The Study on Financial Eco-Environment Index System Structure and Competitiveness Evaluation of Changzhutan Urban Agglomeration

DENG Qizhong[a],* ; YE Ping[b]

[a] Lecture, School of Management, Hunan University of Science and Technology, Hunan Province Research Base of New Type Industrialization, Xiangtan 411201, China.
[b] Development Bank Corporation Guangxi Branch, Nanning, Guangxi, China, 530028.
*Corresponding author.

Abstract

According to the 2003 - 2009 statistical data of eight cities in Changzhutan urban agglomeration, we have taken a deep study on financial eco-environment index system structure and competitiveness evaluation. First of all, we choose the reasonable evaluation indexes and tested the reliability and validity of the indexes, so as to determine the method and model of evaluation indexes. Then, we estimated the local financial eco-environment competence of the eight cities, and compared the results. Results show that: the core city-Changsha has mature financial eco-environment; Zhuzhou and Hengyang have the developing financial eco-environment; and the main form of the rest cities' financial eco-environment is backward.

Keywords: Financial eco-environment; Competitiveness; The principal component analysis

INTRODUCTION

The Lausanne international institute for management development (IMD) presented a set of competitiveness evaluation method and index system, which is the origin of regional financial ecological competitiveness study. In this system, a national competitiveness is divided into eight parts and 290 indexes. Among them, the financial competitiveness part contains four items and 27 indexes. In view of the different research object, scholars have taken a moderate improvement on the index system, to build corresponding financial competitiveness evaluation index system, and get a quantitative evaluation on regional financial competitiveness. However, the evaluation method contains many indicators such as short-term real interest rates, foreign exchange rates and interest rates, which are not suitable for regional research. Some indexes are difficult to quantify, for example: the national credit rating, insider trading, financial institutions such as transparency. It is difficult to obtain the original data of these indicators. Although, there are a lot of relevant financial eco-environmental competitiveness evaluation research, these studies have a common, that

is, comparative research more than empirical research, policy research more than operations research, qualitative research more than quantitative study. The basic reason is that it lacks a set of scientific, reasonable and effective evaluation index system. Therefore, it is difficult for us to systematically evaluate the advantages, disadvantages and comprehensive competitiveness of the regional finance eco-environment in China. Based on this, we research a large number of literature study, expert argumentation and statistical analysis, and take "China city financial eco-environment evaluation"[1] as the prototype, combined with the financial ecology theory put forward by Xu Jinnuo, try to build up a set of Changzhutan urban agglomeration[2] (hereinafter referred to as the "urban agglomeration") financial eco-environment evaluation index system. On this basis, by using principal component analysis method, this paper assessed and compared the urban agglomeration financial eco-environment competitiveness, thus to provide reference basis for urban agglomeration financial ecological resource rational distribution, orderly flow and the scientific policy decision.

THE INDEX SYSTEM AND EVALUATION MODEL

Establishment of Index System

From different perspective, this paper constructed the following seven factors index: Economic base, open degree, corporate financial integrity, Local government services, Standard of living, Human environment, and Social livelihood security. Considering the data of accessibility, universality and maneuverability, we determined the selection of 33 indexes' specific position in this evaluation index system, according to their financial ecological correlation characteristics. Finally, this paper the formed Changzhutan urban agglomeration financial eco-environment index system, as is shown in table 1. In addition, most of the existing literature has evaluated a year or successive years of relevant data; hence, the calculated result just reflects the financial eco-environment of that year. In order to make the evaluation results more objective, more representative, instead of a year period, this paper chooses the whole investigation period for analysis of range, which reflects the urban agglomeration financial eco-environment competitiveness evaluation result reasonable and accuracy.

Evaluation Method

In actual research, in order to find rule, we often need

to observe many variables, collect a large amount of data. However, in most cases, there may be a correlation between variables, thus, increasing the complexity of the study and the difficulty of empirical analysis. Because of certain correlation existed between variables, therefore, we can use less index to generalize the information existing in variables. Principle Component Analysis (PCA) is a mathematical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components. The number of principal components is less than or equal to the number of original variables. Obviously, it is a kind of completely according to the factors in the standards for assessment results of the comprehensive evaluation method, which does not consider the subjective preferences. When it comes to the analysis of many elements object, PCA has obvious advantages of objective.

THE EMPIRICAL RESEARCH

Samples Instructions, Data Sources and the Reliability and Validity of Inspection

This paper takes Changzhutan urban agglomeration of eight cities as research object, and the research period is 2003 - 2009, a total of seven timing points. This paper the selection of related data is all derived from the 1998-2010 "Chinese urban statistical yearbook", "Hunan statistical yearbook", so as to ensure the reliability of data and authority. Due to long-term financial eco-environmental competitiveness is the main research aspects in this paper, therefore, in the measure of each index all take the average of the study period. The urban agglomeration financial eco-environment competitiveness index selection is based on certain principles, and no judge whether these indicators to measure urban agglomeration financial eco-environment of the seven aspects, therefore, it is necessary to use the reliability and validity analysis on the financial eco-environment of seven factors index for inspection, analysis of the internal consistency. If these index is really internal consistent, and able to represent seven factors of financial eco-environment of urban agglomeration, then each city's factor score can represent its financial eco-environment situation of all aspects. It's not only to avoid the multiple linear problem that exists between different variables, but also to lay the foundation of bellowing principal component analysis. It will make the analysis results of reliability and validity steadier to take these variables into standardization conversion before analysis.

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[1] Which is part of the report series hosted by Li Yang from The Chinese academy of social sciences.
[2] Include parts of central Hunan province, Changsha, Zhuzhou and Xiangtan. Among them, Changsha is the core city, Zhuzhou and Xiangtan is vice core cities; Yueyang, Changde, Yiyang, Loudi and Hengyang are main radiation area.

Cronbach coefficient a is on behalf of reliability[3], which is a common method of monitoring the intrinsic reliability. The larger the reliability coefficient, show that the measurement of higher credibility. Validity refers to the seven aspects of the 33 indicators of the financial

environment that can effectively represent competitive. In order to accurately measure the eight cities in the ranking of the competitiveness of the financial environment, this article uses KMO[4] and variance of the cumulative contribution rate of two indicators to assess and estimates.

Table 1
Test Results of Changzhutan Financial Eco-environmental Competitiveness Index and the Reliability and Validity

Target layer	Factor layer	KMO	Variance of the cumulative contribution rate (Number of principal components)	Cronbach coefficient α
Economic base	Per capita gross domestic product, gross industrial production, the proportion of tertiary industry, the total investment in fixed assets, real estate development investment, the total retail sales of social consumer goods	0.798	88.62%（1）	0.842
Open degree	Import and export volume, the number of visitor arrivals, foreign direct investment and imported goods worth of foreign-invested enterprises, foreign invested enterprises at the end of the registration of enterprise number	0.770	95.39%（1）	0.692
Corporate financial integrity	Industrial output value, the fixed assets average balance, the number of industrial enterprises, gross profit, current assets average annual balance of product sales revenue	0.745	92.00%（1）	0.884
Local government services	Revenue, fiscal spending, taxes	0.754	99.77%（2）	0.829
Standard of living	Per capita wages, per capita disposable income, per capita consumption expenditure, business volume of post and telecommunications number of mobile phone subscribers at the end of the urban and rural residents living with power	0.750	94.09%（2）	0.732
Human environment	Government education expenditure, education, infrastructure, colleges and universities the number of full-time teachers, public libraries total reserves	0.693	93.51%（2）	0.762
Social livelihood security	Health, social insurance and the number of social welfare practitioners, hospitals, hospitals in the number of pension and social welfare relief spending, social security benefits	0.681	93.42%（2）	0.811

Financial eco-environment competitiveness of Changzhutan in seven areas, the introduction of indicators of reliability and validity of test results can be seen from Table 1. Look at the overall results from the reliability test, most Cronbach coefficient **α** of the 33 indicators of the seven aspects of the competitiveness of the financial eco-environment is above 0.70. Thus, the internal consistency of this choice of the 33 indicators is good, and they are able to represent the seven indicators of financial eco-environment competitiveness of urban agglomerations. in

the long run, selecting these indicators is very appropriate, and their characterization is strong, the credibility of long-term is more reliable; the highest reliability coefficient of the economic base, corporate financial integrity of local government services, social life and security are more than 0.8, excellent internal consistency, the other three aspects of reliability coefficients are in the range of 0.6 to 0.8, good internal consistency.

From the overall results of the validity test, most of the seven aspects of the competitiveness of the financial eco-

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[3] Reliability analysis of the formula: $r_{xx} = \dfrac{S_T^2}{S_X^2}$, where r_{xx} is the reliability coefficient, S_T is the true variance, S_X is the total variance. Cronbach coefficient α range of between 0 and 1, the greater the value of α, indicating that the higher confidence level of internal consistency. α is greater than 0.8, indicates excellent internal consistency, α better 0.6 to 0.8, α less than 0.6 indicates that the internal consistency was poor. In practical application, α is at least greater than 0.5, preferably greater than 0.7.

[4] Kaiser gives the KMO metrics: above 0.9 that is very suitable; 0.8 to 0.9 is more suitable; 0.7 to 0.8, said the general; 0.6 to 0.7 barely suitable; 0.5 to 0.6 is not suitable; expressed below 0.5 is not suitable for.

environment KMO coefficient are above 0.7. Therefore, a higher degree of overlap between each variable, and these variables apply to the principal component analysis. From the extracted principal components factor, the number of principal components extraction basically is no more than two, all extracted principal components' cumulative contribution rate has reached more than 90%. This suggests that, principal components extracted in this paper are very good characterization of the original variables, and have explanatory power similar to the original variables to a large extent, with the factor validity, reflect the basic connotation of the competitiveness of the financial eco-environment of urban agglomerations. In the long run, from the KMO test results, these indicators are very appropriate, strong characterization and more reliable. Among them, validity coefficients of the economic base, the open degree are the highest, above 0.7, the effect of validity is more appropriate; the explain degree of principal component accumulation contribution rate of the seven main ingredients is high. In particular, The cumulative contribution of the principal component

of the open degree and local government services is more than 95%, the contribution rate of the other five factors is more than 90%, explains the very good results.

Calculation Results and Analysis

Full Cycle of Competitive Evaluation and Interpretation

In order to make competitive evaluation score more intuitive, and eliminate the impact of negative, we converted the composite score into a decimal score, which is to normalize the index. Conversion formula is:

$$F = \frac{F_i - F_{i,min}}{F_{i,max} - F_{i,min}} \times 10 \tag{1}$$

Where the score of city is F_i, $F_{i,max}$ is the score of city with the highest score, $F_{i,min}$ is the score of the city with the lowest score. Table 2 is a comprehensive evaluation result of the eight cities of Changzhutan financial eco-environment, the time span is from 2003 to 2009.

Table 2
Comprehensive Evaluation Result of the Eight Cities of Changzhutan Financial Eco-environment

City	Economic base	Open degree	Corporate financial integrity	Local government services	Standard of living	Human environment	Social livelihood security	Financial eco-environment	Financial eco-environment classification
Changsha	1	1	1	1	1	1	1	1	Class I
Zhuzhou	2	2	3	4	2	5	5	2	Class II
Xiangtan	3	4	5	8	5	6	7	6	Class III
Hengyang	5	5	4	2	6	2	2	3	Class II
Yiyang	7	7	8	6	4	7	6	7	Class III
Changde	6	6	5	3	7	3	3	5	Class III
Yueyang	4	3	2	5	3	4	4	4	Class III
Loudi	8	8	7	7	8	8	8	8	Class III

It can be seen from Table 2, seven aspects of the competitiveness of Changzhutan urban agglomeration financial eco-environment showed very distinct regional characteristics, classification according to the final score can be divided into three categories: Class I of financial eco-environment (score 7 to 10 points), Class I is the most competitive, belongs to a mature financial eco-environment; Class II of financial eco-environment (score 2 to 7 points), Class II is less competitive, belongs to a growth-oriented financial eco-environment; Class III of financial eco-environment (score 0 to 2 points), Class III has weak competitiveness, belongs to a backward-financial eco-environment. Specific analysis results can be summarized as the following:

First, look from the financial eco-environment competitiveness rankings. The financial eco-environment within the urban agglomeration is different, the core city (Changsha) is the best city in financial eco-environment,

and seven areas are the most competitive, belonging to a mature financial eco-environment. Zhuzhou and Hengyang are the cities belonging to growth-oriented financial eco-environment. And, Xiangtan, Yueyang, Changde, Yiyang and Loudi are the cities with backward-financial eco-environment. The financial eco-environment of deputy core zone is the second, and the only one in class II is Zhuzhou. Radiation area of the city financial eco-environment is poorer, and only Hengyang belongs to the class II.

Second, consider the classification of the financial eco-environment. As the economic and trade center in Hunan Province, Changsha (10.0) is ahead of other regions, its ranking in the financial eco-environment in all aspects is number one, and its financial eco-environment competitiveness is the absolute leading position in Hunan, financial elements of the eco-environment is in the formation of a virtuous circle. Zhuzhou (2.12),

Hengyang (2.02) ranked 2 and 3, the scores of the two cities are between 2 and 7, and they are classified as growth financial eco-environment. In addition to Changsha, Zhuzhou is a city development is relatively average and score higher. Xiangtan (0.87), Yiyang (0.67), Loudi (0.00), Changde (1.71), Yueyang (1.91), five cities in the financial eco-environment score between 0 to 2, this paper will classify them as backward type of financial eco-environment. Among urban agglomeration, Zhuzhou's development is relatively balanced and its scores are higher. Xiangtan (0.87), Yiyang (0.67), Loudi (0.00), Changde (1.71), Yueyang (1.91), the financial eco-environment score of these five cities is between 0 and 2, and they are classified as backward financial eco-environment in this paper. Although Xiangtan is vice core cities, its local government service indicators score ranked last, and the rest of the indicators are not ideal. However, Xiangtan has a good geographical superiority, and should be further developed, driven by the core city. In the subsequent development, on the one hand, Xiangtan needs to increase the implementation of the areas of strength, and to strengthen the development efforts in disadvantages field. The score of local government services and social security of Changde is the third, and the score of Open degree is relatively rearward, so the future development goal is to enhance the local government services, social security and open degree in Changde. The score of the corporate integrity of Yueyang is relatively higher; the remaining indicators are relatively average. Not only has the rigid conditioned, such as: economic base, open degree, government administrative efficiency is weak, and the soft conditions, such as: corporate integrity, social environment is not good, so, the financial eco-environment development of Loudi has lagged behind.

CONCLUSIONS

This paper used 2003 - 2009 statistics data of Changzhutan eight cities, and developed an empirical test on the financial eco-environment construction and competitiveness evaluation. In the research process, we build an urban agglomeration financial eco-environment evaluation system, including seven objective indicators, 33 factor indicators, and investigated eight cities' competitiveness of financial eco-environment from the bellowing aspects: Economic base, open degree, corporate financial integrity, Local government services, Standard of living, Human environment, Social livelihood security. The evaluation found that Changsha is a mature financial eco-environment, the best performance in the eight cities examined; Zhuzhou, Hengyang are growth financial eco-environment, the performance of second; the rest five cities are lagging behind type of financial eco-environment, the worst performance in the entire urban agglomeration.

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