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Evaluation of the Financial Ecological Environment of Yangtze River Delta Urban Agglomerations

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ABSTRACT
As the integration of the Yangtze River Delta has become a national strategy, financial industry exists opportunities and challenges in China. Constructing a reasonable index system to evaluate the financial ecological environment of the Yangtze River Delta Urban Agglomerations will help prevent financial risks. This paper selects 26 cities in this area as the evaluation objects and constructs an index system. Afterwards, the papers uses factor analysis to extract important factors affecting the financial ecological environment and calculates the comprehensive scores of the financial ecological environment of these cities from year 2014 to 2018. The conclusions show that: (1) In terms of time, the financial ecological environment score of each city gradually improves over time. (2) In terms of space, the financial ecological environment score of each city varies greatly and the core cities of each region get relatively high score.

Keywords: *Yangtze River Delta Urban Agglomerations, Financial Ecological Environment, Evaluation System, Factor Analysis.*

1. INTRODUCTION

Financial development is related to not only the financial entities themselves, but also the financial ecological environment in which they are located. The financial ecological environment includes various factors such as economic foundation, government governance, financial development, credit culture, science and technology education, etc [1]. The Yangtze River Delta Urban Agglomerations is located at the intersection of the “Belt and Road” and the Yangtze River Economic Belt. With about 2% of China's land area and about 12% of the population, it has created one fifth of the country's GDP. However, the problem of unbalanced and inadequate regional development of the Yangtze River Delta Urban Agglomerations is still prominent, which has become the main factor restricting the people's growing demand for good. Improving the quality of the financial ecological environment will help promote the orderly and healthy development of the financial industry, guide the circulation and effective allocation of social resources in all links. Finally, it will ultimately achieve the goal of regional integrated development and provide impetus for sustainable development of economy.

The concept of "financial ecological environment" was born with financial development theory, emphasizing the consideration of risks in the development of the financial system from the external environment of financial operations rather than from financial entities alone. The current research mainly focuses on the following two points: First, the definition of the concept. Some scholars believe that the financial ecological environment does not include the participants of the financial market. Another part of scholars think that the financial ecological environment includes the participants of the financial market, which basically equates the concept of financial ecological environment with the financial ecosystem. Second, the construction and evaluation method of the index system. At present, the construction of the index system has not yet formed a unified standard. Li et al. [2] have constructed an evaluation system of China's financial ecological environment from 4 first-level indicators, 15 second-level indicators and 42 third-level indicators, including economic operation quality, regional financial development, government's dominance of the economy, financial credit facilities and system construction. Du [3] evaluated the financial ecological environment of the provinces in the Central Plains Economic Zone from three dimensions: financial resource level, economic development level, and social credit foundation. Ge [4] summarized the indicators into four aspects: economic environment, policy environment, legal environment,

and credit environment for comprehensive evaluation and analysis.

Based on the 2014-2018 annual panel data of 26 cities in the Yangtze River Delta Urban Agglomerations, this paper selects 19 relevant indicators to construct an index evaluation system for the financial ecological environment of the Yangtze River Delta Urban Agglomerations, and uses factor analysis to calculate the comprehensive scores of financial ecological environment, and use Excel software to analyse the financial ecological environment of cities to provide empirical evidence for my country's financial reform.

2. FINANCIAL ECOLOGICAL ENVIRONMENT INDEX EVALUATION FRAMEWORK

Based on the basic principles of indicator construction and the availability of data, this paper selects 19 indicators that have an impact on the financial ecological environment from the three aspects of economic foundation, government behaviour, and social and humanities.

The economic foundation is the most basic and important part of the financial ecological environment. In the current external environment of shrinking global markets, it is necessary to concentrate efforts to speed up the formation of domestic and international double recycle. The formation of a domestic cycle means to meet domestic demand as the starting point for development, promote consumption, investment and other aspects, accelerate economic restructuring, and promote economic development. Therefore, this article incorporates economic aggregate into the indicator system. Domestic and international dual cycles mean opening to the outside world, cooperating with other countries, and achieving mutual benefit and win-win results through exports. Therefore, this article will also include economic opening into the indicator system.

In China, the financial system is created by the superstructure, which determines that the government has been a key force in the construction of China's financial ecology from the beginning. In recent years, the state has asked for the government to observe the laws of the market, minimize the government's direct allocation of market resources and direct intervention in microeconomic activities, and vigorously protect and stimulate the vitality of market entities. However, for a long period of time, due to the relationship of interests, excessive government leadership hindered the development of the market economy system. Therefore, this article uses government control resources and government intervention to define government behaviour.

The construction of the financial ecological environment is inseparable from the support of economic foundation and government action, as well as the support of the social and humanities. In detail, the social security system helps workers face social risks such as unemployment and guarantee basic survival resources such as medical care and education, which helps promote the harmonious development of society. Education cultivates talents with various characteristics for the country, cultivates the labour force needed for economic and social development, and cultivates qualified citizens. President Xi emphasized at the Peking University Teacher-student Symposium: "Higher education is an important indicator of a country's development level and development potential." As the core area of economic growth, the technological innovation ability of Yangtze River Delta Urban Agglomerations is an important factor to measure its development potential and prospects. In the context of the rise of big data and artificial intelligence, regions with stronger technological innovation capabilities can effectively use technological means to innovate products and services provided by traditional finance, improve efficiency and reduce costs. The first level indicators and second level indicators are shown in the following Table 1.

Table 1 The evaluation index system of financial ecological environment

	First level indicators	Second level indicators
Economic Foundation	Economic Aggregate	GDP growth rate
		GDP per capita
		The added value of the third industry/GDP
		Disposable income of urban residents per capita
		Consumer Price Index
	Economic Opening	Total import and export/GDP
		Actual foreign investment
Government Action	Government Control	Fiscal budget revenue/GDP
		Fiscal budget expenditure/GDP
	Government Intervention	Fiscal budget expenditure/fiscal budget revenue
		The proportion of finance to public service expenditure
Social Humanities	Social Security	Pension insurance coverage rate
		Medical insurance coverage

	Educational Development	Number of colleges
		Number of teachers in colleges
		Number of students in colleges
		Financial expenditure on education
	Technological Innovation	Number of patent applications
		Number of patents granted

3. FINANCIAL ECOLOGICAL ENVIRONMENT COMPREHENSIVE SCORE MEASUREMENT

This paper uses factor analysis to calculate the comprehensive score of the financial ecological environment of the cities in the Yangtze River Delta Urban Agglomerations from 2014 to 2018. The data source of this article is from the China Statistical Yearbook, Jiangsu Statistical Yearbook, Zhejiang Statistical Yearbook, Anhui Statistical Yearbook, City Statistical Yearbook, as well as the China National Knowledge Network's Socio-Economic Development Statistics Database and China Economic Net Statistics. It is compiled on the basis of the database. Because a small part of the data is missing, this paper uses the linear difference compensation method to supplement the missing data. In the end, 260 sets of data on 19 indicators from 2014 to 2018 of 26 cities in Yangtze River Delta Urban Agglomerations were obtained. This paper uses SPSS24.0 software to perform factor analysis on the standardized data.

3.1. Definition of Factor Ananlysis

Factor analysis is a multivariate statistical analysis method that converts multiple observed variables into a few unrelated comprehensive indicators. It was first proposed by British psychologist C.E. Spearman. The basic idea is to classify closely related variables into the same category, while the correlation between variables of different categories is low. Variables in the same category can be imagined to be highly correlated with each other under the influence of a common factor. This common factor is also called a common factor and is potentially unobservable. Factor analysis reflects a kind of dimensionality reduction idea. Through dimensionality reduction, variables with high correlation are brought together, which not only facilitates the extraction of easily interpretable features, but also reduces the number of variables to be analysed and the complexity of problem analysis.

The selection of the financial ecological environment measurement method will directly affect the accuracy of the evaluation. After comparing the advantages and disadvantages of other evaluation models, this paper believes that factor analysis can overcome the disadvantages of other models to a certain extent. Therefore, this paper selects factor analysis to measure the comprehensive score of financial ecological environment.

3.2. Empirical analysis

The methods used in this paper to test whether the index is suitable for factor analysis are KMO and Bartlett’s test. When KMO is greater than 0.70 and the probability value of Bartlett's sphere test is less than 0.01, it is suitable for factor analysis. The results of KMO and Bartlett's test using statistical software SPSS are shown in Table 2. It can be seen from the table that the value of KMO is 0.810, which is greater than 0.7, indicating that the index selected in this article is suitable for factor analysis. The value of Bartlett test is 6215.523, and the statistical significance is approximately 0.000, which is at the 1% significance level to reject the original hypothesis. As a result, it can be believed that there is a correlation between the original indicators.

According to the results in Table 3, the five factors with eigenvalues greater than 1 are retained, and their variance contribution rates are: the first factor is 26.130%, the second factor is 18.562%, the third factor is 15.637%, the fourth factor is 11.952% and the fifth factor is 7.710%. The cumulative contribution rate of the Five factors is 79.990%. In other words, the variance explained by the other 14 factors only accounts for about 20%, so keeping the first 5 factors can explain most of the information. This approach is reasonable.

In order to calculate the comprehensive score of the financial ecological environment of the cities in the Yangtze River Delta Urban Agglomerations, it is necessary to write the score coefficient matrix of the main factors, and the expressions of 5 common factors can be written according to the results, and then weighted according to the contribution rate of each factor get a comprehensive score.

Table 2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.810
Bartlett's Test of Sphericity	Approx. Chi-Square	6215.523
	df	171
	Sig.	0.000

Table 3 Total Variance Explained

Factor	Eigenvalues	Variance (%)	Cumulative Contribution (%)
1	4.965	26.130	26.130
2	3.527	18.562	44.691
3	2.971	15.637	60.328
4	2.271	11.952	72.280
5	1.465	7.710	79.990
6	…	…	…

Based on the above results, the comprehensive scores of the financial ecological environment of 26 cities in the Yangtze River Delta Urban Agglomerations from 2014 to 2018 can be calculated, as shown in Table 4.

Table 4 Comprehensive score of each city's financial ecological environment

City	201	201	201	201	201
Shanghai	1.42	1.55	1.72	1.70	2.14
Nanjing	0.31	0.34	0.41	0.44	0.69
Wuxi	0.07	0.08	0.14	0.14	0.22
Changzh	-	-	-	-	-
Suzhou	0.39	0.40	0.47	0.46	0.73
Nantong	-	-	-	-	0.04
Yanchen	-	-	-	-	0.02
Yangzho	-	-	-	-	-
Zhenjiang	-	0.03	-	-	-
Taizhou	-	-	-	-	-
Hangzho	0.31	0.45	0.54	0.55	0.78
Ningbo	0.13	0.24	0.27	0.23	0.40
Jiaxing	-	-	-	-	0.05
Huzhou	-	-	-	-	0.05
Shaoxing	-	-	-	-	0.09
Jinhua	-	-	-	-	0.09
Zhousha	-	-	0.00	-	0.11
Taizhou	-	-	-	-	0.03
Hefei	0.06	0.14	0.37	0.13	0.42
Wuhu	-	-	0.06	0.05	0.06
Maansha	-	-	-	-	-
Tongling	-	-	-	-	-
Anqing	-	-	-	-	0.03
Chuzhou	-	-	0.05	0.05	0.11
Chizhou	-	0.04	0.02	-	-
Xuanche	-	-	0.02	0.02	0.06

4. CONCLUSION

The comprehensive score of the 26 cities in the Yangtze River Delta Urban Agglomerations shows that Shanghai, Nanjing, Wuxi, Suzhou, Hangzhou, Ningbo, and Hefei have higher comprehensive scores for the financial ecological environment. These cities happen to be the "leaders" in the economic development of various regions. Therefore, the measurement of financial ecological environment in this article is more in line with the actual situation. Through horizontal comparison, it can be seen that over time, the financial ecological environment score of each city has basically gradually increased, indicating that the financial ecological environment is gradually getting better. Through vertical comparison, it can be seen that the financial ecological environment scores of various cities are quite different, even if the score of some of the cities is higher, such as Nanjing, Wuxi, Suzhou, Hangzhou, and Hefei, they are still less than half of Shanghai in 2018. This is inseparable from Shanghai, as the first city to go global, with a profound financial background and a relatively mature financial development.

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