

# A Comparative Study on Agglomeration Effects of the Central Cities of Three Urban Agglomerations in China— A Case Study of Producer Services

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**Abstract.** The central city drives the development of the surrounding cities through the agglomeration effect of producer services. This paper measures the clustering abilities of producer services in central city of the three urban agglomerations through the location quotient coefficient. Conclusions can be drawn as follows: the agglomeration effect of the central cities of “Beijing-Tianjin-Hebei” is the largest, followed by the “Yangtze River Delta” and the “Pearl River Delta”. Based on this, this paper puts forward some policy suggestions for the healthy development of the three major urban agglomerations.

**Keywords:** Urban agglomeration · The central city · Producer services · Industrial agglomeration

## 1 Introduction

As a growth pole of economic development of urban agglomeration, the central city outputs the resources and services to other city through the external service function, and makes the factor flow between cities, which is the main driving force to the development of cities [1]. Producer services, as an important economic form of the central city, is gradually replacing the manufacturing industry as the main driving force of economic growth. Industrial agglomeration has an important influence on the economic development of a region, and many scholars (Cui Yu-ming [2], Zhang Yunfei [3], Yu Binbin [4]) have done a deep research on it. The characteristics of spatial agglomeration of producer services are obvious, showing the trend of centralization and specialization in general [5–7]. “13th Five-Year Plan Proposal” requires that the urban agglomeration should play the leading role of radiation, optimize the development of “Beijing-Tianjin-Hebei”, “Yangtze River Delta”, “Pearl River Delta” three urban agglomeration, and strengthen regional service functions [8]. Therefore, this paper takes the productive service industry of the central cities of the three major urban agglomerations as the research object, estimates its agglomeration effect, discusses its impact on the development of urban agglomeration, and provides effective suggestions for guiding the positive and healthy development of urban agglomeration.

## 2 Research Object and Model Establishment

### 2.1 Research Object

This paper selects the three major urban agglomerations as the research subject. Reference to the existing research results [9–11], this paper selects Beijing, Shanghai and Guangzhou, respectively, as the central city of the three major urban agglomerations. According to industry classification given by the National Bureau of statistics, the producer services (replaced by PSs in the below) is defined as transportation, storage and postal industry, information transmission, computer services and software industry, financial industry, leasing and business services, scientific research, technical services and geological prospecting industry five industries, hereinafter referred to as the logistics industry, information industry, the financial industry, business industry and technology industry (replaced by L, I, F, B and T in the below). The data of the relevant indicators are derived from “China Urban Statistical Yearbook (2006-2015)” and the relevant cities statistical yearbook.

### 2.2 Model Establishment - the Convergency Index of the Industry

This paper uses location quotient coefficient to measure the industrial agglomeration ability of the three major urban agglomerations in China. The formula is as follows:

$$LQ_{ij} = \frac{x_{ij}/x_i}{x_j/x} \quad (1)$$

Among them,  $x_{ij}$  represents the number of employees in city  $i$  of industry  $j$ ,  $x_i$  represents the total number of employees in city  $i$ ,  $x_j$  represents the total number of employees in the national industry  $j$ ,  $x$  represents total number of employees in China. When  $LQ_{ij} < 1$ , it indicates that city  $i$  industry  $j$  is lack of concentration; when  $1 < LQ_{ij} < 1.5$ , it indicates that city  $i$  industry  $j$  is in a general agglomeration state; when  $LQ_{ij} > 1.5$ , it indicates that city  $i$  industry  $j$  is in a highly concentrated state.

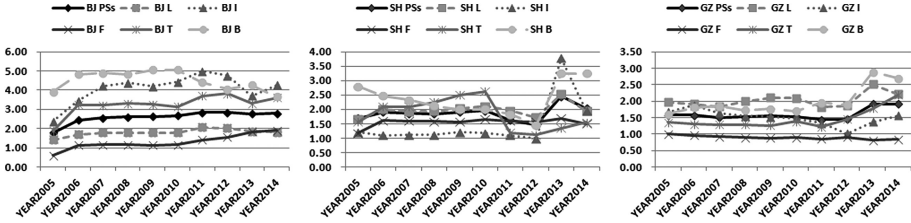
## 3 The Agglomeration Effect of Producer Services in Central Cities

### 3.1 Analysis on the Agglomeration Ability of Producer Services in Central Cities

Location quotient (formula 1) measures the degree of specialization of an industry of a city in a country. Figure 1 is the location quotient of the producer services and the various industries in the central city of the three urban agglomerations from 2005 to 2014.

In Fig. 1, Beijing’s overall agglomeration capacity of the producer services increased steadily, Shanghai and Guangzhou are both improved in volatility. Changes of the industrial agglomeration ability are different, the agglomeration ability of the

various industries in Beijing is on the rise; In addition to the 2013 Shanghai’s industrial agglomeration ability is basically a downward trend; Guangzhou’s industrial agglomeration ability is relatively stable.



**Fig. 1.** The location quotient of producer services and internal industries in central city

Based on the vertical axis location quotient value, we can know that ① the producer services in Beijing have prominent regional advantages in the whole country, which have been rising continuously in the past 10 years. In addition to the financial industry, the rest of the industries are in a state of high agglomeration. ② In Shanghai, in addition to the information industry, the rest of the industries are in a state of high agglomeration, location quotient value fluctuates up and down in 2. The development of producer services in Shanghai is relatively balanced, and the location advantages are relatively concentrated. ③ The producer services in Guangzhou are more stable, and the change trend of each industry is basically the same and relatively concentrated. The agglomeration ability of logistics, business and information industry is stronger than the other two industries.

### 3.2 The Difference of the Agglomeration Ability of Producer Services

The results showed in Table 1 are the agglomeration ability differences. The greater the absolute value of the data in the table indicates that the difference is greater; the positive value indicates that the agglomeration ability of the surrounding city is not as good as that of the central city, negative and vice.

Seen from Table 1, In the three urban agglomerations, “Beijing, Tianjin and Hebei” producer services have the largest difference, followed by the “Yangtze River Delta” and “Pearl River Delta”.

In “Beijing-Tianjin-Hebei”, the difference of information, technology and business industries is obvious, the agglomeration ability of them in Beijing is higher than the surrounding cities; The differences of logistics and financial industries are relatively small, the agglomeration ability of surrounding cities are stronger than Beijing, as a whole the overall difference is smaller.

The difference of producer services in the “Yangtze River Delta” is mainly reflected in the logistics, science and technology and the business industries. There is still a gap in the agglomeration ability of each industry between the surrounding cities and

**Table 1.** The location quotient difference of each city and central city

	City	L	I	F	T	B	PSs	City	L	I	F	T	B	PSs
BTH	TJ	0.6	3.3	0.4	1.9	3.2	1.5	BD	1.2	3.4	0.2	1.8	4.2	1.8
	SJZ	0.3	3.3	-0.1	1.9	3.9	1.3	ZJK	0.9	3.2	0.2	2.6	4.0	1.7
	TS	0.8	3.5	0.1	3.0	3.9	1.8	CD	0.7	3.0	-0.3	2.7	3.7	1.5
	QHD	-0.8	3.3	-0.3	2.5	3.9	1.1	CZ	0.9	3.1	0.1	2.9	3.9	1.7
	HD	0.9	3.5	0.2	2.6	4.0	1.8	LF	1.2	3.1	0.2	1.9	3.9	1.7
	XT	1.2	3.2	0.0	2.7	4.2	1.9	HS	0.7	3.0	-0.4	2.8	4.2	1.6
	<b>AVE</b>	<b>0.9</b>	<b>3.2</b>	<b>0.2</b>	<b>2.4</b>	<b>3.9</b>	<b>1.6</b>							
YRD	NJ	0.3	-0.1	0.8	0.2	1.1	0.5	HZ	1.1	-0.4	0.5	0.4	0.7	0.6
	WX	1.3	0.6	0.6	1.1	1.6	1.1	NB	1.2	1.0	0.4	1.3	1.1	1.0
	ChZ	1.0	0.8	0.5	1.1	1.6	1.0	JX	1.6	1.1	0.8	1.4	1.3	1.3
	SZ	1.5	0.8	0.7	1.6	1.9	1.3	HuZ	1.4	0.8	0.5	1.4	1.7	1.2
	NT	1.3	0.8	0.5	1.5	1.8	1.2	SX	1.7	1.1	0.9	1.6	1.9	1.5
	YZ	1.4	0.6	0.7	1.2	1.8	1.2	ZS	0.2	0.6	0.3	1.1	0.6	0.5
	ZJ	1.1	0.9	0.3	1.1	1.7	1.0	TZ <sub>2</sub>	1.5	0.9	0.2	1.3	1.5	1.1
	TZ <sub>1</sub>	1.4	0.6	0.3	1.4	1.5	1.1	<b>AVE</b>	<b>1.2</b>	<b>0.8</b>	<b>0.5</b>	<b>1.2</b>	<b>1.5</b>	<b>1.0</b>
PRD	SZ	0.7	0.1	-0.2	0.5	-0.3	0.2	ZQ	1.2	0.5	0.0	1.0	1.4	0.9
	ZH	1.4	0.4	0.2	1.1	1.2	0.9	HZ	1.7	1.1	0.2	1.2	1.6	1.2
	FS	1.4	0.3	-0.5	1.0	1.4	0.8	DG	1.2	0.8	-1.5	1.1	1.5	0.5
	JM	1.5	0.9	-0.3	1.2	1.6	1.0	ZS	1.4	0.8	-0.3	1.0	1.4	0.8
	<b>AVE</b>	<b>1.3</b>	<b>0.6</b>	<b>0.4</b>	<b>1.0</b>	<b>1.3</b>	<b>0.8</b>							

Shanghai. Shanghai industrial development advantages are obvious, driving the development of surrounding cities.

In “Pearl River Delta”, the differences of information and financial industries are relatively small. The small difference in information industry is due to the strong agglomeration ability of each city, and the convergence of Guangzhou development. The small difference in the financial industry is due to the “Pearl River Delta” urban agglomeration overall weak agglomeration ability, and lack of concentration caused.

## 4 Conclusion

As the growth pole of the economic development of the urban agglomeration, the central city’s research on the agglomeration effect is very important to the development of the urban agglomeration.

- (1) The degree of agglomeration of producer services in the central city of the “Beijing-Tianjin-Hebei” is the highest among the three major urban agglomerations, followed by the “Yangtze River Delta” and the “Pearl River Delta”. The three urban agglomerations should make full use of the advantages of industrial agglomeration to make balanced development of various industries.
- (2) The higher the degree of industrial agglomeration in the central city, and it is easy to make a bigger difference with the surrounding cities. We should further

strengthen the inter-city linkages, reduce the differences between cities, and achieve the coordinated development of urban agglomeration state.

- (3) The development of urban agglomeration needs to pay attention to the agglomeration function of the central city. “Beijing-Tianjin-Hebei” should make full use of the prominent central city status of Beijing, focusing on the development of regional economic growth pole cities. “Yangtze River Delta” should improve the central city’s radiation driven role of the surrounding cities. “Pearl River Delta” should make good use of the advantages of balanced development of cities.

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