

Competitiveness Evaluation of the Urban Investment Environment in Yangtze River Delta

GuiQin Gou; Leilei Bai

Address: Room 302, the Forth dormitory, South Campus, University of Shanghai for Science and Technology
No.334 Jungong Road, Yangpu District, Shanghai, 200093

Email address: gouguiqin@163.com , Tel: 86-13917147837

Abstract : Unlike previous studies, this article is building 31 indicators of the regional investment environment evaluation system from five aspects ,which are urban production, distribution, technology, service and management capacity .The approach is to the index system data of above 15 prefecture-level cities in the Yangtze River Delta region in the year of 2006. Then it score and sort each city's investment environment competitiveness.

Keywords: the Yangtze River Delta; Investment Environment Competitiveness; Principal Component Analysis Method

After 30 years of reform and opening up, China's investment environment has been greatly improved, but there is still a big difference throughout different investment environments. In order to maintain the sustainable development of the urban economy society, it is necessary to establish a service-oriented, scientific, systematic index system and evaluation criteria to reflect investment environment status in different cities, thus promoting and enhancing China's investment environment into a high level.

China's Yangtze River Delta city group is known as the world's sixth urban agglomerations, its overall level of development ranks first across the country groups. The land area of Shanghai, Jiangsu, Zhejiang accounted for 2.2% of the country; population accounts for 10.9%; And its GDP reached 4.75 trillion RMB in 2006, accounting for 20.7% of the country; the fiscal revenue accounted for 23.3% of the country; the total imports and exports of goods accounted for 37% of the country; the actual use of foreign direct investment accounted for 53% of the country; The Yangtze River Delta accounted for 48 cities in National hundred counties in 2005. Premier Wen Jiabao pointed out that the Yangtze River Delta is one of the earliest areas of China's opening to the outside world on the forum about coordinating development of the Yangtze River Delta in 2007. At present, the Yangtze River Delta has become an important window of China's external relations and a more perfect socialist market economic system area.

The purpose of this evaluation has two points. The first is to provide the basis for domestic and foreign investors, helping them make the right investment decisions and select the ideal investment area by fully grasping and understanding the regional and urban environment conditions. The second is to help local governments scientifically assess the regional and urban investment environment, fully grasp the development trend of the future investment environment, and actively provide important ideas to create a high quality and efficient investment environment in line with international practice.

1. Index System and Evaluation Methods

1.1 Index System building

The investment environment refers to the sum of each element situation and expectation which are able to influence and attract investors to invest in various elements. These elements include policies, cultural, geographic, social, and economic aspects. Urban investment environment is one aspect in the investment environment system, which reflects the conditions among the investment environment elements related in regions and the urban administrative area.

There are three main aspects in building the principles of urban investment environment evaluation system .First; it

must be scientific, which is reflected in the indicators' comprehensiveness, completeness and accuracy. Second, it must be systematic. By regarding the investment environment as a system, indicators that forming the system should be interrelated, meaning that not only the horizontal indicators are interrelated, but also the vertical indicators are highly representative. Third, it must be simple and easy to operate. The indicators should be set up on the basis of comprehensiveness and integrity, and the source and

availability of indicators should be consistent with design goals of the index system.

In summary of above principles, the study index system consists of five first level indicators: (a) urban production capacity; (b) urban scientific and technological capacity; (c) urban distribution capacity; (d) urban service capacity; (e) urban management capacity. Using 31 second indicators to specify the meaning and scope of the first level index, the index system will be ultimately completed by the 31 basic indicators like those in Table 1.

Table1. Evaluation index system of urban investment environment competitiveness

First level index	Second level index	Description
Urban production capacity	GDP (100 million yuan) (x1)	Reflect the urban economic strength
	Per capita GDP (yuan / person) (x2)	
	The total profits of Large-scale industrial enterprise (100 million yuan) (x3)	Reflect the urban economic yield potential
	The whole society fixed assets investment (100 million yuan) (x4)	
	Proportion of the tertiary industry to GDP (%) (x5)	Reflect the urban industrial development
	Proportion of tertiary industry employment (%) (x6)	
	Urban residents per capita disposable income (yuan) (x7)	Reflect the urban actual production
	The average wage of workers (yuan) (x8)	
Urban scientific and technological capabilities	The number of professional and technical personnel in every million people(person) (x9)	Reflect the urban research capacity
	The number of college students in every million (people) (x10)	
	Education expenditure per capita (yuan) (x11)	Reflects the Government's investment in science and education
Urban distribution capacity	Contractual utilization of foreign capital (100 million U.S. dollars) (x12)	Reflect the ability of cities to attract foreign capital
	The actual utilization of foreign investment (100 million U.S. dollars) (x13)	
	Total retail sales (One hundred million yuan) (x14)	Reflect the commodity distribution capabilities
	Total freight (tons) (x15)	Reflect the urban physical distribution capacity
	Years total passenger (ten thousand per time) (x16)	
Urban service capacity	Pension and Social Welfare Relief Funds (One hundred million yuan) (x17)	Reflect the urban basic welfare
	Social Security Subsidy expenditures (One hundred million yuan) (x18)	
	The number of having hospital beds per oen hundred thousand (sheets) (x19)	Reflect the city's comprehensive service
	The number of having practicing physicians, physician assistants per ten thousand people (people) (x20)	
	Every hundred public library collection (books) (x21)	
	Per capita water consumption (tonnes) (x22)	Reflect the urban

	The per capita electricity consumption (degrees) (x23)	daily supply capacity of urban infrastructure
	Urban road area per capita (square meters) (x24)	
	Per ten thousand people with public buses and trams (units) (x25)	
	garden green area per capita (square meters / person) (x26)	
Urban management capacity	Industrial wastewater discharge compliance rate (percent) (x27)	Reflect the ability of the city government management
	Environmental pollution control investment (One hundred million yuan) (x28)	
	Local finance general budget expenditure (million yuan) (x29)	
	Local finance general budget revenue (million yuan) (x30)	
	Administrative level assignment (x31)	

1.2 Evaluation Methods

Among the multiple indicators in the comprehensive evaluation, the index weight determination is the most important. There are many methods to determine the weight. This article mainly uses principal component analysis, as its concept is clear and easy to operate. And it is also strong objective as it based on the discrete degree empowerment of the data itself.

2. Case study

To improve the accuracy of the evaluation, we use 15 cities in the Yangtze River Delta for the study objectives, and the

approach is to analyze the 31 indicators of the 15 prefecture-level cities in 2006. First is to normalize the raw data with the help of SPSS software, then go to the principal component analysis. By getting eigen value, variance contribution rate and cumulative contribution rate from the correlation coefficient matrix, we chose five principal components, which cumulative contribution rate is 93.1%. There are large communalities among the variables after extracting the principal component, explaining that it retains most of the information when changing the variable space into a main component space, that is, the five principal components are enough to mean the urban investment environment ability. Table 2 is the load matrix by maximizing variance orthogonal rotation with original loading matrix variance. (Table 2)

Table2. The load matrix of rotation principal component

Index	Principal component										
	F1	F2	F3	F4	F5		F1	F2	F3	F4	F5
x30	.995	.063	.02	.023	.04	x8	.734	.447	.337	-.241	.172
x18	.995	.051	-.039	.052	.03	x12	.702	.432	-.17	.37	-.23
x29	.992	.093	.027	.021	.035	x23	.691	.657	.135	.119	-.13
x9	.985	-.001	.045	-.018	.103	x20	.683	.541	.304	-.239	.235
x17	.973	.121	.159	.016	-.009	x16	-.051	.935	.143	.182	.047
x15	.966	.081	.073	-.144	.025	x22	.121	.842	-.11	-.201	-.4
x14	.948	.235	.173	.058	-.042	x2	.338	.784	.092	.286	.29
x28	.934	.113	.031	.237	.014	x7	.438	.7	.045	-.197	.341
x1	.932	.313	.059	.155	-.005	x25	.456	.661	.181	.079	-.06
x21	.932	.05	.283	-.096	.065	x6	.334	-.478	.471	-.39	-.02
x3	.908	.357	-.023	.205	.025	x10	.176	.213	.906	-.107	-.03
x4	.891	.375	.132	.183	-.056	x26	-.227	-.004	.839	.402	.108
x11	.887	.304	-.007	-.154	.26	x5	.59	.136	.592	-.468	.061
x19	.856	.386	.016	-.17	.127	x24	.261	.132	.057	.871	.058
x13	.789	.441	-.11	.353	-.13	x27	.06	.022	.028	.039	.939
x31	.787	.236	.388	-.275	-.058						

It can be seen from the principal component load matrix that the load of the first principal component F1 is greater than the load of other indicators in the general budget of the local financial income x30, local finance general budget expenditure x29, total investment in environmental pollution control x28, pension and social welfare relief fee x17, Social Security Programs x18 and so on, this can be regarded as a composite indicator that reflect the ability of urban management capacity and basic welfare ability, which combines the information of 62.038% of all indicators.

The load of the second principal component F2 is greater than the load of other indicators in per capita water consumption x22, per capita power consumption x23, per ten thousand people with public buses and trams x25, years total passenger x16, per capita GDPx2 and other indicators, this can be seen as a composite indicator that reflect the daily supply and economic capacity, which combines the information of 11.745% of all indicators.

The load of the third component F3 is greater than the load of other indicators in the proportion of the tertiary industry to GDP x5, proportion of tertiary industry employment x6, the number of college students in every million people x10 and other indicators, this can be seen as a composite indicator that reflect the urban industrial development and research capacity, which combines the information of 8.910% of all indicators.

The load of the fourth principal component F4 is greater than the load of other indicators in actual utilization of the total foreign investment x13, garden green area per capita x26, urban road space per capita x24 and other indicators, this can be regarded as a composite indicator that reflect the city ability to attract external fund and urban infrastructure situation, which combines the information of 5.718% of all indicators.

The load of the fifth principal component F5 is greater than the load of other indicators in the urban residents per capita disposable income x7, the average wage of workers x8, the number of having practicing physicians and physician assistants per ten thousand people x20 and other indicators, this can be seen as a composite indicator that reflect the city actual production situation and the comprehensive service ability, which combines the information of 4.689% of all indicators.

According to the coefficient matrix of principal component score and the standardized variable observation, the five principal components score can be calculated such as $F1 = 0.932x1 + 0.338x2 + \dots + 0.787x31$. The composite score value F can be calculated by using the weight of each principal components of the corresponding variance contribution ratio (Si).

The principal component scores, the composite score and the ranking of the 15 cities of China's Yangtze River Delta like below Table 3

Table 3. The principal component score, composite score and ranking

City	F1	F2	F3	F4	F5	F	
	Score	Score	Score	Score	Score	Composite score	Ranking
Shanghai	53.265	19.738	7.263	1.275	2.743	35.750	1
Nanjing	5.636	1.788	8.587	-0.640	1.091	4.457	4
Wuxi	3.304	3.449	0.924	2.279	1.330	2.919	6
Changzhou	-5.512	-2.406	-1.424	-1.205	-0.064	-3.904	7
Suzhou	12.929	8.443	-1.453	4.929	0.232	9.399	2
Nanjing	-8.638	-4.031	-3.173	1.356	-5.428	-6.295	10
Yangzhou	-12.734	-8.016	-2.769	-0.816	-0.844	-9.324	14
Zhenjiang	-11.206	-5.938	-0.940	-0.038	0.023	-7.756	13
Taizhou	-15.797	-10.671	-2.719	1.468	-0.576	-11.421	15
Hangzhou	8.525	7.009	3.086	-2.961	-0.769	6.333	3
Ningbo	4.756	5.003	0.603	-1.569	0.151	3.672	5
Jiaxing	-7.986	-1.826	-3.048	-0.406	-0.010	-5.326	9
Huzhou	-10.854	-4.923	-2.853	-0.917	0.298	-7.593	12
Shaoxing	-6.658	-1.438	-1.831	1.465	0.854	-4.171	8
Zhoushan	-9.031	-6.181	-0.253	-4.219	0.969	-6.739	11

3. Evaluation results

According to sort in Table 3 and the original data, the analysis results of 15 cities in the Yangtze River Delta are as below:

(1) From Table 3, it can be seen that the city's comprehensive strength ranking of the Yangtze River Delta were as follows: Shanghai, Suzhou, Hangzhou, Nanjing, Ningbo, Wuxi, Changzhou, Shaoxing, Jiaxing, Nantong, Zhoushan, Huzhou, Zhenjiang, Yangzhou, Taizhou. The sorted result agrees quite well with the general law, which is the more coordinated development and the stronger government regulation service ability of the city, the higher ranking of the city's overall rank.

(2) Shanghai ranked first among 15 cities 'comprehensive ability ranking. Its F1, F2 and F5 ranked first, F3 ranked second, especially the urban management capacity and basic welfare capacity (F1) was far ahead of other cities. But Shanghai in the F4 ranked behind several cities, explaining that its ability to attract foreign capital and the urban infrastructure condition of are weak, indicating that Shanghai's comprehensive ability is largely reflected in the urban management and service and economic development capacity, which is not commensurate with Shanghai's rapid economic development and infrastructure improvement.

(3) Suzhou ranked second among 15 cities 'comprehensive ability ranking. Its F1 and F2 ranked second, explaining the city's daily supply and economic capacity, urban management service capability are stronger. Its F3 ranked ninth, explaining the industry development and urban research capacity of Suzhou are weaker. The city's F4 scored the highest, explaining that Suzhou has the strongest ability to attract foreign capital and the most perfect urban infrastructure condition.

(4) Hangzhou ranked third among 15 cities 'comprehensive ability ranking. Its F1, F2, and F3 ranked third, indicating that the city has a stronger ability in daily supply and economic, the urban management, urban industrial development and urban research. But the city's ability to attract external fund, the urban infrastructure condition are weak, as its F4 was No. 14. In addition, the city actual production and comprehensive service ability are weak too, which were ranked No. 14.

(5) Nanjing ranked fourth among 15 cities 'comprehensive ability ranking. The city's F1 came in second place, indicating that its urban management service capability is strong, but its ability to attract external fund and the urban infrastructure condition (F4) are weak, as F4 ranked No. 9. The city's F3 scored the highest, showing that Nanjing has the most perfect industrial development condition and the strongest urban research capacity.

To sum up, although Shanghai, Suzhou, Hangzhou, Nanjing are the top four in the ranking of comprehensive ability, but they are not the same cases in the ranking of the urban development. For example, in the urban industrial

development condition and urban research capacity, Nanjing is the strongest, but in the daily supply and economic capacity and urban management capability, Shanghai is the strongest. Therefore, we can say that in different aspects of urban development, the advantages of each city are different.

4. Conclusion

In summary, it is reasonable that using the method of principal component analysis to comprehensively evaluate and analyze the investment environment results of the 15 cities in the Yangtze River Delta. And in fact, the results are mostly consistent with the actual situation of the 15 cities. Of course, some limitations exist in the sample index selection, resulting that there isn't a more accurate explanation in other cases between cities. However, generally speaking, it is still largely reflect the investment environment competitiveness and socio-economic comprehensive strength between each city. And with the corresponding analysis of the four cities of Shanghai, Suzhou, Hangzhou, Nanjing, this article provides a theoretical support for the comprehensive analysis and evaluation investment environment to the Yangtze River Delta Region.

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