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Synergy Degree of the Integration of Trade and Investment based on the Experience of China

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Abstract: Trade and investment integration theory developed under the condition of the deepening economic globalization and liberalization, it studies the trade and investment behavior of multinational companies. The main point is that foreign trade and investment present high consistency in geographical location, industrial distribution, subject selection and decision. It is insufficient to study the trade and investment as a system. This study puts forward synergy degree of foreign trade and investment system based on the perspective of synergy, builds synergy degree model, measures the development level of integration of trade and investment and selects the data of China's foreign trade and investment to get the China's trade and investment integration synergy degree. The result shows that the synergy degree is slow, China's trade and investment integration in its primary stage.

Key words: Integration of trade and investment, synergy degree, calculation and Measure, China

INTRODUCTION

Since the late 20th century, foreign trade and foreign direct investment develop rapidly and show the trend of accelerated convergence. The integration of trade and investment has become an important force to promote Economic globalization and world economic growth. Multinational companies affect the global industry layout and structural adjustment profoundly by means of trade and investment and realize the profit maximization.

For a long time, trade and investment relationship and their integration development is the mainstream economists focus on the important issues. Since the 1950s, Foreign scholars formed the certain theoretical point of view through the study of a country (or region) of foreign trade and investment relationship and its influence on economic development. Such as the model of "alternative" (Mundell, 1957) "complementary model" (Markusen, 1983) "the island model" (Kojima, 1978) "compensation investment model" (Bhagwati *et al.*, 1987), "relationship between uncertain conclusion" (Patrie, 1994; Neary, 1995). On the macro level, these theory reveal the relationship between different conditions of foreign trade and investment.

After the mid-1980s, the economics of the new trade theory (Grossman *et al.*, 2006) and the industrial cluster theory Williamson (1975) and Porter (1998) studied the trade and investment location its influence on the development of the industrial spatial agglomeration, these theory revealed the evolution of division of labor, element flow and the internal connection of industrial

agglomeration and explored the integration of trade and investment integration with the global industry space associated mechanism.

The international product cycle theory (Vernon, 1996), OLI mode (Dunning, 1980) multinational company globalization strategy (Yeaple, 2003; Grossman *et al.*, 2006) and so on, such theories illuminate the trade and investment integration is the development of inner choice of the multinational company under different conditions for trade and investment activities. Then, some scholars carried on the empirical test on the relation of trade and investment of different countries (regions) by regression analysis and granger test, panel data methods.

But previous scholars mainly refers to the definition of trade and investment integration is a kind of international economic phenomenon of highly integrated, interdependent and symbiotic development between foreign trade and foreign direct investment. It is expressed as the formation of integration of trade and investment when it promote the relationship between trade and investment. But it is lack of quantitative indicators to measure the development level of integration of trade and investment of such research method. This study put forward the concept of coordination degree of foreign trade and investment system according to the previous insufficient of quantitative measure of the development level of integration of trade and investment, this study establish the coordination degree of foreign trade and investment system to quantitative measure the development level of integration of trade and investment.

Measure of trade and investment integration development level:

The synergy degree of foreign trade and investment refers to the harmony degree with each other between the two systems in the process of development, it embodies the trend of the integration of trade and investment system from disorderly to orderly. It is the quantitative indicators to reflects the degree of the integration of trade and investment development.

The calculation of coordination degree of foreign trade and investment system mainly includes the following steps.

Design evaluation index system: It analyses the basic condition of the integration of trade and investment and some various variables within the subsystem of the foreign trade and investment, such as size, structure, location selection, etc. It selects different evaluation index to measure the trade investment integration development according to certain principles.

Determine the foreign trade and investment subsystem coordination development level: It needs a dimensionless processing of data if the evaluation index system of different data do not match the unit. It adopts factor analysis method to determine the two subsystems inspects each year during the period of comprehensive development level if the evaluation index is large.

Coordinated development of establishing regression equation on the basis of a cointegration relationship in foreign trade and investment.

It defines the coefficient of the ratio between the subsystems of foreign trade and investment cooperation and calculates synergy degree of two subsystems to measure subsystem coordination degree between foreign trade and investment.

Analysis of the synergy results: This study uses the number between 0 and 1 as the measured values of synergy degree of foreign trade and investment system by reference to energy-economy-environment about the classification of the coordination degree proposed by Chinese scholars Liu and Sun (2005). It means the two sub-systems completely synergy of the ministry of foreign trade and investment if the synergy degree is 1. It means the two sub-systems is not synergy of the ministry of foreign trade and investment if the synergy degree is 0. It means the two sub-systems is sectional synergy if the

synergy degree of foreign trade and investment between 0 and 1. The synergy is much higher, the synergy degree more close to 1.

The level of trade and investment integration development can be divided into three stages of six kinds of circumstances depending on the synergy degree, as Table 1.

LEVEL OF TRADE AND INVESEMENT INTEGRATION DEVELOPMENT OF CHINA

This study establishes the model of synergy degree of foreign trade and investment system using the theory of synergy to measure the development of China’s trade and investment integration level.

Evaluation index system design: The development of the subsystems of foreign trade and investment cooperation index system design should be guided by the coordinated development of foreign trade and investment. This study design an evaluation index of subsystem coordinated development of foreign trade and investment which include 20 indexes. It contains three main aspects of the total amount, structure and location from the angle of reflecting the degree of promoting foreign trade and investment. The specific indexes of the subsystems as showed in Table 2.

The Index data as Table 3 and 4 are got through the China statistical yearbook.

Table 3 is foreign trade subsystem index data, it contains ten indicators from 2002 to 2011, it includes four industry index and six distinguish indicators.

Table 4 is direct investment subsystem index data, it contains 10 indicators from 2002 to 2011, it includes four industry index and six distinguish indicators.

The study standardizes the above data to eliminate the influence, due to the evaluation indicators of the unit is different in the above table which has certain influence to the data statistics processing. The standardized data expressed in matrix, this study adopts the centralized dimensionless method, calculation formula as shown in Eq. 1:

$$X_{ij}^* = \frac{X_{ij} - \bar{X}_j}{s_j} \tag{1}$$

X_{ij}^* is standard observations. \bar{x}_j , s_j ($j = 1.2.3,\dots, n$) is j indicators observations (sample) mean value and mean square error (samples), respectively.

Table 1: Synergy degree of foreign trade and investment and integration development stage

Trade and investment integration level	Primary stage		Intermediate stage		Advanced stage	
Synergy degree index	0-0.4	0.4-0.6	0.6-0.8	0.8-0.9	0.9-0.95	0.95-1
Synergy degree evaluation	Weak synergy	Smaller synergy	Primary synergy	Intermediate synergy	Good synergy	Excellent synergy

Table 2: Subsystem evaluation index
Aggregate: Indicators According to the industry indicators (same year)

According to the location of points (same year)

Subsystem	Index	Index 2	Index 3	Index 4	Index 5	Index 6	Index 7	Index 8	Index 9	Index 10
Foreign trade (EX)	Net exports of goods and services	Primary exporting	Manufactured goods exporting	Other industry	Asia	Africa	European	Latin America	North America	Oceania
Foreign direct investment (OFDI)	Net investment	Agriculture	Mining and manufacturing	Other industry	Asia	Africa	European	Latin America	North America	Oceania

Determination of coordination development level. (1) Consistent, standardization of evaluation index

Table 3: Foreign trade subsystem index data

Year	Net exports of goods and services (billion dollar)	Primary exporting (billion dollar)	Manufactured goods exporting (billion dollar)	Other industry (billion dollar)	Asia (10,000 dollar)	Africa (10,000 dollar)	European (10,000 dollar)	Latin America (10,000 dollar)	North America (10,000 dollar)	Oceania (10,000 dollar)
2002	2794.2	285.40	2970.56	0.04	17130288	696121	5827785	948824	7426926	528920
2003	2682.1	348.12	4034.16	0.01	22257956	1018185	8816772	1187743	9813121	729001
2004	4079.2	405.49	5527.77	0.04	29548698	1381322	12238620	1823809	13323048	1017062
2005	10223.1	490.37	7129.16	0.07	36640758	1868160	16562821	2368050	17466840	1288713
2006	16654.1	529.19	9160.17	0.44	45572692	2668788	21536973	3602795	21911386	1600926
2007	23380.6	615.09	11562.67	26.84	56787403	3729773	28784856	5153940	25211509	2110096
2008	24134.9	779.57	13527.36	0.01	66411850	5123992	34342205	7176204	27427243	2587812
2009	15033.3	631.12	11384.83	0.15	56865091	9106580	42669501	12186305	32811172	6759084
2010	15097.6	816.86	14960.69	0.01	73195484	5995405	35518797	9179803	30584271	3301671
2011	12163.3	1005.45	17978.36	0.01	89903809	7308303	41357108	12171930	35007506	4089432

Data source: China statistical yearbook

Table 4: Foreign direct investment subsystem index data

Year	Net investment (billion dollar)	Agriculture (10,000 dollar)	Mining and manufacturing (10,000 dollar)	Other industry (10,000 dollar)	Asia (10,000 dollar)	Africa (10,000 dollar)	European (10,000 dollar)	Latin America (10,000 dollar)	North America (10,000 dollar)	Oceania (10,000 dollar)
2002	25.20	8794	147653	95553	780699	202295	110739	40954	72192	12216
2003	28.54	10439	198463	76498	903868	283269	141526	70917	30912	8620
2004	54.98	28866	268220	243676	300027	31742	17092	176272	12649	12015
2005	122.61	10536	404514	2209392	437464	39168	50502	646616	32084	20283
2006	176.34	18504	959809	1125785	766325	51986	59771	846874	25805	12636
2007	265.06	27171	667008	1947061	1659315	157431	154043	490241	112571	77008
2008	559.07	17183	963602	4576917	4489046	211199	676019	1053827	262144	188896
2009	565.29	34279	1641235	3947766	4040759	4773456	26465129	5709426	23855383	2492696
2010	688.11	53398	1301372	5464858	4489046	211199	676019	1053827	262144	188896
2011	746.54	79775	2501073	4813019	4549445	317314	825108	1193582	248132	331823

Data source: China statistical yearbook

Two sub-systems of comprehensive development level:

This study determines the two subsystem comprehensive development level of the calendar year by the method of Factor analysis, respectively. The basic idea of Factor analysis is to find out a few random variables which control all variables to describe the relationship between multiple variables through the variable correlation coefficient matrix, the random variables are referred to as factors.

Standardized data: This study uses the factor analysis of statistical software SPSS10.0 to deal with the foreign trade of the 10 indicators and foreign direct investment in Table 3 and 4 original data and get the standardized data as shown in Table 5 and 6.

Table 5 is standardization of evaluation index matrix of China's foreign trade subsystem, it includes ten index.

Table 6 is standardization of evaluation index matrix of China's Foreign Direct Investment (FDI) subsystem, it includes ten index.

The correlation matrix R of the two sub-systems of foreign trade and investment data.

The correlation matrix R of foreign trade subsystem is shown in Table 7.

The correlation matrix R of Foreign direct investment subsystem is shown in Table 8.

Matrix is not positive definite matrices: The eigenvalue and cumulative contribution rate of the correlation matrix R.

The initial eigenvalues summation, Extraction of sum of squares loaded and Rotate the sum of squares loaded of foreign trade subsystem correlation coefficient matrix are include in Table 9.

Table 5: Standardization of evaluation index matrix of China's foreign trade subsystem

Net exports of goods and services	Primary exporting	Manufactured goods exporting	Other industry	Asia	Africa	European	Latin America	North America	Oceania
-1.27085	-1.071360	-1.174430	-0.325250	-1.157980	-0.993390	-1.171890	-1.005120	-1.259560	-0.875080
-1.09226	-0.817950	-0.871440	-0.321700	-0.847290	-0.867760	-0.920450	-0.859560	-0.899700	-0.724340
-0.30692	-0.443020	-0.546580	-0.318160	-0.545060	-0.699340	-0.602720	-0.735010	-0.474850	-0.582190
0.515114	-0.271550	-0.134580	-0.274430	-0.164440	-0.422360	-0.237230	-0.452450	-0.019160	-0.418810
1.374925	0.107885	0.352789	2.845703	0.313470	-0.055310	0.295331	-0.097490	0.319188	-0.152370
1.471343	0.834418	0.751342	-0.325250	0.723609	0.427017	0.703675	0.365291	0.546361	0.097614
0.307937	0.178692	0.316713	-0.308700	0.316781	1.804794	1.315549	1.511810	1.098360	2.280384
0.316156	0.999134	1.042103	-0.325250	1.012688	0.728482	0.790129	0.823798	0.870042	0.471167
-0.05892	1.832166	1.654261	-0.325250	1.724700	1.182680	1.219117	1.508520	1.323543	0.883391

Table 6: Standardization of evaluation index matrix of China's foreign direct investment (FDI) subsystem

Net investmen	Agriculture	Mining and manufacturing	Other industry	Asia	Africa	European	Latin America	North America	Oceania
-1.02795	-0.820990	-0.944690	-1.132270	-0.708010	-0.236050	-0.33530	-0.635330	-0.327750	-0.425360
-0.9357	-0.001270	-0.851460	-1.052520	-1.027600	-0.408330	-0.35033	-0.572020	-0.330180	-0.420930
-0.69975	-0.816670	-0.669300	-0.114800	-0.954860	-0.403250	-0.34629	-0.289400	-0.327590	-0.410130
-0.51229	-0.462220	0.072859	-0.631720	-0.780810	-0.394470	-0.34517	-0.169070	-0.328430	-0.420120
-0.20275	-0.076670	-0.318470	-0.239940	-0.308180	-0.322240	-0.33379	-0.383370	-0.316870	-0.336100
0.823019	-0.520980	0.077928	1.014590	1.189493	-0.285420	-0.27074	-0.044720	-0.296950	-0.190060
0.84472	0.239528	0.983595	0.714463	0.952231	2.839424	2.84411	2.752717	2.845783	2.816915
1.273228	1.090031	0.529363	1.438170	1.189493	-0.285420	-0.27074	-0.044720	-0.296950	-0.190060
1.477085	2.263405	2.132782	1.127219	1.221460	-0.212730	-0.25273	0.039254	-0.298810	-0.003510

Table 7: Correlation matrix R of foreign trade subsystem

Correlation matrix R	Net exports of goods and services	Primary exporting	Manufactured goods exporting	Other industry	Asia	Africa	European	Latin America	North America	Oceania
Net exports of goods and services	1.000	0.620	0.690	0.487	0.669	0.540	0.703	0.509	0.710	0.426
Primary exporting	0.620	1.000	0.991	0.036	0.994	0.806	0.899	0.868	0.923	0.643
Manufactured goods exporting	0.690	0.991	1.000	0.123	0.999	0.832	0.929	0.882	0.954	0.667
Other industry	0.487	0.036	0.123	1.000	0.109	-0.020	0.104	-0.035	0.113	-0.053
Asia	0.669	0.994	0.999	0.109	1.000	0.833	0.927	0.886	0.951	0.679
Africa	0.540	0.806	0.832	-0.020	0.833	1.000	0.966	0.988	0.937	0.969
European	0.703	0.889	0.929	0.104	0.927	0.996	1.000	0.967	0.990	0.887
Latin America	0.509	0.868	0.882	-0.035	0.886	0.988	0.967	1.000	0.948	0.931
North America	0.710	0.923	0.954	0.113	0.951	0.937	0.990	0.948	1.000	0.845
Oceania	0.426	0.643	0.677	-0.053	0.679	0.969	0.887	0.931	0.845	1.000

Table 8: Correlation matrix R foreign direct investment subsystem

Correlation matrix R	Net investment	Agriculture	Mining and manufacturing	Other industry	Asia	Africa	European	Latin America	North America	Oceania
Net investment	1.000	0.789	0.893	0.967	0.970	0.329	0.330	0.503	0.309	0.424
Agriculture	0.789	1.000	0.869	0.678	0.679	0.114	0.111	0.241	0.093	0.204
Mining and manufacturing	0.893	0.869	1.000	0.795	0.808	0.375	0.374	0.535	0.355	0.465
Other industry	0.967	0.678	0.795	1.000	0.934	0.276	0.283	0.465	0.263	0.370
Asia	0.970	0.679	0.808	0.934	1.000	0.374	0.369	0.515	0.347	0.456
Africa	0.329	0.114	0.375	0.276	0.374	1.000	0.999	0.968	0.998	0.994
The European	0.330	0.111	0.374	0.283	0.369	0.999	1.000	0.974	1.000	0.994
Latin America	0.503	0.241	0.535	0.465	0.515	0.968	0.974	1.000	0.970	0.986
North America	0.309	0.093	0.355	0.263	0.347	0.998	1.000	0.970	1.000	0.991
Oceania	0.424	0.204	0.465	0.370	0.456	0.994	0.994	0.986	0.991	1.000

Table 9: Eigen value and cumulative contribution rate of foreign trade subsystem correlation coefficient matrix

Explain the total variance									
Ingredients	Initial eigenvalues			Extraction of sum of squares loaded			Rotate the sum of squares loaded		
	Summation	Variance (%)	Cumulative (%)	Summation	Variance (%)	Cumulative (%)	Summation	Variance (%)	Cumulative (%)
1	7.739	77.395	77.395	7.739	77.395	77.395	7.458	74.583	74.583
2	1.354	13.543	90.938	1.354	13.543	90.938	1.635	16.355	90.938
3	0.602	6.021	96.959						
4	0.283	2.833	99.791						
5	0.016	0.163	99.954						
6	0.004	0.063	99.990						
7	0.001	0.009	99.999						
8	0.000	0.001	100.000						
9	6.417E-6	6.417E-5	100.000						
10	-1.981E-16	-1.981E-15	100.000						

Table 10: Eigen value and cumulative contribution rate of foreign direct investment (FDI) subsystem correlation coefficient matrix

Explain the total variance									
Ingredients	Initial eigenvalues			Extraction of sum of squares loaded			Rotate the sum of squares loaded		
	Summation	Variance (%)	Cumulative (%)	Summation	Variance (%)	Cumulative (%)	Summation	Variance (%)	Cumulative (%)
1	6.418	64.184	64.184	6.418	64.184	64.184	4.990	49.896	49.896
2	2.970	29.699	93.883	2.970	29.699	93.883	4.399	43.987	93.883
3	0.451	4.512	98.395						
4	0.089	0.892	99.288						
5	0.065	0.653	99.941						
6	0.005	0.046	99.987						
7	0.001	0.008	99.995						
8	0.000	0.005	100.000						
9	2.917E-5	0.000	100.000						
10	1.393E-16	1.393E-15	100.000						

The results concluded that the first two characteristic value of the cumulative contribution rate has reached 90.938%, it explains the first two factors basically all the information on behalf of the foreign trade subsystem, just take the first two factors.

The initial eigenvalues summation, Extraction of sum of squares loaded and Rotate the sum of squares loaded of foreign direct investment subsystem correlation coefficient matrix are include in Table 10.

The results concluded that the first two characteristic value of the cumulative contribution rate has reached 90.938%, it explains the first two factors basically all the information on behalf of the Foreign Direct Investment (FDI) subsystem, just take the first two factors.

Establish the factor pattern: Factor Pattern is rotated it as Maximum variance and get the Orthogonal factor table of foreign trade subsystem as Table 11.

Factor Pattern is rotated it as Maximum variance and get the Orthogonal factor table of foreign direct investment subsystem as Table 12.

Synergy development level: The factor F1 loading is much bigger among the primary exporting in the orthogonal factor table, manufactured goods exporting, other industry, Asia, Africa, The European, Latin America, North America and Oceania in the foreign trade subsystem. F1 is the first and second industry factor. Factor F2 loading is much bigger among net exports of

goods and services and other industry, so factor F2 is the third industry factor. Factor F1 loading is much bigger among Africa, The European, Latin America, North America and Oceania in the foreign direct investment subsystem, F1 is the regional factor. Factor F2 loading is much bigger among Net investment, Agriculture, Mining and manufacturing, other Industry and Asia, F2 is industry factor. The score of the two factors from the factor score table.

The factor score of foreign trade subsystem is showed in Table 13, It contains two indicators, respectively FAC1-1 and FAC2-1.

The factor score of foreign direct investment subsystem is showed in Table 14, It contains two indicators, respectively FAC1-1 and FAC2-1.

The study gets the Level of development(F) of the two sub-systems of foreign trade and investment, the calculation formula of foreign trade and investment is as follows:

$$F = \lambda_1 F1 / \sum \lambda_i + \lambda_2 F2 / \sum \lambda_i + \dots + \lambda_m Fm / \sum \lambda_i \quad (2)$$

Table 11: Orthogonal factor table of foreign trade subsystem

Sybsystem	Ingredients	
	1	2
Net exports of goods and services	0.561	0.713
Primary exporting	0.913	0.199
Manufactured goods exporting	0.921	0.279
Other industry	-0.089	0.919
Asia	0.924	0.259
Africa	0.970	0.001
European	0.976	0.196
Latin America	0.986	-0.006
North America	0.969	0.223
Oceania	0.891	-0.009

Annotation: Principal component analysis method rotation method: With Kaiser standardized orthogonal rotation method convergence after 3 rotation

Table 12: Orthogonal factor table of foreign direct investment

Subsystem	Ingredients	
	1	2
Net investmen	0.209	0.969
Agriculture	-0.017	0.877
Mining and manufacturing	0.259	0.902
Other industry	0.171	0.924
Asia	0.257	0.909
Africa	0.989	0.130
European	0.991	0.130
Latin America	0.944	-0.312
North America	0.994	0.108
Oceania	0.972	-0.232

Annotation: Principal component analysis method rotation method: With Kaiser standardized orthogonal rotation method convergence after 3 rotation

Table 15: Table of China's trade and investment integration system coordination development level

Development level	Year							
	2004	2005	2006	2007	2008	2009	2010	2011
Development level of foreign trade	-1.065	-0.925	-0.728	-0.470	-0.175	0.159	0.524	0.890
Development level of FDI	-0.444	-0.427	-0.433	-0.349	-0.295	-0.259	-0.001	1.897
Comprehensive development level	-0.754	-0.676	-0.581	-0.409	-0.235	-0.050	0.262	1.394

λ is characteristic value, n is total number of characteristic value, m is the number which is obtained, m = 2.

The study gets the coordinated development of comprehensive level of China's foreign trade and investment subsystems from 2004-2011 through the above methods and get the comprehensive development level of the whole system according to the weighted average, the weight of every subsystem comprehensive level is a half, the result is as Table 15.

The coordinated development of China's trade and investment integration system level which is drawn up according to the data in the Table 15.

From the Fig. 1 shows that trade development level, investment, development level and the comprehensive

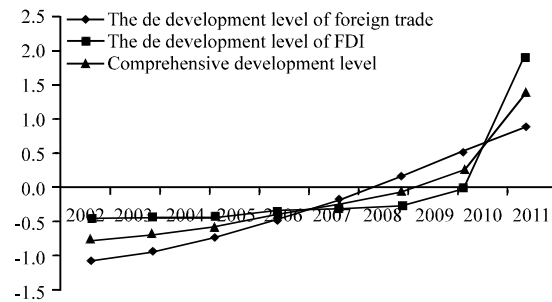


Fig. 1: Coordinated development of China's trade and investment integration system level

Table 13: Factor score of foreign trade subsystem

FAC1-1	FAC2-1
-1.26316	-0.64494
-1.08277	-0.63941
-0.84511	-0.54867
-0.57426	-0.18546
-0.26035	0.19249
-0.25195	2.61200
0.59367	0.47880
1.28558	-0.77782
0.90286	-0.12660
1.49548	-0.36039

Table 14: Factor score of foreign direct investment subsystem

FAC1-1	FAC2-1
-0.21870	-1.02132
-0.21348	-0.97803
-0.31090	-0.78763
-0.23998	-0.65543
-0.25030	-0.45152
-0.31563	-0.18956
-0.29235	0.62817
2.83085	0.27095
-0.46914	1.29850
-0.52037	1.88587

development level are all in a rising trend except in 2010, it instructions Foreign trade and investment has been in the stage of expansion, Foreign trade and investment development level is in a spiral phase from 2002-2005, it means the development is not the same at different periods.

INTEGRATION OF DEVELOPMENT LEVEL

The study measure and calculate Chinese trade and investment integration development level through the system synergy degree of foreign trade and investment.

Establishment of the coordinated development of the regression equation: According to the comprehensive development level of the subsystems of the foreign trade and investment, The study assume that X and Y, respectively the two subsystem comprehensive development level of foreign trade and investment and determine the following regression equation by SPSS10.0 software.

$$\text{TRADE} = -2.37449951172e-06 + 0.744995117192 \times \text{INVESTMENT} \quad (3)$$

$$R^2 = 0.45 (2.557)$$

$$\text{INVESTMENT} = 1.48824398848e-06 + 0.603584342817 \times \text{TRADE} \quad (4)$$

$$R^2 = 0.45 (2.556)$$

Synergy coefficient calculation

Formula: Establishing the coordination coefficient calculation formula as follows according to the fuzzy membership functions:

$$W(i/j) = \exp[K(B_i - b_j)^2] \quad (K = -2/S) \quad (5)$$

$W(i/j)$ is the synergy development coefficient of the subsystem j . B_i is the actual value of comprehensive development level of the i subsystem. B_j is comprehensive development level of the i subsystem synergy with the j subsystem and the study can get the value through the collaborative development model, S is the variance of B_i (Table 16).

T is foreign trade subsystem, I is investment subsystem and calculate $W(T/I)$ and $W(I/T)$ by Eq. 5.

RESULTS

The study define the synergy degree of the subsystem of foreign trade and investment as Eq. 6:

$$W(T, I) = 1 - \min\{W(T/I), W(I/T)\} / \max\{W(T/I), W(I/T)\} \quad (6)$$

So, the study gets the synergy degree of the subsystem of foreign trade and investment as Table 17 and Fig. 2.

The Table 17 contains subsystem coordination degree of foreign trade and investment from 2002-2011, the collaborative degree changing trend is uncertain, it reaches the lowest in 2006 and the highest in 2009.

Changing trend of synergy degree which is drawn up according to the data in the Table 15 as Fig. 2, it shows the changing tendency is uncertainty.

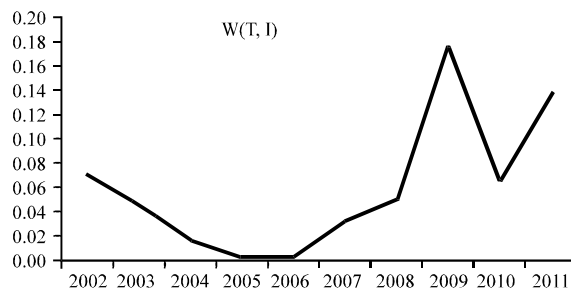


Fig. 2: Change trend of synergy degree

Table 16: Synergy coefficient of the two sub-systems of foreign trade and investment

	Year									
Subsystem	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$w\left(\frac{T}{I}\right)$	0.73153	0.818603	0.931981	0.988235	0.988535	0.868262	0.799656	0.439292	0.749195	0.532156
$w\left(\frac{I}{T}\right)$	0.679867	0.781103	0.916727	0.985499	0.985868	0.839997	0.758849	0.362291	0.700188	0.459045

Table 17: Synergy degree of the subsystem of foreign trade and investment of china

	Year									
Subsystem	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$W(T, I)$	0.070622	0.04581	0.01638	0.002769	0.002698	0.032553	0.051031	0.175285	0.065413	0.137386

CONCLUSION

Synergy degree of foreign trade and investment is low:

The synergy degree of the two sub-systems of foreign trade and investment is slow. It is below 0.3 from 2002 to 2011, it means that the synergy degree is weak synergy and it represents that China's trade and investment integration development at a lower level in the early stage.

Variation tendency: The synergy degree of the two sub-systems of foreign trade and investment reduces slowly from 2002-2006. It means that foreign direct investment development is behind the development of foreign trade after the entry into the WTO although the foreign trade and investment are in a growth trend. The synergy degree began to ascend after 2006 and at its highest point in 2009. The reason is that foreign trade has fallen dramatically while foreign direct investment has been on the rise affected by the global financial crisis. But the synergy degree is not high still because of the difference between foreign trade and foreign direct investment is bigger.

The study selects a number of indicators to calculate the synergy degree of China's foreign trade and investment system on the basis of analysis the development of Chinese foreign trade and investment. The synergy degree is still relatively low, it suggests that China's trade and investment integration level is low and in primary stage, there are some problems in the process of synergy.

China has introduced a series of foreign trade and investment policies to promote the development of foreign trade and investment. The development of foreign trade promotes the growth of the investment and it leads to the expansion of foreign trade in turn. They interactive fusion and collaborative development, but the synergy degree is not high. Foreign trade and investment cooperation has many problems hind the development of trade and investment synergy.

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