advantages in the textile production that is labor-intensive, the demand on China's textile products will increase accordingly; (5) The difference in per capita income, which refers to the difference between the trader and China. On one hand, the similar preferences theory indicates that the international trade is an extension of domestic trade; a country should export those products which own a tremendous size of domestic market. So the trade volume between the countries with similar preferences and same level of per capita income is the largest. We can draw the conclusion that the larger the gap of per capita income is, the more unfavorable China's textile exports trade is; On the other hand, the per capita income indirectly reflects the labor cost gap between the trader and China. If their per capita income is much higher than China's, then China's textile production has more total cost competitive advantage in accordance with the international comparative advantage principle. Conversely, if China's per capita income is far greater than theirs, then China's textile products will show obvious competitive disadvantage. The competitive advantage determines the size of China's textile exports; (6) The trader's foreign trade dependence is portrayed by the ratio of all of a country's total imports and exports of goods and the GNP, reflecting the country's economic dependence on international markets or the degree of openness. In the circumstances that other conditions are certain, the higher the degree of dependence on foreign trade is, the greater the country's capacity of importing and exporting on the international market will be; (7) Competitiveness index of the textile industry is the ratio of the balance between import and export of textiles and garments and the total volume, which analyzes the position and role of one country in the development of world's textile industry from the point of international division. Competitiveness index of textile industry usually values between -1 and 1. The number, which is greater than 0, indicates that the country is a net exporter of textile products, while is the less than 0 indicates that the country is a net importer. Therefore, if the other side is a net importer, it will bring larger China's textiles export, on the contrary, if the other side is a net exporter, imports of textiles from China will be increased; (8) The textile growth rate of import and export here refers to the annual average growth and reflects the changing trend and rate of a country's imports and exports. In theory, under the impact of the change rate of trader's imports and exports, China's textile exports and imports will accordingly change, but having relevance with the importing and exporting capacity of China's textiles in the fixed market. The specific economic implications and expected symbols of all variables in the model are shown in table 1. Variables above refer to trading nations, which are on the main consideration of the text studying on the international environment of China's textile exports. In particular the impact of international trade protection measures on China's textile exports, therefore, the analysis of the impact of China internal factors is not regarded as focus in the text.

TABLE I. THE MEANING OF EVERY EXPLAINING VARIABLES, DATA SOURCES AND THE THEORETICAL EXPLANATIONS

Variable name	Variable meaning	Formula and data sources	Expected symbol	Theoretical explanations
EX_{ijt}	the total textile exports from China to j country in the t year (100 million US dollars)			
GDP_{jt}	GDP (million US dollars)	Data from UN	+	Reflecting the size and growth potential of textile market demand (supply) of a country (region), the greater the GDP is, the stronger the textiles demand or supply capacity will be.
DIS_{ij}	The geographical distance between China's capital and other countries' capitals (1000 km)	The geographical distance is calculated by distance calculator based on the latitude and longitude of Beijing and the capital of j country	-	The distance indirectly reflects the size of the transportation costs, and the farther the distance between the two countries is, the greater different it becomes in history, culture, language, and other social characteristics, thereby affecting the bilateral textile trade.
$PGDP_{jt}$	GDP per capita	Data from UN	uncertain	Explained above

$DPGDP_{ijt}$	Gross Domestic Product per capita (US Dollars / person / year)	the difference of per capita GDP between the trader and China (GDP per capita of each country are directly from UN)	uncertain	Explained above
POP_{jt}	The total population (thousand)	Data from UN	+	Population reflects the size of the market of a country. In general, the more population means greater market.
BT_{jt}	trade protection measures taken by traders (Dummy variables)	compiling in accordance with the Trade Relief Information Network	uncertain	In theory, the trade protection measures will reduce the textiles trade in short-term, but the level of China's textile technology will continually increase in a long-term under the pressure of international trade protectionism. The capacity of leaping trade barriers will be continuously enhanced, and the textiles imports and exports may not fall but up.
REG_{ijt}	whether the trader and China are in the same regional trade organization (Dummy variables)	data was obtained according to China's Ministry of Commerce Web site	+	The trade preferences of regional trade organizations are good for the bilateral trade increase of the internal members, and the relatively open trading environment will reduce internal corresponding trade protection measures and trade barriers, and help to expand China's textile trade.
DEP_{jt}	The degree of dependence on Foreign Trade(%)	the ratio of total imports and exports of goods and GNP (Data of import, export, and GNP are all from UN)	+	In general, the higher the degree of dependence on foreign trade is, the ties between nations and the international market will be closer, and correspondingly the textile supply will have greater aspirations.
TCI_{jt}	Textile Industry Competitiveness Index (dimensionless index)	the ratio of balance and the total in textile imports and exports (the data of textiles' import and export are directly from WTO)	-	If the competitiveness of the textile industry index is greater than 0, the country is a net exporter in the international textile industry, otherwise, it is a net importer.

Note: The distance between China and the EU refers to the average distance between the capital of China and the capitals of every EU Member State.

We need to avoid putting some the linear related variables into the same model in the empirical process, for example, there is a clear linear correlation between the GDP and GDP per capita and population, between the per capita total national product and the balance of per capita value. The specific application can be found later. In order to ensure the consistency of statistical standards, this paper tries to make the similar data from the same source in the data collection process.

C. Modeling ideas

The basic thinking of using Trade Gravity Model to analyze trade flows is: to deduce the impact on trade flows of variables through estimation of parameters by Trade Gravity Model and to forecast and control the bilateral flows. The commonly used parameter estimation method is the ordinary least squares (OLS). In order to ensure optimal estimator, variables in the model should meet the assumptions that [28]: random error is non-auto-correlation, the explaining variable is independent with the error, and the explaining variables are non-linear.

In general, the time serial data and cross-sectional data may have heteroscedasticity. The existing of heteroscedasticity means that variance changes with time and ordinal number, which will affect the effectiveness of estimates. Heteroscedasticity in Economic Time Series is almost progressive, the main sources of which is that the difference of explained variables is increasing because of the increase of the explaining variables' values, so we often use taking logarithm to eliminate heteroscedasticity. In addition, this paper also uses the latest "simplism modeling theory," also known as "general-to-specific" modeling theory n the modeling process, the theory considers that [29]: a "general" model should be established in the first model setting step. It includes all the variables of all priori economic theories and assumptions, all kinds of possible "simple" model were "nested" in the "general" model, and then the insignificant variables will be gradually removed in the model estimating process to from a more "simple" ultimate mode finally. This modeling thought is favorable to overcome the "data mining" problem in traditional model as well as the "arbitrary" defect, and also helps to avoid missing important explaining variables leading a false autocorrelation. Based on the above analysis, the established initial Trade Gravitational Model is:

$$\begin{aligned}\log(EX_{ijt}) = {} & \alpha + \beta_1 \log(GDP_{jt}) + \beta_2 \log(DIS_{ij}) \\ & + \beta_3 \log(POP_{jt}) + \beta_4 \log(IM_{ijt}) + \beta_5 TCI_{jt} \\ & + \beta_6 REG_{ijt} + \beta_7 TI_{jt} + \beta_8 DEP_{jt} + \beta_9 IMZZ_{jt} \\ & + \beta_{10} BT_{jt} + \beta_{11} DPGDP_{ijt} + \varepsilon_{jt} \end{aligned} \quad (2)$$

The population also can be replaced by per capita income, per capita income margin, and other explaining variables and inspected respectively.

III. MODEL CHECKING AND CORRECTION

The cross-section, including 20 countries and regions, is expressed with subscript j, and the time series is from 1995 to 2004 with a subscript t. The subscript i refers to China. This paper provides an analysis on China's textiles export trade under the overall international trade protection, therefore, this paper is based on a fixed effect model, using the main indicators: determination coefficient test (R^2 and adjusted coefficient of determination $\overline{R}^2$), the regression significant test (F test) and the accuracy test ($P(F-statistic)$). If the F-test refuses the original assumptions of the model and the goodness-of-fit is larger, the joint effect of regression of the explaining variables in the equation is significant. However, the better overall significance can not guarantee that all the variables can pass significant test, so, all explaining variables also need separately t test after F-test, Only when the variables go through t test under a reasonable significant level, can we say that the explaining variables have some power to explain the explained variables. Of course, because of the inappropriate selection for variables, and the wrong model setting, the test would be false. We gradually remove the insignificant variables in accordance with the above-mentioned methods, after which regress, repeat the above steps until get a satisfactory outcome. Finally the "simplification" multiple regression model is got. The results are calculated as follows:

TABLE II. THE CALCULATED RESULTS OF TEXTILE EXPORTS' TRADE GRAVITY MODEL

the explained variables：the amount of textiles exports to 20 countries and regions in China during the 1995-2004 year			
Explaining variables	Coefficient	Explaining variables	Coefficient
IM_{ijt}	0.069060 （2.559788）**	GDP_{jt}	1.374977 (10.00718)***
DIS_{ij}	-2.179883（-2.243104）**	POP_{jt}	0.152644 (3.335020)***
DEP_{jt}	0.013764 （7.049570）***	TCI_{jt}	0.679220 (1.747080)***
REG_{ijt}	0.297961 （9.690945）***	$IMZZ_{jt}$	0.021048 (1.421495)
$EXZZ_{jt}$	-0.259615 （-1.590568）	BT_{jt}	0.050492 （3.547977）***
C	-1.519494 （-0.181093）	R^2	0.982662
Adjusted $\overline{R}^2$	0.979705	DW test	1.123360
F-test	332.2480	Significance level	0.000000***

Note: The numbers in brackets are the results after t-test. ***, **, and * represent the t-test under the 1%, 5% and 10% significant level.

Accordingly the textile exports' Trade Gravity Model:

$$\begin{aligned}\log(EX_{ijt}) &= 0.069*\log(IM_{ijt}) \\ &+1.375*\log(GDP_{jt})-2.180*\log(DIS_{ij}) \\ &+0.153*\log(POP_{jt})+0.014*DEP_{jt} \\ &+0.679*TCI_{jt}+0.298*REG_{ijt} \\ &+0.021*IMZZ_{jt}-0.260*EXZZ_{jt} \\ &+0.050*BT_{jt}-1.519 \qquad (3)\end{aligned}$$

The results calculated from the exports' Trade Gravity Model indicate that the overall significant test of the equation and the accuracy are very satisfactory, the determine coefficients and the adjusted ones are all more than 0.97 of the model. The explaining variables GDP_{jt}, POP_{jt}, DEP_{jt}, TCI_{jt}, REG_{ijt} and BT_{jt} are tested by significant inspection at 1% level, the explanatory variable IM_{ijt} and DIS_{ij} are tested by t-test at 5% level, and the $IMZZ_{jt}$ and $EXZZ_{jt}$, as well as the constant don't go through the test even at the level of 10%. Using the estimation model we do hypothesis testing (Wald test) for coefficients of the export equation, the calculated result is a low probability that the original assumptions should be rejected. In addition, because the samples are used in the 1995-2004 time-series data, it also need to check serial correlation. Durbin-Watson test is common used. Discrimination based on that if the value of DW test is in a neighborhood of 0, 2, 4, the random are with no correlation, with autocorrelation, or with negative correlation. The value here of DW test is 1.12. Inferred from the above we can say that there is a serious autocorrelation in the equation. The estimated coefficients of the explaining variables are invalid with the serial relevance. Therefore, the export Trade Gravity Model should be amended.

Adding autoregressive item in equation is an ordinary way of amending. First of all, we should use the first order autoregressive model to calculate the total F value of significant test is 595.76, the goodness-of-fit $\overline{R}^2$ of equations is 0.99006, and the value of DW test is 2.13046. From these test results, it seems that regression equation has good effects, but the explanatory variables DIS_{ij}, $IMZZ_{jt}$ and $EXZZ_{jt}$ hasn't yet pass the t test at the 10% level, therefore, we would continue to filtrate the explanatory variables. Testing process is guided by the following principles: the goodness-of-fit of regression equation and the overall significant test should be improved continuously, the error of estimated value of the variables should in decreasing trend, and all the explaining variables must pass t test and get the results as shown in Table 3.

TABLE III. THE ADJUSTED CALCULATING RESULTS OF THE TEXTILE EXPORTS' TRADE GRAVITY MODEL

Explained variables：the amount of textiles exports to 20 countries and regions in China during the 1995-2004 year			
Explaining variables	Coefficient	Explaining variables	Coefficient
IM_{ijt}	0.099676 （4.829332）***	GDP_{jt}	0.754079 (6.829332)***
POP_{jt}	0.068767 (1.818719)*	DEP_{jt}	0.005437 （2.761578）***
TCI_{jt}	-1.312269 (-4.405821)***	BT_{jt}	0.027562 （3.482593）***
C	-8.738142 （-4.231154）***	AR(1)	0.916525 （20.57307）***
R^2	0.993579	Adjusted $\overline{R}^2$	0.992488
F -test	910.5750	DW test	2.061678
Significance level		0.000000	

Note: The numbers in brackets are the results after t-test. ***, **, and * represent the t-test under the 1%, 5% and 10% significant level.

Accordingly the textile exports' Trade Gravity Model:

$$\begin{aligned}\log(EX_{ijt}) &= 0.1*\log(IM_{ijt}) + 0.754*\log(GDP_{jt}) \\ &+ 0.069*\log(POP_{jt}) + 0.005*DEP_{jt} \\ &- 1.312*TCI_{jt} + 0.028*BT_{jt} \\ &- 8.738 + [AR(1) = 0.916525]\end{aligned} \quad (4)$$

It is easy to see that the results in Table 3 are superior to the results in Table 2 by contrast. As there is a strong linear relationship among the population, GDP per capita and GDP (gross domestic product), they can not appear in the model at the same time. In addition, the difference of GDP per capita and GDP per capita are similar explanatory variables, therefore, this paper will use $PGDP_{jt}$ and $DPGDP_{ijt}$ replacing POP_{jt} to test for testing the impact on trade flows of GDP per capita to and the difference of GDP per capita. With the other variables remain unchanged, we replace population for GDP per capita. The calculated results show that the coefficient of $PGDP_{jt}$ has not passed the inspection at 10% significant level. Similarly, we replace it with the difference of GDP per capita, then the result showing that the $DPGDP_{ijt}$ passed the t-test at 5% significant level is 3.75 E-06. The adjusted goodness-of-fit of the equation is 0.993339, F is 1027.727, and DW is 2.040637. However, the difference of GDP per capita using population as variable is higher than the one using the AIC information guidelines and SC guidelines, so the optimal results of Trade Gravity Model for China's textile exports are shown as (4).

In order not to affect the accuracy of model estimates and effectiveness we should avoid the heteroscedasticity and serial correlation of random sequence errors, and also ask for that all the explaining variables are random. And the multicollinearity should be minimized among explaining variables. For the above issues always widespread in practical applications, this paper has taken the following measures and countermeasures. Specifically, we use the logarithm form firstly, and use weighted least squares (WLS), thus heteroscedasticity can be effectively eliminated (The existence of heteroscedasticity is contrary to the assumption of random.). If it does not have heteroscedasticity, the WLS method is equivalent to the ordinary least squares method. Secondly, it's often come out serial correlation in the sample model using time series data (The emergence of serial correlation is contrary to the assumption that all random errors are not related.). This is related to the inertia inherent of economic variables. In the calculation process of China's textile exports' Trade Gravity Model, the model has been effectively amended through increasing autoregressive item. Finally, there always appear multicollinearity problems in economic models, which are contrary to the basic assumptions of linear regression. Multicollinearity refers to complete or nearly complete linear relationship among explanatory variables, which means that we should consider the extent but the existence of multicollinearity. This is relevant to a number of reasons such as the common trend of economic variables. From the coefficient of determination of this model and F-test, R^2 (and $\overline{R}^2$) and F in China's textile exports' Trade Gravity Model are high. More than 98% information of the total deviation is explained by the regression indicating that the joint linear phenomenon is significant between explaining variables and dependent variables. Under these conditions, all variables are explained through the t -test, which illustrate that the independent explanation of dependent variables for explaining variables is prominent. In addition, the estimated results of the coefficient of explaining variables are the same of the expectation of economic theory, without abnormal phenomenon, estimated from which the equation does not have multicollinearity. Based on the above information, China's textile exports Trade Gravity Model is effective.

Ⅳ. ANALYSIS AND DISCUSSION

Coefficients are the marginal returns of the variable in the case that other variables remain unchangeable. In particular, when the dimension about variables are so different in the multiple regression model that we can't compare the estimated regression coefficients, we should carry on the following changes in order to compare the relative importance of the explaining variables:

$$\hat{\beta}_j^* = \hat{\beta}_j \frac{S_{x_j}}{S_y} = \hat{\beta}_j \sqrt{\frac{\sum (x_{ji} - \bar{x}_j)^2}{\sum (y_i - \bar{y})^2}}, \quad (j = 1,2,\cdots,k; i = 1,2,\cdots,n) \quad (5)$$

s_{x_j} and s_y are respectively the standard deviation of x_j and y. $\hat{\beta}_j^*$ can be directly used to compare the relative importance of explaining variables. Accordingly, this paper sorts the importance of various explaining variables of Trade Gravity Model in China's textile export. Specifically, the sequence of explaining variables of China's textile exports from high to low is $GDP_{jt} > EX_{ij(t-1)} > POP_{jt} > IM_{ijt} > BT_{jt} > DEP_{jt}$ according to their relative importance. In addition, the greater the competitiveness index of importer's textile industry is the more disadvantages China's textiles exporting will face.

From the comparison of the estimated coefficient results of explaining variables in the Trade Gravity Model of China's textile exports and the expected sign, trader's variables play an important role in China's textiles exporting, such as the GDP, population and the degree of dependence on foreign trade. This is fully in line with expectations of economic theory, reflecting the larger market demand and economic scale of China's textiles. The country with more open markets will have greater exports, which can be mainly confirmed by China's textile exporting market. There is negative effect between trader's industrial competitiveness index and China's textile exports, fully according to the expected symbol, reflecting a greater export of textile products to the net-importing country and fewer exports to the net-exporting country, which also means that the vertical trade relations in China's textile exports occupy a more important position. This is mainly because the textile industry in China is still a labor-intensive industry. Compared with developed countries, China has the advantage of low-cost, but this advantage is no longer so obvious when compare with developing countries. From the coefficients of exports' reunification and the statistical results, the previous year's exports of textile is good for the exports next year, reflecting a certain continuity in China's textile exports rather than random and blindness, indicating that China's textile products in the international market competition not only has become more and more powerful ability to develop new markets, but also shown increasing strong competitiveness in maintaining market share. The calculated results that the international community's trade protection measures have positive effects on China's textile exports are different with the ordinary understanding. On this result, we can explain from the following external and internal aspects: on the one hand, trade protection measures only affect the external textile trade, which is the condition. The self-striving, which is the root, is internal factors. And the external factors can play their role only through the internal ones. In fact, from the developing course of China's textile trade, the international community has never stopped prohibiting China's textiles trade. Some developed countries are still forced Chinese government to sign the "voluntary " exporting agreement through the high-handed policy, even in the 50s and the 60s in the beginning of the liberation, aiming at curbing China's textile products exports. The pressure of this unequal relationship was eased after the entering into WTO. However, some of the WTO terms made China's textile trade face a new round of unfair trade treatment. Even after the year 2005, China is the only one in world that is suffered again from the textile quota by Europe and the United States. On the other hand, facing the pressure of the external environment and tough challenges, China's textile and apparel exporting trade has maintained a double-digit growth, maintaining the highest exporting in the world for more than ten years. Various economic indicators of China's textile industry are continually improving. The domestic textile and garment enterprises not only increase the quantity but increase the investments in research at the same time. The overall level of science and technology industry has been significantly improved. In 2005, the all-personnel labor productivity of China's textile industry was about 51,100 RMB / person, increasing a 12.72 percent year-on-year. The contribution rate of science and technology has been close to 50%, the energy consumption of per 10,000 RMB of output value is 15% lower than that in 2000. Many producing equipments and techniques have reached the international advanced level, even leading the world in some areas. The number of patent applications and approvals in core technology and key links was in growth trend. These facts show that the capacity of leaping trade barriers of China's textile industry is continually increasing, therefore, China's textile and apparel exports do not decrease but increase year by year under the pressure of the trade protective measures outside. However, China must not consider that the trade protection is helpful to China's textile export. Strictly speaking, the meaning of which the estimated coefficients of trade protective measures are positive numbers is that the efforts of Chinese Government and textile industry has greatly undermined the trade protection measures' negative effects, namely that under the correct guidance of Chinese Government, the textile industry has changed the pressure of international trade protection into an internal driving force for the development of industry and continuous improvements in production technology through its own efforts, improving production processes, product quality, marketing services, and export markets, making great achievements, thereby reducing the adverse affects of the textile protection by the international community. The third important reason is that trade protection measures mainly concentrated after the year 2002 when China entered into WTO, which means that China can participate in international textile competition as a WTO member, and China could enjoy the preferential trade arrangements same as the other member countries, therefore, the entering into WTO greatly expanded the foreign trade market and spurred the growth of China's textile exports, weakening the negative impact of the trade protection in international community.

Ⅴ. Conclusion

Seeing from the Trade Gravity Model, China's textile exports are relying more on the country's total GDP but the GDP per capita, reflecting that China's textile export

structure is still in the initial stage, and the resource and labor intensive exports account for a large proportion. This is why China's textile products are vulnerable to international trade sanctions.

Although the international trade protectionism has never ceased restricting China's textile trade, China's textiles export has maintained a steady growth, which is not only benefited from China's efficient and low cost, but also from the long time and tireless efforts in the industrial technology and the international market. Objectively speaking, the driving role of regional trading arrangements for the export of China's textile trade is not prominent enough. Especially in the rather trade fierce protection today, participating in regional trade activities can not only help expanding exports, reducing trade friction, and avoiding trade risks as well.

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