

Analysis of Factors Affecting China's OFDI

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Abstract—The OFDI in China increased from 2.6 billion U.S. dollars in 1997 to 196.1 billion U.S. dollars in 2016, showing that the OFDI in China has achieved a rapid development. With the implementation of the trade policy “Belt and Road”, and the increasing influence of uncertainties in foreign trade, it is of great significance to study the factors affecting OFDI in China. In this paper, it selected 15 related indicators from 1997 to 2016 and used the principal component analysis to analysis the factors affecting OFDI in China, and then drew the conclusions: the main factors affecting OFDI in China rank from the greatest influence to the least influence are the basic economic factors, financial support factors and world economic factors. Meanwhile, it proposes the measures like strengthening the foreign trade, improving the economic strength, as well as strengthening the output of technology and capital in China.

Keywords—OFDI; influencing factors; principal component analysis

I. INTRODUCTION

In the work meeting of the Ministry of Commerce in December 2017, Shan ZHONG pointed out that China should continue to support foreign investment in enterprises with clear strategies and adherence to their main business. On the one hand, we should guide enterprises to become bigger and stronger, focus on global allocation of resources, and enhance international competitiveness; on the other hand, we need to adapt to the development of China's domestic economy, promote the transformation of made in china into created in China, and drive Chinese equipment, Chinese standards, Chinese technology and services to "go out". At abroad, Khanindra Ch.Das used simultaneous equation model and panel data to analyze the data from 1996 to 2010, and he found that the economic development level, r&d cost and the degree of globalization had significant influence on OFDI[1]. Other scholars believe that the attractiveness of domestic market attractiveness (Chetty S and Campbellhunt C,2004), domestic technical level (Andersson S et al.2010), high innovation ability and learning ability (Covin and Miller,2014) are important factors for enterprises to rapidly enter host countries for OFDI[2][3][4]. At home, Zhanqi YAO used OLS, system GMM and other models to study the factors affecting China's OFDI in the countries along the “Belt and Road” from 2003 to 2014. The research shows that the improvement of economic level is the main reason for China's OFDI[5]. Licheng QIU and Ramasam B used OLS regression analysis to show that resource demand and labor costs - wages and OFDI change in a positive direction, while exports and China's OFDI have a negative direction[6][7]. Weifu ZHANG used the method of multiple regression OLS to get the conclusion that economic scale and government support had positive effect on China's OFDI[8]. Based on 15 related factors, this paper selects the data from 1997 to 2016 for principal component analysis, and

finally draws conclusions and proposes some measures to promote China's OFDI.

II. FACTORS AFFECTING CHINA'S OFDI

A. Index Selection and Data Description

This paper uses principal component analysis to analyze the influencing factors of China's OFDI, in this paper, the explained variables select the OFDI flow (Y), the explaining variables contain six first-level indicators, and the 15 secondary indicators that reflect the factors affecting China's OFDI are selected as the original variables, the six primary indicators are China's macroeconomic development, fiscal policy, foreign economic and trade, monetary policy, industrial policy and world macroeconomic operation. Among them, macroeconomic development includes GDP(x1), CPI(x2) and the number of top 500 Chinese enterprises(x3). Fiscal policy includes the growth rate of fiscal revenue(x4) and the growth rate of fiscal expenditure(x5). Foreign economic trade include foreign exchange reserves(x6), RMB to us dollar exchange rate(x7), total import and export trade(x8), and the volume of absorbing FDI(x9). The monetary policy includes the issuance of monetary reserve by monetary authority(x10) and sources of RMB credit funds for financial institutions(x11); Industrial policies include the average wage of urban employees(x12) and the number of overseas quoted companies(x13); World macroeconomic operation includes global economic growth rate(x14) and the growth rate of foreign investment in the world(x15). The data of these variables are derived from the “National Bureau of Statistics of China”, “Department of Outward Investment and Economic Cooperation of the Ministry of Commerce of the People's Republic of China”, and “Fortune Chinese Network”. We used Spss23.0 software and select 1997-2016 years' data to make an empirical analysis of the 15 secondary indicators.

B. An Empirical Analysis of the Factors Influencing China's OFDI

1) Data Normalization Processing

As the measurement units of different indexes are different, the numerical problems caused by original data are directly adopted, and formula (1) is used for standardized processing to transform original data into dimensionless indexes. On this basis, principal component analysis is carried out.

$$Z_{ij} = \frac{X_{ij} - \bar{X}_j}{\sigma_j} \quad (1)$$

Among them, Z_{ij} represents the normalized value of the j

column of the i th row; x_{ij} represents the original value of the j column of the i th row; \bar{x}_j represents the average value of column j ; σ_j represents the standard deviation of column j .

2) *Correlation Coefficient and Multicollinearity Test*

TABLE I. ANALYSIS RESULTS OF CORRELATION COEFFICIENT

variable	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15
x1	1.000	.995	.994	-.525	-.530	.954	-.942	.965	.976	.996	.993	.999	.947	-.167	-.197
x2	.995	1.000	.985	-.495	-.479	.968	-.962	.973	.984	.992	.980	.990	.942	-.173	-.201
x3	.994	.985	1.000	-.563	-.572	.942	-.929	.950	.959	.988	.990	.992	.919	-.158	-.196
x4	-.525	-.495	-.563	1.000	.704	-.388	.419	-.358	-.409	-.486	-.580	-.531	-.359	.433	.319
x5	-.530	-.479	-.572	.704	1.000	-.377	.320	-.402	-.408	-.501	-.580	-.538	-.408	-.022	.044
x6	.954	.968	.942	-.388	-.377	1.000	-.989	.987	.980	.968	.916	.944	.917	-.182	-.222
x7	-.942	-.962	-.929	.419	.320	-.989	1.000	-.969	-.973	-.952	-.904	-.931	-.888	.252	.278
x8	.965	.973	.950	-.358	-.402	.987	-.969	1.000	.983	.978	.927	.958	.946	-.113	-.196
x9	.976	.984	.959	-.409	-.408	.980	-.973	.983	1.000	.983	.952	.972	.951	-.182	-.216
x10	.996	.992	.988	-.486	-.501	.968	-.952	.978	.983	1.000	.982	.995	.956	-.163	-.202
x11	.993	.980	.990	-.580	-.580	.916	-.904	.927	.952	.982	1.000	.995	.933	-.178	-.183
x12	.999	.990	.992	-.531	-.538	.944	-.931	.958	.972	.995	.995	1.000	.955	-.178	-.198
x13	.947	.942	.919	-.359	-.408	.917	-.888	.946	.951	.956	.933	.955	1.000	-.150	-.131
x14	-.167	-.173	-.158	.433	-.022	-.182	.252	-.113	-.182	-.163	-.178	-.178	-.150	1.000	.659
x15	-.197	-.201	-.196	.319	.044	-.222	.278	-.196	-.216	-.202	-.183	-.198	-.131	.659	1.000

TABLE II. KMO AND BARTLETT TEST

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.749	
Bartlett's Test of Sphericity	Approx. Chi-Square	792.280
	df	105
	Sig.	.000

According to the results in table 1 and table 2, on the one hand, it can be seen from the results of correlation coefficient analysis, there is a strong correlation between some variables, and the highest one can reach 0.999, it indicates that there is a correlation between the 15 indicators, so it has the premise of principal component analysis. On the other hand, the KMO test is an index for comparing the simple correlation coefficient and the partial correlation coefficient between variables. The closer the value of the KMO test is to 1, indicating that the correlation between the variables is stronger, which makes it more suitable for principal component analysis. Caesar gives a test standard, and the value of the KMO test above 0.5 are suitable for principal component analysis[9]. As

Before principal component analysis, We need to test the necessity and feasibility of principal component analysis. There are two kinds of test methods: correlation coefficient analysis and KMO test. The test results are shown in table 1 and table 2.

can be seen from Table 2, the test result is 0.749, so the sample data of this paper can be analyzed by principal component analysis.

3) *Principal Component Analysis*

a) *Analysis of Variance Contribution Rate and Extraction of Common Factors*

The extraction of the common factor must have two criteria at the same time. The first criterion is that the eigenvalue corresponding to the common factor must be greater than one; the second criterion is that the cumulative variance contribution rate of the common factor must be greater than 80%. According to these two criteria, it can be seen from Table 3 that the eigenvalues of variable 1, variable 2 and variable 3 are all greater than 1 and the cumulative variance contribution of these three common factors is 94.842%, they meet the requirements of common factor extraction. Therefore, three common factors will be extracted in this paper.

TABLE III. TOTAL VARIANCE INTERPRETATION AND PRINCIPAL COMPONENT EXTRACTION ANALYSIS RESULTS

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.235	74.899	74.899	11.235	74.899	74.899	10.175	67.833	67.833
2	1.737	11.582	86.481	1.737	11.582	86.481	2.179	14.530	82.363
3	1.254	8.361	94.842	1.254	8.361	94.842	1.872	12.479	94.842
4	.388	2.588	97.429						
5	.187	1.249	98.678						
6	.115	.769	99.447						
7	.049	.326	99.773						
8	.016	.109	99.882						
9	.007	.045	99.927						
10	.005	.035	99.962						
11	.003	.020	99.982						
12	.002	.016	99.998						
13	.000	.002	100.000						
14	5.185E-5	.000	100.000						
15	1.344E-5	8.962E-5	100.000						

b) Factor Loading Matrix after Rotation

Due to the fact that the actual meaning of the unrotated common factor is not easy to be explained, the orthogonal rotation through maximizing the variance of the common factor can make each variable highly correlated to only one common factor, so the related problems can be explained more easily. It can be seen from table 4 that in the rotated factor loading matrix, each common factor only has a large load with several original indexes, we name it according to the load factor and then the model of each economic index is obtained:

$$\begin{aligned}
 x_1 &= 0.948 F_1 + 0.300 F_2 - 0.081 F_3 \\
 x_2 &= 0.961 F_1 + 0.246 F_2 - 0.092 F_3 \\
 x_3 &= 0.925 F_1 + 0.355 F_2 - 0.075 F_3 \\
 x_{15} &= -0.120 F_1 - 0.037 F_2 + 0.882 F_3
 \end{aligned}
 \tag{2}$$

TABLE IV. ROTATED COMPONENT MATRIX ANALYSIS RESULTS

variable	Component Matrix			Rotated Component Matrix		
	F1	F2	F3	F1	F2	F3
x1	.996	.054	-.017	.948	.300	-.081
x2	.993	.060	.040	.961	.246	-.092
x3	.990	.041	-.075	.925	.355	-.075
x4	-.543	.502	.597	-.256	-.840	.365
x5	-.529	.064	.790	-.290	-.901	-.109
x6	.966	.074	.177	.972	.107	-.117
x7	-.956	.001	-.218	-.956	-.086	.199
x8	.970	.133	.155	.983	.114	-.056
x9	.981	.075	.142	.978	.144	-.107
x10	.995	.068	.028	.962	.255	-.081
x11	.985	.029	-.098	.912	.377	-.078

TABLE IV CONTINUE

x12	.994	.045	-.027	.942	.311	-.086
x13	.945	.137	.114	.950	.143	-.036
x14	-.219	.869	-.219	-.072	-.085	.915
x15	-.246	.815	-.265	-.120	-.037	.882

It can be seen from the model and Table 4 that the factor load of the common factor F1 is mainly distributed in indicators such as x1, x2, x3, x6, x7, x8, x9, x10, x11, x12, x13, and the load of these indicators exceeds 0.8. Moreover, the impact of these factors on China's OFDI is mainly reflected in the domestic and international economic aspects, so the public factor F1 is named as the "basic economy" factor. The public factor F2 is mainly distributed in indicators such as x4 and x5. The impact of these factors on China's OFDI is mainly reflected in financial support aspects. Therefore, the public factor F2 is named as "financial support" factor. X14 and x15 are highly correlated, and the common factor F3 is named the "world economy" factor. So far, this study reduced 15 factors influencing China's OFDI to "basic economic factor", "financial support factor" and "world economic factor" through principal component analysis, and then examined the influencing factors of China's OFDI.

c) The Analysis of Factor Loading Matrix

The mathematical model is established on the basis of three principal components:

$$\begin{aligned}
 F_1 &= 0.948z_1 + 0.961z_2 + 0.925z_3 - 0.256z_4 - 0.290z_5 + 0.972z_6 \\
 &- 0.956z_7 + 0.983z_8 + 0.978z_9 + 0.962z_{10} + 0.985z_{11} + 0.942z_{12} \\
 &+ 0.950z_{13} - 0.072z_{14} - 0.120z_{15} \\
 F_2 &= 0.300z_1 + 0.246z_2 + 0.355z_3 - 0.840z_4 - 0.901z_5 + 0.107z_6 \\
 &- 0.086z_7 + 0.114z_8 + 0.144z_9 + 0.255z_{10} + 0.377z_{11} + 0.311z_{12} \\
 &+ 0.143z_{13} - 0.085z_{14} - 0.037z_{15} \\
 F_3 &= -0.081z_1 - 0.092z_2 - 0.075z_3 - 0.365z_4 - 0.109z_5 - 0.117z_6 \\
 &+ 0.199z_7 - 0.056z_8 - 0.107z_9 - 0.081z_{10} - 0.078z_{11} - 0.086z_{12} \\
 &- 0.036z_{13} + 0.915z_{14} + 0.882z_{15}
 \end{aligned} \tag{3}$$

The data after standardization is brought into formula (3), and the three principal component scores affecting China's OFDI are obtained, as shown in Table 5.

TABLE V. COMPONENT SCORE

Year	F1	F2	F3
1997	-11.60897	-2.54063	1.82913
1998	-11.35308	-2.20752	1.88568
1999	-11.68731	-3.35557	2.44402
2000	-11.07972	-3.10782	1.70263
2001	-10.14857	-3.1408	-1.79842
2002	-9.10022	-1.7778	-0.26226
2003	-8.02218	-0.72818	0.87324
2004	-7.37011	-2.07913	2.77625
2005	-6.07162	-2.13348	0.36608
2006	-4.6712	-2.21097	2.37858
2007	-2.62891	-3.63498	1.35877
2008	1.28246	-1.64694	-2.13521
2009	3.12642	0.56638	-4.46138
2010	5.47288	0.32819	0.58012
2011	8.50852	0.02052	-1.18153
2012	11.01673	3.12962	-1.62535
2013	13.9346	4.85813	-1.34253
2014	15.78887	6.01112	-1.13341
2015	16.71853	5.90478	-0.93642
2016	17.92352	7.73636	-1.15125

It can be seen from the analysis results that, in the basic economic factors (F1), each indicator has a positive promoting effect on China's OFDI, it becomes the first major factor. In the financial support factor (F2), the growth rate of fiscal revenue and the growth rate of fiscal expenditure have a significant impact on China's OFDI, indicating that national financial support has a promoting effect on China's overseas investment. In the world economic factor (F3), the influence coefficient of global economic growth rate and the growth rate of foreign investment in the world all reached above 0.8, indicating that the improvement of overseas investment environment and the improvement of world economic trade have promoted China's OFDI. By analyzing the scores of the three principal components between 1997 and 2016, it can be seen that the three principal components have an obvious influence on China's OFDI, indicating that the principal

component analysis is reasonable.

III. CONCLUSIONS AND POLICY RECOMMENDATIONS

The basic economic factors make the greatest contribution to China's OFDI, indicating that keeping a good development of domestic economic as well as an economic growth rate which is stable and consist with China's national conditions is an important basis for promoting the increase of China's OFDI. The financial support factor is an important force that reflects the source of funds for China's OFDI and promotes the sustained, rapid and healthy development of a country's economy. Therefore, adequate financial funds to support China's OFDI are an important guarantee for it. And the world economic factor reflects the economic development condition of the main capital exporting nations in the world. In the process of the world's economic development, international trades and investments become the engine of overseas investments. Having a stable economic investment environment not only has unique advantages for China's OFDI, but also is benefit to achieve win-win and cooperation.

Based on the above research conclusions, this paper proposes several policy suggestions:(1). Promote steady economic growth and keep a good condition of domestic economic development. (2). Carry out a strategy combining trade and investment and attach great importance to the expansion of overseas markets. (3). Increase the output of capital and technology of China and so on. (4). Implement multi-regional development strategies and strengthen the construction of overseas economic and trade cooperation. (5). Play the functions of government effectively and establish a stable and effective investment market.

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