

# Comparative Research into Competitiveness of China's Second-Tier Cities and Third-Tier Cities

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**Abstract:** Research into economic competitiveness of cities can help us accurately recognize the development status, advantages and disadvantages of the cities and thereby formulate correct development and competition strategies for them; second-tier cities and third-tier cities in China do not confront serious “metropolitan malaise” and “high threshold” that first-tier cities face, and compared with fourth-tier cities they enjoy more complete infrastructure and policy support; besides, the attraction of second-tier cities and third-tier cities is growing, so their development potential should not be underestimated. It is necessary to research economic competitiveness of China's second-tier cities and third-tier cities. This article is based on analysis of indexes and data. It starts from economic competitiveness, business-friendliness competitiveness and liveability competitiveness of cities and sub-indexes thereof. It makes an overall comparative analysis of the first-tier cities, second-tier cities, third-tier cities and fourth-tier cities and focuses on analysis of advantages and disadvantages of second-tier cities and third-tier cities. The results show that, spatial distribution of economic competitiveness of second-tier cities and third-tier cities is seriously unbalanced; input into economic competitiveness of cities fails to be well converted into output; combination of high housing prices and low incomes is detrimental to liveability of cities and consequently is adverse to economic competitiveness of cities; technological innovation and attraction to high-end factors are staying power for the development of second-tier cities and third-tier cities.

**Keywords:** second-tier cities; third-tier cities; economic competitiveness; business-friendliness competitiveness; liveability competitiveness

## 1. Background

### 1.1 Research significance

Research into economic competitiveness of cities has become the hotspot of the academia and the media. On one hand, in the international environment of speeding-up economic globalization, allocation of factors and resources will become borderless. This forces China's

cities to simultaneously face domestic and foreign competition in the course of development in the future. Research into economic competitiveness of cities can help people accurately and objectively recognize the development status, advantages and disadvantages of the cities, and provide guidance on how to formulate correct economic development and competition strategies instead of blind decision-making. On the other hand, in the acceleration period of post-industrialization and urbanization in China, competition between cities becomes extremely fierce. Due to blind and disordered competition, idle land, colossal waste of social resources and losses of both sides of competitors emerge one after another. Meanwhile, cities in a region cannot have complementary advantages or seek win-win in cooperation-competition, as a result of lack of cooperation spirit, which is detrimental to regional economic integration. Research into economic competitiveness of cities can help people know the cities and their competitors, size up the situation in the course of competition and formulate suitable strategies for competition and regional cooperation, so as to achieve orderly city competition in a region and win-win development.

Second-tier cities and third-tier cities gradually become hotspots for corporate investments and habitation. Along with accelerating urbanization in China and rapid development of economy, science and technology, culture, health, education, etc., overheated economy, fierce market competition, serious haze, excessive living cost, “metropolitan malaise”, etc. are widespread in first-tier cities. In contrast, second-tier cities and third-tier cities do not confront high daunting housing prices or serious PM2.5 pollution, so they are becoming more and more attractive. Low entry requirements, enhanced environment, improved infrastructure, adequate public service, accumulated resources and factors, and increasing attraction accelerate the development of second-tier cities and third-tier cities. Therefore, investment environment and habitation environment of second-tier cities and third-tier cities in China are drawing more and more attention. These second-tier cities and third-tier cities offer greater development space. As regional economic centers, they are developing at an amazing speed and playing an increasingly significant role in promoting regional economic development.

In conclusion, research into economic competitiveness of second-tier cities and third-tier cities in China is important to promote their development and help them involve in domestic and international competition.

## **1.2 Definitions of second-tier city and third-tier city**

Like first-tier city, second-tier city and third-tier city are folk concepts. There are no clear and stable evaluation standards for them in the academia. Usually, they are used as rough concepts for classifying and analyzing economic situations of cities in media reports. In this article, second-tier city means any city specifically designated in the state plan and sub-provincial city in China.

There are 15 second-tier cities in China, including Tianjin and Chongqing (2 municipalities directly under the Central Government) and 13 sub-provincial cities. Third-tier city means: any provincial city of any province and any developed city on the southeast coast in Yangtze River Delta, Pearl River Delta and Beijing-Tianjin-Hebei, including 42 prefecture-level cities.

### **1.3 Literature review**

City competitiveness is undoubtedly a very important theoretical proposition, as cities are becoming more and more important and competition between cities is increasingly fierce in the globalization and urbanization age. In the research into city competitiveness, measurement of city competitiveness and analysis of city competitiveness factors are very important. Because city competitiveness is a comprehensive concept, there are no special indexes to measure it. Some scholars attempt to use single indexes, such as labor productivity (Michael Porter, 1990), real GDP per capita (OECD (2005)) or economic growth (Michael Kitson, 2005) and other substitutive indexes, to measure city competitiveness. Most scholars attempt to use comprehensive indexes (Dennis A.Rondinelli and Gyula Vastag, 1996; Augusto Lopez Kela-oluosi, 2005; David G. Tuerck, 2002; Abhishek Sharma, 2006; Dong-Sung Cho, 2006; Alvin Diaz, 2001; jianfa shen, 2002) to create indexes for measuring city competitiveness. They sort out and analyze city competitiveness by controllable-non-controllable factors perspective (Fried and Lovell, 1996), economic and strategic factors perspective (van Dijk, 1998; Jensen-Butler, 1997; van den Berg, 1993; and Lever, 1997), the structural-dynamic factors perspective (Sutarauta, 2001; and Linnamaa, 1999), the economic, social and environmental factors perspective (Duffy, 1995; Oatley, 1998; Jensen-Butler, 1997; Savitch and Kantor, 2002), the internal-external factors perspective (Kaunas, 2008; and Pengfei Ni, 2004), the actor-condition factors perspective (neoIT (US), 2006), supply-demand factors perspective (Michael Porter, 1990), etc. and emphasize the fact that: human capital, technological innovation, international business, economic structure and economic agglomeration are crucial to city competitiveness. But there are omissions in some important aspects in most of the above researches. Based on the previous researches, this article compares and analyzes the competitiveness of the cities in China in terms of input-output and livability-business-friendliness.

## **2. Research methods**

### **2.1 Theoretical framework and index system**

Economic competitiveness of cities means compared with other cities the ability of a city to

attract, contend for, possess, control and convert resources as well as the ability to seize, occupy and control the market, so as to better, faster and more economically create value and provide residents with benefits, in the course of competition and development.

In terms of display or output of the economic competitiveness of cities, the economic competitiveness of cities is mainly expressed by economic density and economic growth of cities:

$$\text{Economic competitiveness of cities} = F(\text{economic density, economic growth})$$

Wherein, economic density is expressed by GDP per square kilometer of cities (strictly speaking, green GDP per square kilometer), comprehensively showing the economic rent and economic income of unit space of cities and utilization efficiency of land as an important resource; economic growth is measured by GDP increment, namely the difference between GDP for the base period and GDP for the current period, showing the speed and scale alteration of benefits expansion of cities, and it can be used for comparison between cities. The index system is shown in Table 1:

**Table 1 Economic Competitiveness (Output) Index System of Cities**

Comprehensive Economic Competitiveness Index System		Comprehensive Economic Competitiveness Index System	
Definition of index	Definition of index	Index	Index
Comprehensive increment competitiveness	Average GDP increment for five successive years	Comprehensive efficiency competitiveness	GDP per square kilometer

Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

In terms of input into economic competitiveness of cities, the economic competitiveness of cities means factors and environment of the cities which can be divided into subject quality, local factor, local demand, subject connection, public system and infrastructure. In terms of business friendliness and livability, more specific factors can be extracted from the six aspects, so as to direct practising.

Specifically, embodiment of business friendliness competitiveness includes good enterprise performance, vast market demand, favorable environment suitable for development of urban industries and enterprises, and vibrant governmental service and social service.

Business friendliness competitiveness = F (enterprise ontology, local factor, local demand, system environment, subject connection and infrastructure)

Enterprise ontology: Urban enterprises show urban business environment via businesses, improve the level of urban industries by converting knowledge into actual productivity and provide direct power for urban economic development. Local factor: The total of direct production factors and indirect environmental factors which are owned by a city and convenient to be used. Local factor at least includes talents, capital, science and technology, etc. Local demand: The demand scale of a city influences the industry scale; the demand level influences the industry level,

and the demand growth influences the industry growth. Therefore, local demand is significant for industrial agglomeration and economic development of a city. System environment: A favorable system can help reduce transaction costs, improve transaction efficiency, effectively inspire and constrain economic agents, ensure due welfare of citizens, and reduce inequality and discrimination. Subject connection: In terms of space, subject connection is divided into internal connection of a city, connection between cities and external connection of a city, and in terms of contents involves political connection, economic connection, social connection, culture connection, etc. Infrastructure: Good infrastructure is the material base for establishing efficient connection between economic agents and efficiently converting such connection into economic fruits. The index system is shown in Table 2:

**Table 2 Business Friendliness Competitiveness Index System**

Definitions of indexes	Enterprise ontology	Local factor	Local demand	System environment	Subject connection	Infrastructure
<b>Indexes</b>	Large enterprise index	Proportion of population with college degree or above	GDP size	Degree of convenience for establishment of an enterprise	Total freight transport volume of a city	Degree of highway transportation convenience
	Enterprise growth index	Patent index	Total retail sales of consumer goods of China	Corporate tax burdens	Total passenger traffic volume of a city	Degree of railway transportation convenience
	Enterprise operation index	Deposit balance per capita	Total sales of commodity in the whole sale and retail trade above designated size	Bad credit ratio	Number of business travellers	Degree of air transportation convenience
						Degree of sea transportation convenience

Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

Specifically, the livability competitiveness is represented by comfortable natural environment, convenient infrastructure, stable social environment and improved population quality.

Livability competitiveness = F (population quality, social environment, ecological environment, living environment, municipal facilities)

Population quality: Population quality can be defined in spiritual aspect and material aspect.

The spiritual aspect at least includes moral level, education, ideology, etc. of a person. The material aspect mainly means physical condition of a person. Social environment: The total of social material and spiritual conditions within the scope of human life and activities. Ecological environment: It means the total of all natural factors and the effects thereof which are in close relation to mankind and influence human life and production activities. Living environment: It is represented by the ability of a city to provide citizens with basic necessities and other living conditions. Municipal facilities: They cover all aspects of city life, including roads, water supply, power supply, gas supply, heat supply, communication, etc. The index system is shown in Table 3:

**Table 3 Livability Competitiveness Index System**

Definitions of indexes	Population quality	Social environment	Ecological environment	Living condition	Municipal facilities
<b>Index</b>	Average life expectancy	Number of doctors per 10,000 persons	Air quality	Housing price-to-income ratio	Road area per capita
	Proportion of population with college degree or above	Number of primary schools per 1,000 persons	Temperature comfort degree	Number of dining and shopping places per 10,000 persons	Density of sewage pipes
		Number of criminal cases per 10,000 persons	Green coverage ratio		Percentage of population with access to tap water

Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

## 2.2 Sample selection

Sample cities include 287 cities in 23 provinces, 5 autonomous regions and 4 municipalities directly under the Central Government in Mainland China. Specifically, the sample cities include 4 first-tier cities, 15 second-tier cities, 42 third-tier cities and 226 fourth-tier cities. The distribution list of second-tier cities and third-tier cities is shown in Table 4:

**Table 4 Distribution of Second-Tier Cities and Third-Tier Cities in Six Main Regions**

	Second-tier	Third-tier
Bohai Rim	Tianjin, Jinan, Qingdao	Shijiazhuang, Tangshan, Zibo, Dongying, Yantai, Weifang, Jining, Taian
Northeast China	Shenyang, Dalian, Changchun, Harbin	An`shan, Daqing
Southeast China	Nanjing, Hangzhou, Ningbo, Xiamen	Wuxi, Xuzhou, Changzhou, Suzhou, Nantong, Yangzhou, Zhenjiang, Taizhou, Wenzhou, Jiaxing, Shaoxing, Fuzhou, Quanzhou, Zhuhai, Foshan, Dongguan, Zhongshan
Middle China	Wuhan	Nanchang, Taiyuan, Zhengzhou, Kaifeng, Hefei, Changsha
Southwest	Chongqing, Chengdu	Nanning, Haikou, Guiyang, Kunming

China		
Northwest China	Xi'an	Xining, Yinchuan, Urumqi, Hohhot

## 2.3 Calculation method

### 2.3.1 Method for standardization of index data

The index data of economic competitiveness of cities have different dimensions, so they should be nondimensionalized at first. Objective indexes are divided into single objective indexes and comprehensive indexes. For nondimensionalization of the raw data of single objective indexes, this article mainly adopts standardization, indexation, threshold value method and percentile rank method.

The formula of standardization:

$$Xi = \frac{(x_i - \bar{x})}{Q2}$$

, where  $Xi$  is the value to which  $x_i$  is converted,  $x_i$  is the raw data,  $\bar{x}$  is the average value,  $Q2$  is variance.

The formula of indexation:

$$Xi = \frac{x_i}{x_{0i}}$$

, where  $Xi$  is the value to which  $x_i$  is converted,  $x_i$  is the raw data,  $x_{0i}$  is the maximum value.

The formula of the threshold value method:

$$Xi = \frac{(x_i - x_{Min})}{(x_{Max} - x_{Min})}$$

, where  $Xi$  is the value to which  $x_i$  is converted,  $x_i$  is the raw data,  $x_{Max}$  is the maximum sample value,  $x_{Min}$  is the minimum sample value.

The formula of the percentile rank method:

$$Xi = \frac{n_i}{(n_i + N_i)}$$

, where  $Xi$  is the value to which  $x_i$  is converted,  $x_i$  is the raw data,  $n_i$  is the number of sample values which are less than  $x_i$ ,  $N_i$  is the number of sample values (other than  $x_i$ ) which are larger than or equal to  $x_i$ .

Nondimensionalization of the raw data of objective indexes: This article firstly nondimensionalizes all single indexes and then gets the comprehensive index value by weighting via the equal-weight method.

### 2.3.2 Method for measurement of economic competitiveness of cities

Comprehensive indexes of city competitiveness: The method for synthesis of all indexes of economic competitiveness, business-friendliness competitiveness and livability competitiveness of a city is the non-linear weighting synthesis method, namely a non-linear model is used for comprehensive evaluation,  $g = \prod x_i^{w_i}$ , where  $w_i$  is the weighting coefficient and  $x_i \leq 1$ . Such evaluation model is sensitive to indexes of small values but is not sensitive to indexes of large values. It can reflect comprehensive index data in a more comprehensive and scientific way.

Explanation indexes of city competitiveness: In synthesization of the third-level indexes into the second-level indexes and synthesization of the second-level indexes into the first-level indexes, standardization and equal-weighted addition are carried out. The standardization method is as previously mentioned. The formula is as follows:

$$z_{il} = \sum_j z_{ilj}, \text{ where } z_{il} \text{ denotes the second-level index, } z_{ilj} \text{ denotes the third-level index.}$$

$$z_i = \sum_l z_{il}, \text{ where } z_i \text{ denotes the first-level index, } z_{il} \text{ denotes the second-level index.}$$

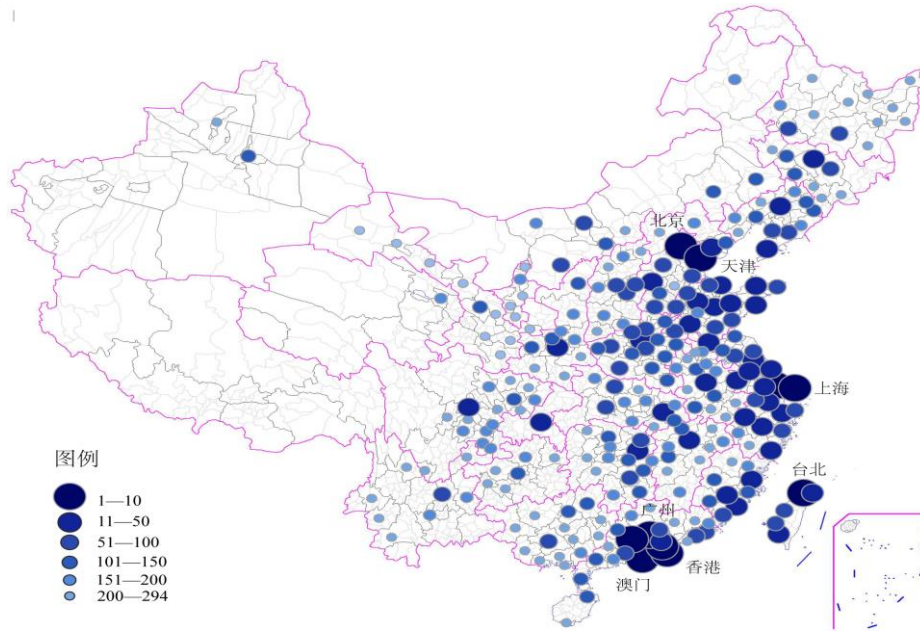
## 3. Result analysis

### 3.1 Overall distribution of economic competitiveness, business friendliness competitiveness and livability competitiveness of a city: location advantages have more significant impact on competitiveness, and Southeast China and Bohai Rim have higher competitiveness.

In terms of urban economic competitiveness of the state and 7 regions, economic competitiveness of cities in Hong Kong, Macau and Taiwan, cities on the southeast coast and cities in Bohai Rim exceeds the average competitiveness level of the state, the economic competitiveness of cities in Northeast China, Middle China, Southwest China and Northwest China is under the average level of the state, and the economic competitiveness indexes of these cities are in descending order. This shows that location advantages have significant impact on the economic competitiveness of a city. Within a region, difference in economic competitiveness between the cities in Southeast China is large, with the biggest coefficient of variation, while distribution of the economic competitiveness indexes of the cities in Middle China is relatively concentrated, with the smallest coefficient of variation (as shown in Figure 1 and Table 5)

**Figure 1 Economic Competitiveness Rankings of 294 Cities**





Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

**Table 5 Economic Competitiveness Indexes of the State and Seven Regions**

Scope	Coverage	Average value	Standard deviation	Coefficient of variation
China	294	0.103	0.115	1.113
Hong Kong-Macau-Taiwan	7	0.387	0.332	0.857
Southeast China	55	0.169	0.168	0.992
Bohai Rim	30	0.141	0.094	0.669
Middle China	80	0.077	0.042	0.034
Southwest China	49	0.063	0.041	0.646
Northeast China	34	0.077	0.049	0.634
Northwest China	39	0.057	0.032	0.557

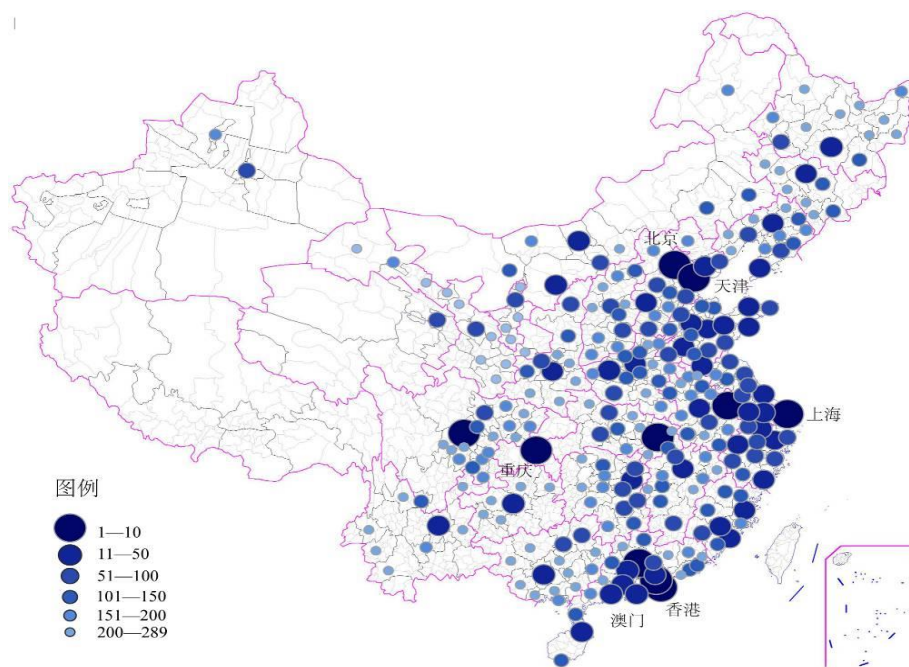
Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

In terms of business friendliness competitiveness indexes of the state and 7 regions, their average score rankings are as follows: Hong Kong-Macau-Taiwan, Bohai Rim, Southeast China, Middle China, Southwest China, Northeast China and Northwest China. The Hong Kong-Macau-Taiwan region ranks first with the score of 0.759, the score of Bohai Rim and that of Southeast China are close to each other and exceed the average level of China, and the business friendliness competitiveness indexes of the rest 4 regions are lower than the average level of China. This shows that business friendliness competitiveness is closely related to the economic development degree. Within a region, the coefficient of variation of Middle China is smallest, with the most balanced distribution, the coefficient of variation of Southeast China is biggest, and the dispersion degrees of the rest regions are almost the same.

In terms of livability competitiveness of the state and 7 regions, the average score rankings

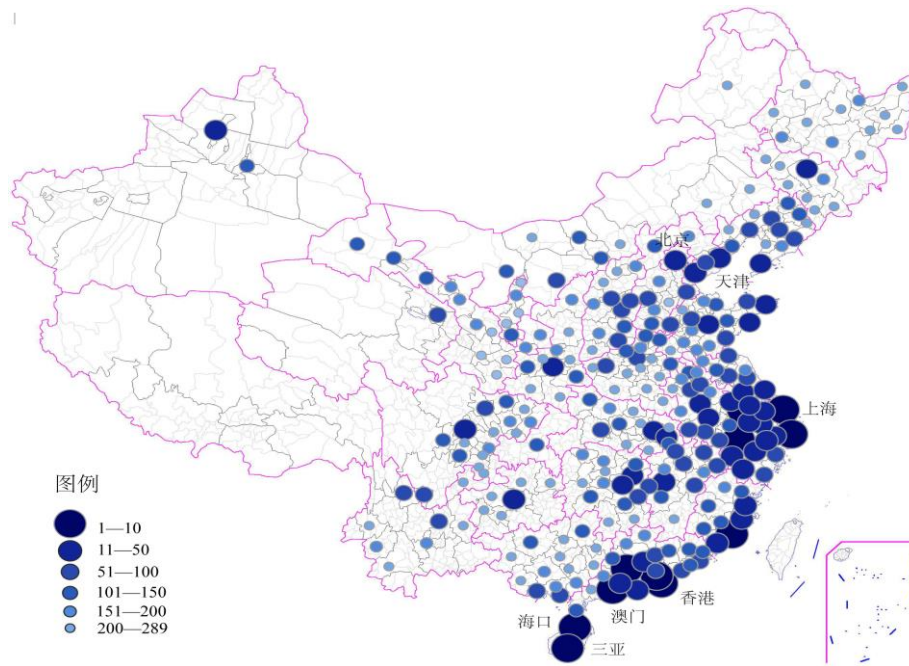
are as follows: Hong Kong-Macau-Taiwan, Southeast China, Bohai Rim, Middle China, Southwest China, Northeast China and Northwest China. On the whole, coastal cities in Southeast China are most livable, and particularly seaside cities have higher livability competitiveness indexes; the livability of cities in Middle China and Southwest China is somewhat improved but still fails to reach the average level of the state; and construction of livable cities in Northeast China and Northwest China is a long-term heavy task. Within a region, the difference in livable degree between cities in Southwest China is relatively large, with the biggest coefficient of variation, while the livable degree of Hong Kong-Macau-Taiwan is relatively homogeneous, with the smallest coefficient of variation (as shown in Figure 2 and Table 6).

**Figure 2 Business Friendliness Competitiveness Rankings of 289 Cities**



Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

**Figure 3 Livability Competitiveness of 289 Cities**



Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

**Table 6 Business Friendliness Competitiveness and Livability Competitiveness Indexes of the State and Seven Regions**

Scope	Variable	Number of Cities	Average value	Standard deviation	Coefficient of variation
China	Business friendliness competitiveness	289	0.299	0.175	0.584
	Livability competitiveness	289	0.454	0.159	0.350
Hong Kong-Macau-Taiwan	Business friendliness competitiveness	2	0.759	0.341	0.450
	Livability competitiveness	2	0.855	0.173	0.202
Southeast China	Business friendliness competitiveness	55	0.404	0.185	0.458
	Livability competitiveness	55	0.584	0.142	0.244
Bohai Rim	Business friendliness competitiveness	30	0.417	0.167	0.401
	Livability competitiveness	30	0.506	0.119	0.234
Middle China	Business friendliness competitiveness	80	0.277	0.126	0.452
	Livability	80	0.444	0.124	0.280

	competitiveness				
Southwest China	Business friendliness competitiveness	49	0.219	0.158	0.725
	Livability competitiveness	49	0.388	0.161	0.415
Northeast China	Business friendliness competitiveness	34	0.248	0.142	0.572
	Livability competitiveness	34	0.382	0.132	0.344
Northwest China	Business friendliness competitiveness	39	0.228	0.145	0.635
	Livability competitiveness	39	0.347	0.139	0.372

Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

### 3.2 Distribution of competitiveness of third-tier cities

#### 3.2.1 Second-tier cities: Their regional difference is obvious. The competitiveness of the cities in the east and south is high but the competitiveness of the cities in the west and north is low. Their livability is inferior to their business friendliness competitiveness and economic strength, and its distribution is not homogeneous

The second-tier cities have higher administrative ranks, greater shares of urban finance, adequate urban infrastructure, vast market demand, more national policy and system support, sound incentive systems for the development of local enterprises, favorable conditions for establishment of new enterprises and sustainable development of all industries, more high-end factors and compared with first-tier cities, they have less stringent requirements on entry. As a result, in terms of industry structure level, industry profitability and average labour productivity, the second-tier cities rank first in China just like the first-tier cities, and have attraction and talent convergence ability. Moreover, advantages in terms of land cost, human cost, work environment, energy supply, etc. are great attraction and market potential for foreign investment and projects, making the second-tier cities popular areas of foreign investment and new hotspots of foreign investment and export trade. On the whole, second-tier cities have greater economic strength and good business-friendly conditions, but have livable conditions which are not good enough.

Most second-tier cities have great economic competitiveness. Tianjin, Wuhan and Nanjing (the top 3 among second-tier cities) respectively rank eighth, thirteenth and fourteenth in China. The average score of Tianjin reaches 0.430. Xi'an, Changchun and Harbin are bottom 3 among second-tier cities which are far behind the other second-tier cities.

In terms of business friendliness competitiveness, rankings of most second-tier cities are relatively high. Wuhan, Chengdu and Tianjin are top 3 among the second-tier cities and their average scores are close to each other. Wuhan, Chengdu and Tianjin respectively rank sixth, seventh and eighth among 287 cities in China. Rankings of Changchun and Harbin are still not

good enough. The scores of Changchun and Harbin are the bottom 2 among the second-tier cities. In terms of livability competitiveness, only a minority of second-tier cities obtain higher index scores. Xiamen, Hangzhou and Qingdao are among the most livable second-tier cities and respectively rank fifth, ninth and eleventh in China; Chongqing and Harbin respectively rank 127th and 160th, with worrisome livability; the rankings of the livability competitiveness of the rest second-tier cities are not as high as the rankings of their economic competitiveness and business friendliness competitiveness (as shown in Table 7).

On the whole, the urban economic competitiveness, business friendliness competitiveness and livability competitiveness of second-tier cities show regional differences. Southeast China has less significant advantages, while the competitiveness of the cities in Northeast China is slightly poor.

**Table 7 Competitiveness Rankings of Second-Tier Cities**

City	Economic competitiveness	Ranking	Business friendliness competitiveness	Ranking	Livability competitiveness	Ranking	City	Economic competitiveness	Ranking	Business-friendly city competitiveness	Ranking	Livable city competitiveness	Ranking
Tianjin	0.430	8	0.702	8	0.653	33	Shenyang	0.229	22	0.630	16	0.609	51
Wuhan	0.294	13	0.726	6	0.684	23	Hangzhou	0.224	24	0.671	11	0.761	9
Nanjing	0.291	14	0.699	9	0.675	27	Chongqing	0.210	26	0.675	10	0.463	127
Chengdu	0.266	15	0.705	7	0.651	35	Jinan	0.200	28	0.663	13	0.582	63
Qingdao	0.262	16	0.662	14	0.734	11	Xi'an	0.176	34	0.611	19	0.648	36
Xiamen	0.242	18	0.561	25	0.842	5	Changchun	0.148	41	0.495	39	0.637	40
Dalian	0.237	19	0.555	26	0.619	47	Harbin	0.124	46	0.480	43	0.418	160
Ningbo	0.234	21	0.581	24	0.667	29							

Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

**3.2.2 Third-tier cities: Their regional distribution is not balanced. The competitiveness of the cities in the southeast is high and the competitiveness of the cities in the northwest is low; these cities are generally livable cities; the economic competitiveness of Suzhou, Foshan, Wuxi and Dongguan exceeds the economic competitiveness of top 3 among the second-tier cities.**

Third-tier cities are provincial cities and some developed cities in eastern megalopolis and have lower administrative ranks compared with the first-tier cities and the second-tier cities.

Infrastructure construction of third-tier cities is relatively defective, as infrastructure construction of cities in China is hierarchical. In addition, compared with second-tier cities, third-tier cities have smaller domestic and foreign market demand, fewer high-end factors and weaker urban economic competitiveness and business friendliness competitiveness, but there are exceptions, as the economic competitiveness of Suzhou, Foshan, Wuxi and Dongguan exceeds the top 3 among second-tier cities. Most third-tier cities are located in southeastern coastal areas, and generally they have advantageous environment and livable conditions.

In terms of urban economic competitiveness, some third-tier cities have higher scores than some second-tier cities. Infrastructure construction of cities in China is hierarchical. Suzhou, Foshan, Wuxi and Dongguan (the top 4 among third-tier cities) respectively rank seventh, ninth, eleventh and twelfth in China, exceeding the top 3 among second-tier cities. Lanzhou, Kaifeng, Haikou, Yinchuan and Xining have relatively weak economic competitiveness. The difference in score between the five cities is small, and their scores are mainly between 0.060 and 0.076.

In terms of business friendliness competitiveness, Changsha, Hefei, Suzhou, Zhengzhou and Foshan have relatively high average scores and respectively rank twelfth, fifteenth, seventeenth, eighteenth and twentieth; Kaifeng, Xining, Yinchuan, Anshan and Taizhou have relatively low scores. Situation of Kaifeng is most dangerous, which ranks 235 among 287 cities of China. In terms of livability competitiveness, rankings of third-tier cities are generally high; the top 5 livable third-tier cities are Zhuhai, Haikou, Wuxi, Suzhou and Zhongshan. Zhuhai ranks first among cities of China, with the ideal livable competitiveness index of 1; Haikou has the score of 0.871 ranking only second to Zhuhai and ranks third nationwide; Wuxi has good livable conditions and ranks among top 10 nationwide (as shown in Table 8).

On the whole, the regional distribution of the urban economic competitiveness, business friendliness competitiveness and livability competitiveness of third-tier cities is not balanced. Their competitiveness is strong in the southeast but weak in the northwest.

**Table 8 Competitiveness Rankings of Third-Tier Cities**

City	Economic competitiveness	Ranking	Business friendliness competitiveness	Ranking	Livability competitiveness	Ranking	City	Economic competitiveness	Ranking	Business friendliness competitiveness	Ranking	Livable city competitiveness	Ranking
Suzhou	0.437	7	0.624	17	0.731	13	Nanchang	0.143	45	0.531	31	0.595	55
Foshan	0.412	9	0.610	20	0.681	25	Taizhou	0.143	46	0.368	79	0.587	60
Wuxi	0.375	11	0.589	23	0.768	8	Weifang	0.139	47	0.542	28	0.494	104

Dongguan	0.332	12	0.448	53	0.518	89	Dongying	0.136	48	0.475	44	0.482	114
Zhengzhou	0.235	20	0.621	18	0.517	90	Wenzhou	0.134	49	0.513	35	0.587	59
Changsha	0.228	23	0.668	12	0.648	37	Jining	0.133	50	0.371	77	0.411	172
Changzhou	0.215	25	0.492	40	0.724	16	Zhuhaizi	0.131	52	0.464	48	1	1
Tangshan	0.201	27	0.521	32	0.528	85	Daqing	0.128	53	0.415	60	0.428	153
Zhongshan	0.197	29	0.451	52	0.729	15	Anshan	0.127	54	0.346	93	0.403	177
Nantong	0.195	30	0.504	38	0.589	57	Taian	0.125	55	0.403	68	0.627	43
Yantai	0.193	31	0.535	30	0.576	65	Taiyuan	0.106	72	0.540	29	0.535	81
Quanzhou	0.182	32	0.471	45	0.448	136	Kunming	0.100	78	0.511	36	0.434	149
Zibo	0.177	33	0.468	46	0.611	50	Hohhot	0.099	79	0.454	51	0.486	113
Hefei	0.168	35	0.645	15	0.679	26	Nanning	0.099	81	0.480	42	0.415	165
Jiaxing	0.167	36	0.373	75	0.584	61	Guiyang	0.086	105	0.509	37	0.628	42
Xuzhou	0.158	38	0.550	27	0.392	185	Urumqi	0.085	111	0.412	63	0.472	121
Zhenjiang	0.155	39	0.409	64	0.701	19	Lanzhou	0.076	120	0.442	54	0.417	162
Fuzhou	0.155	40	0.592	22	0.682	24	Kaifeng	0.074	121	0.161	235	0.372	202
Shaoxing	0.148	42	0.369	78	0.611	49	Haikou	0.073	123	0.489	41	0.871	3
Shijiazhuang	0.146	43	0.597	21	0.568	70	Yinchuan	0.063	166	0.356	82	0.390	186
Yangzhou	0.146	44	0.397	70	0.673	28	Xinling	0.060	188	0.334	97	0.549	77

Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

### 3.3 Comparative analysis

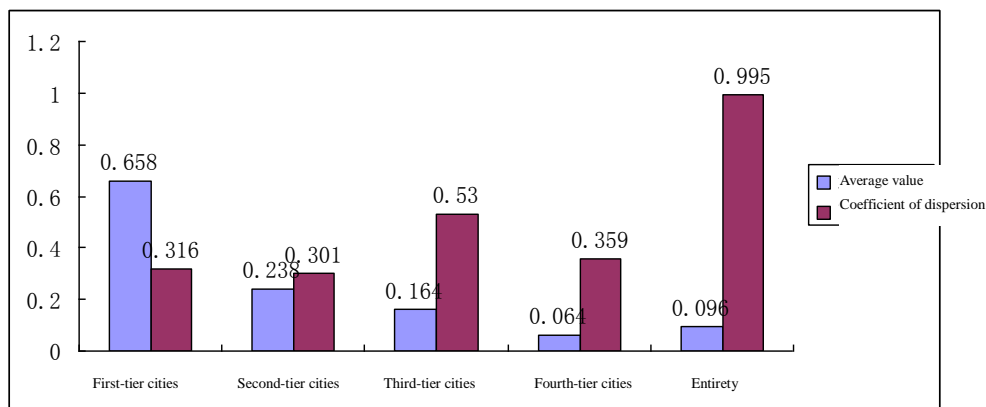
**3.3.1 Comparison of urban economic competitiveness: Difference between second-tier cities and third-tier cities is small; difference between second-tier cities and first-tier cities and difference between third-tier cities and first-tier cities are big; difference between cities of the same tier is obvious.**

In terms of average value index, the overall average economic competitiveness index of



287 cities is 0.096. The average values of first-tier cities, second-tier cities and third-tier cities exceed 0.096, but the difference between the second-tier cities and the first-tier cities and the difference between the third-tier cities and the first-tier cities are big. The average urban economic competitiveness indexes of first-tier cities, second-tier cities and third-tier cities are respectively 0.658, 0.238 and 0.164. The average score of fourth-tier cities does not reach the overall average level. The dispersion degree is very high in terms of entirety or cities of the same tier. The overall dispersion degree reaches 0.995. The dispersion degree of third-tier cities, fourth-tier cities, first-tier cities and second-tier cities are respectively 0.53, 0.359, 0.316 and 0.301 (in descending order), as shown in Figure 4.

**Figure 4 Urban Economic Competitiveness Comparisons between First-Tier, Second-Tier, Third-Tier and Fourth-Tier Cities and the Entirety**



Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

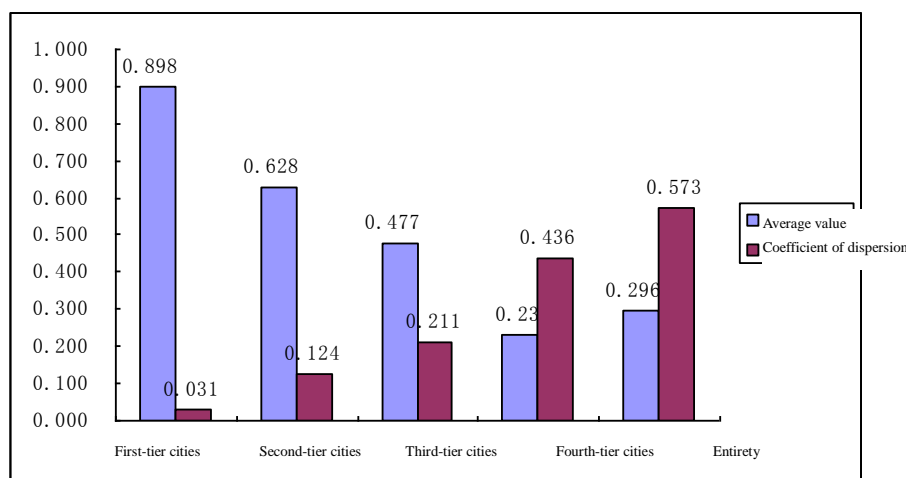
**3.3.2 Comparison of business friendliness competitiveness: The difference in urban economic competitiveness between second-tier cities and third-tier cities becomes slightly bigger, but the difference in urban economic competitiveness between second-tier cities and first-tier cities and the difference between the third-tier cities and first-tier cities become smaller; indexes in all aspects basically are in descending order of the tiers of cities. There is a positive correlation between patent indexes and the change trend of urban economic competitiveness.**

In terms of average business friendliness competitiveness index value, the overall distribution trend is basically in line with the distribution trend of the urban economic competitiveness, namely the scores are in descending order according to the tiers of cities; the fourth-tier cities fail to reach the average. The business friendliness competitiveness level of cities of the same tier is higher than the urban economic competitiveness level. The difference between the second-tier cities and the first-tier cities become smaller. The average business friendliness competitiveness values of the second-tier cities and the first-tier cities are respectively 0.898 and 0.628. The difference between the fourth-tier cities and the third-tier cities becomes bigger. The third-tier



cities have more obvious advantages, compared with the fourth-tier cities. The average scores of the third-tier cities and the fourth-tier cities are respectively 0.477 and 0.230. Compared with urban economic competitiveness, the dispersion degree of business friendliness competitiveness decreases slightly; the coefficient of dispersion at the overall level is 0.573; 4 first-tier cities have the same business friendliness competitiveness, with the coefficient of dispersion of 0.124. The third-tier cities and the fourth-tier cities have similar dispersion conditions of business friendliness competitiveness. The coefficients of dispersion of the third-tier cities and the fourth-tier cities are respectively 0.211 and 0.230 (as shown in Figure 5).

**Figure 5 Comparisons of Business Friendliness Competitiveness between First-Tier, Second-Tier, Third-Tier and Fourth-Tier Cities and the Entirety**



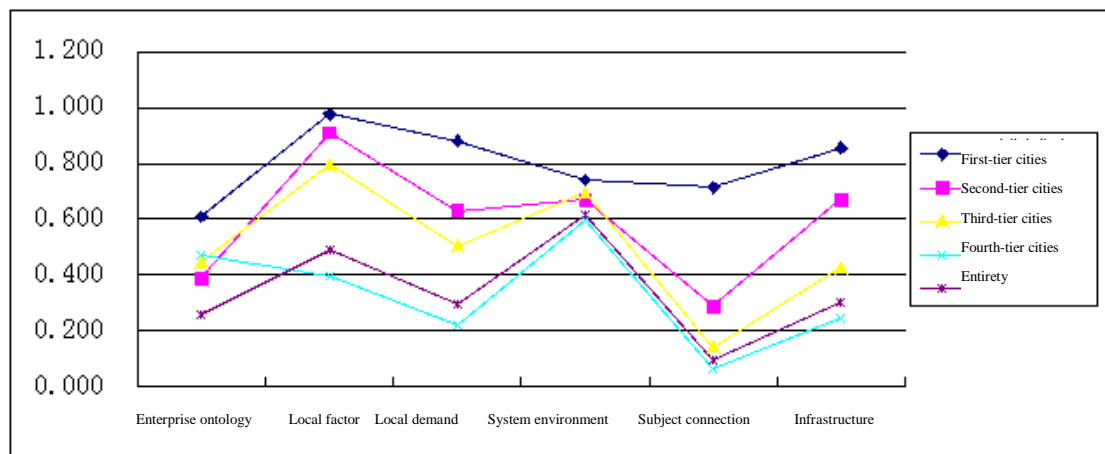
Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

The average values of business friendliness competitiveness in some aspects do not decrease progressively in line with the city hierarchy system. This phenomenon obviously happens in “enterprise ontology”. The first-tier cities have stable rankings with the average score of 0.609. The average values of second-tier, third-tier and fourth tier cities are respectively 0.387, 0.443 and 0.472, showing the trend that the rankings are not in line with the tiers, in spite of small difference in score between the second-tier, third-tier and fourth tier cities. This warns the second-tier cities and the third-tier cities to pay more attention to their enterprise growth and management condition and to bring in some large enterprises as possible. In terms of “local factor”, the difference in score between the first-tier, second-tier and third-tier cities is small, but the difference in score between the fourth-tier and the first-tier cities, between the fourth-tier and the second-tier cities and between the fourth-tier and the third-tier cities are big. The average score of “local factor” of the fourth-tier cities does not reach the average. This shows that the quality of the labor force and innovation ability in first-tier, second-tier and third-tier cities is good, but the fourth-tier cities are inferior in this regard. Distribution of “subject connection” scores of cities of the same tier is on the contrary. The first-tier cities are outstanding with the average score of 0.714, while the average

scores of the second-tier, third-tier and fourth-tier cities are close to each other. This shows that the economic relations of the second-tier, third-tier and fourth-tier cities with the external are not close enough and the degree of intercourse should be further improved. In addition, the figure shows that in terms of “system environment”, the distribution is concentrated, with the scores of cities of all tiers close to each other. It is worth mentioning that the average score of the third-tier cities exceeds that of the second-tier cities; the difference in average score between the third-tier cities and the first-tier cities is small; average scores of the first-tier, second-tier and third-tier cities are respectively 0.740, 0.670 and 0.694, while the fourth-tier cities are slightly inferior. In terms of the “local demand” and “infrastructure” indexes, the scores of cities of four tiers are in descending order according to city tiers (as shown in Figure 6).

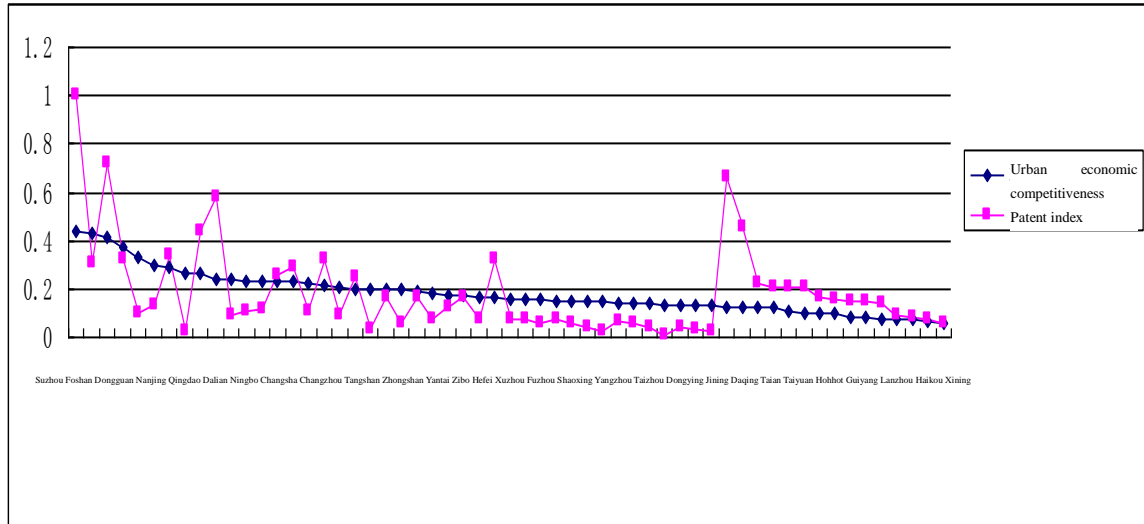
In terms of the relation between urban economic competitiveness and patent index of second-tier cities and third-tier cities, with descending order of urban economic competitiveness, the change trend of the corresponding patent index shows relatively great fluctuation, but regardless of greater fluctuation, it is not difficult to find that the patent index decreases with the decrease of the urban economic competitiveness index, so there is a positive correlation between these two indexes. As shown in Figure 7, the urban economic competitiveness index and the patent index of Suzhou are biggest; like urban economic competitiveness, the patent indexes are in descending order, in the range from Xuzhou to Daqing and that from Taian to Xining.

**Figure 6 Comparisons of Business Friendliness Competitiveness Index between First-Tier, Second-Tier, Third-Tier and Fourth-Tier Cities and the Entirety**



Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

**Figure 7 Relation between the Patent Index and the Urban Economic Competitiveness**

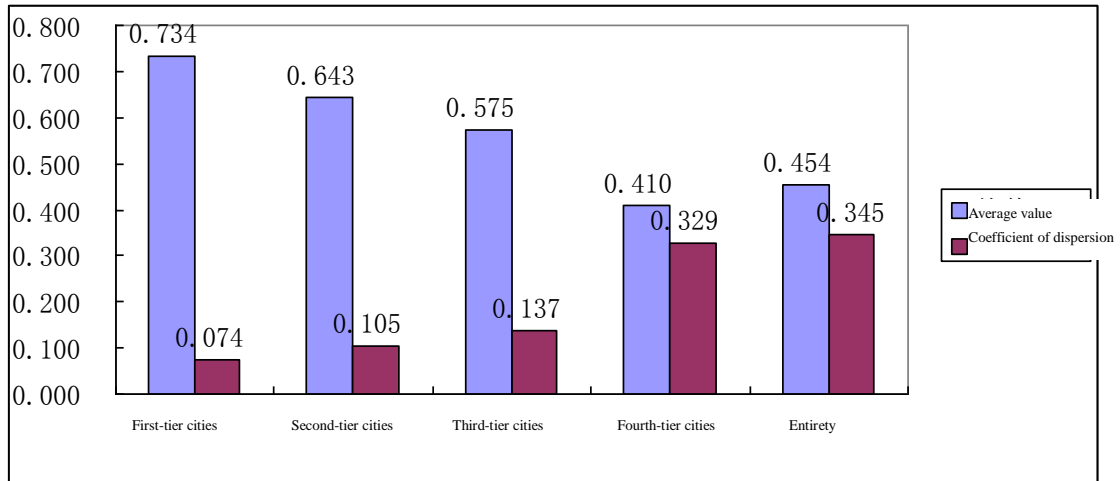


Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

**3.3.3 Comparison of livability competitiveness: Compared with business-friendliness, the difference in livability competitiveness between first-tier cities, second-tier cities and third-tier cities decreases further, but index scores of second-tier cities and third-tier cities in all aspects are close to each other; the social environments of the second-tier cities and the third-tier cities are better than the social environment of the first-tier cities; the trend of the housing price-to-income ratio rankings and that of the urban economic competitiveness rankings are consistent.**

In terms of average livability competitiveness index value, average scores of the first-tier cities, the second-tier cities, the third-tier cities and the fourth-tier cities are in descending order. Compared with business friendliness competitiveness of cities of all tiers, the livability competitiveness level of the second-tier, third-tier, fourth-tier cities and the overall livability competitiveness level are better, except for the livability competitiveness of first-tier cities which declines slightly; the average index values of the first-tier, second-tier, third-tier and fourth-tier cities and the overall index value are respectively 0.734, 0.643, 0.575, 0.410 and 0.454. The dispersion degrees of the livability competitiveness in terms of entirety or cities of the same tier are smaller than that of the business friendliness competitiveness. This shows that the difference in livability between cities is small. By contrast, the difference in livability between the fourth-tier cities is big. The coefficients of dispersion of the fourth-tier cities, the first-tier cities, the second-tier cities and the third-tier cities are respectively 0.329, 0.074, 0.105 and 0.137 (as shown in Figure 8).

**Figure 8 Comparison of Livability Competitiveness between First-Tier, Second-Tier, Third-Tier and Fourth-Tier Cities and the Entirety**

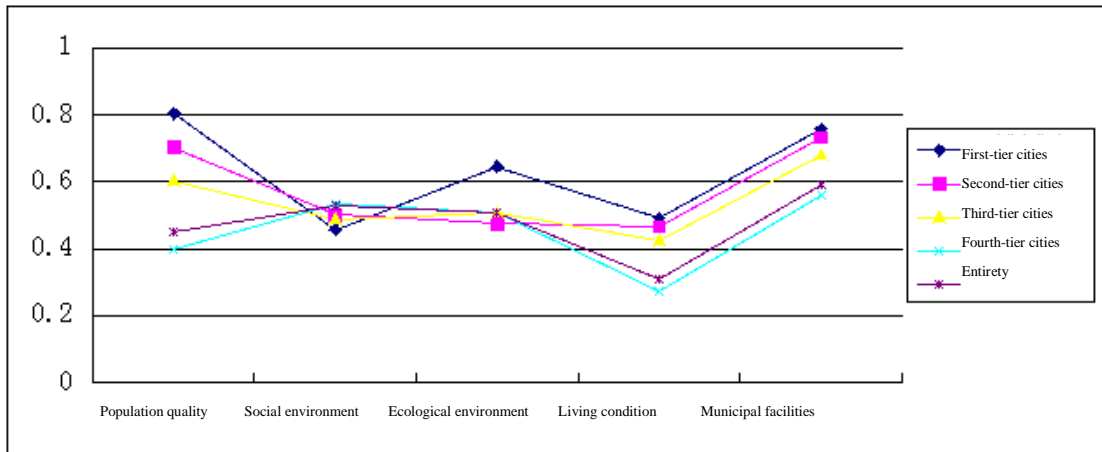


Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

In terms of all livability competitiveness indexes, the average scores of the second-tier cities and the third-tier cities have similar distributions to some extent; the difference in average score between the second-tier cities and the third-tier cities is slight. Compared with the first-tier cities, the second-tier cities, the third-tier cities and the fourth-tier cities have good “social environment” and their average values exceed 0.457, the average value of the first-tier cities; the average value of the fourth-tier cities is larger than that of the second-tier cities and the third-tier cities; the fourth tier is the only tier which has an average score higher than the average level. On the contrary, “ecological environment” is their common disadvantage. There is a certain gap between the first-tier cities and the cities of other tiers. Only the score of the third-tier cities reaches the average level. The score of the second-tier cities (0.475) is smaller than that of the fourth-tier cities (0.507). In terms of “livable environment” and “municipal facilities”, the scores of the first-tier cities, the second-tier cities and the third-tier cities are in descending order, with slight differences between each other. The fourth-tier cities underperform and fail to reach the average level. In terms of “population quality”, the average scores are in descending order according to the tiers, but the differences among tiers are relatively obvious; the difference between the fourth-tier cities and the third-tier cities is most significant (as shown in Figure 9).

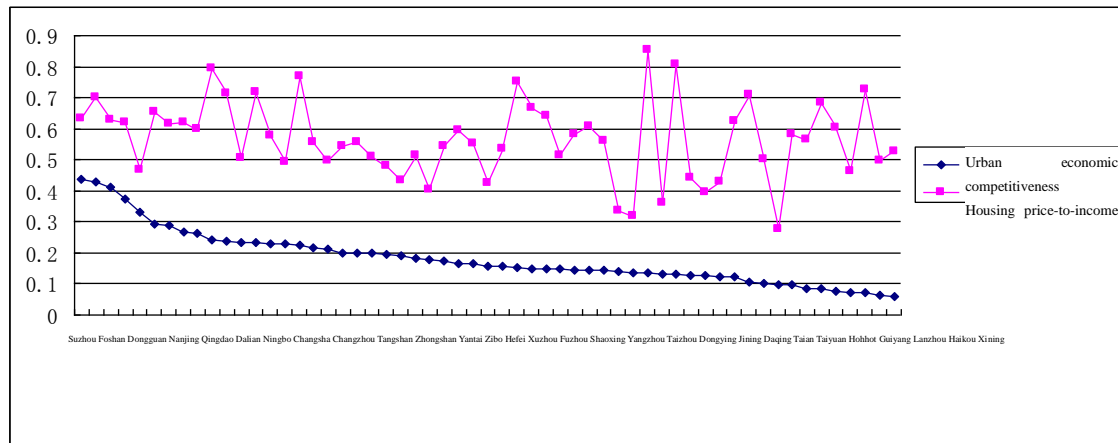
In terms of relation between economic competitiveness and housing price-to-income ratio of the second-tier cities and the third-tier cities, with decrease of urban economic competitiveness, overall fluctuation of corresponding housing price-to-income ratios is obvious. Regardless of greater fluctuation, it can be seen that the housing price-to-income ratio and the urban economic competitiveness are consistent in terms of rankings. The combination of high housing prices and low incomes results in uneasy residence and higher living cost, which seriously influences the livable level of cities and thus influences urban economic competitiveness, as shown in Figure 10

**Figure 9 Comparison of Business Friendliness Competitiveness Index between First-Tier, Second-Tier, Third-Tier and Fourth-Tier Cities and the Entirety**



Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

**Figure 10 Relation between the Housing Price-to-Income Ratio and the Urban Economic Competitiveness**



Sources of data: the city and competitiveness database of Chinese Academy of Social Sciences

#### 4. Main conclusions

##### 4.1 Conclusions based on overall comparison

Based on empirical result analysis of the aforesaid index systems, the features of economic competitiveness, business friendliness competitiveness and livability competitiveness of the second-tier cities and the third-tier cities in China can be concluded as follows:

The cost of urban environment, industry function support and aggregate development of the second-tier cities is low compared with the first-tier cities. This makes second-tier cities become investment hotspots. The requirements for entry of private capital into the first-tier cities are stringent, while there are better investment opportunities in the second-tier cities. Foreign capital flows into the second-tier cities due to low-cost advantage. Second-tier cities witness a bright development prospect, with stronger attraction, industry cluster, continuous convergence of talents, technologies and other high-end factors, complete infrastructure construction, policy and system support of governments. The certain gap between the first-tier cities and the second-tier cities in terms of input (business friendliness and livability competitiveness) and output

(comprehensive economic competitiveness) does not influence the great development potential of the second-tier cities.

The third-tier cities have better livable conditions generally. In recent years, they gradually attract a respectable amount of investment, but their business-friendly environment and economic strength are barely satisfactory. There is a big gap between the third-tier cities and the first-tier cities, as well as between the third-tier cities and the second-tier cities. The third-tier cities face inadequate infrastructure construction, insufficiently close economic relation with the external, deficient market development efforts, small domestic and foreign market shares, barely satisfactory number of big enterprises, enterprise growth and management condition.

## **4.2 Analysis based on empirical results**

### **Firstly, the special imbalance continues to deteriorate, easily leading to vicious circle**

The spatial imbalance of urban economic competitiveness is not only embodiment of the features of economic competitiveness of the second-tier and third-tier cities in China but also an important factor restricting future increase in economic competitiveness scores. The features are easily “set in stone”, like the regional difference of economic development. This hinders backward cities from catching up with developed cities and restricts development, which further aggravates imbalance of spatial distribution.

### **Secondly, input into economic competitiveness of the second-tier and third-tier cities is not well converted into output**

As the input part of the input-output model of urban economic competitiveness, overall realization of business friendliness and livability competitiveness of the second-tier cities and the third-tier cities is better and higher than its corresponding urban economic competitiveness. This shows that input is not well converted into output and that the operation efficiency of the urban industry system is not high in the course of economic competitiveness of the second-tier cities and third-tier cities.

### **Thirdly, the combination of high housing prices and low incomes becomes the important reason for low economic competitiveness of the second-tier cities and the third-tier cities**

The housing price-to-income ratios of the second-tier cities and the third-tier cities are higher than corresponding urban economic competitiveness and are in consistent with overall rankings of urban economic competitiveness. Uneasy residence and high living cost result from high housing prices (in conventional sense) and low incomes of citizens. The combination of high housing prices and low incomes largely influences the livable levels of cities and hinders talent attraction and retention, thus reducing urban economic competitiveness. To improve livable levels and economic competitiveness, the second-tier cities and the third-tier cities should find a rational

range of housing price-to-income ratios. This is important experience of the livable benchmarking city, Zhuhai.

**Fourthly, innovation is the staying power for economic development of the second-tier cities and the third-tier cities**

For developed second-tier cities and third-tier cities, strong economic competitiveness mainly benefits from high-end factors and technological innovation. Remaining second-tier cities and third-tier cities which are suffering housing bubble are witnessing rapid economic development by attracting a great deal of investment via innovation and convergence of high-end factors. This shows that, the second-tier cities and the third-tier cities should encourage innovation in the course of the future economic development to keep themselves active. Innovation features uneasy imitation, high additional value, etc., so innovation advantages can last for a long time and result in strong competitiveness. Meanwhile, accelerating industrial technological innovation and using high-tech and advanced applicable technology for transforming and improving traditional industries can bring about reduced consumption and pollution, change in excessive resource consumption and the development mode which leads to environmental pollution and improvement in industrial competitiveness.

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