National Accounting Review

NAR, 3(1): 69–85.
DOI: 10.3934/NAR.2021003
Received: 05 November 2020
Accepted: 15 January 2021
Published: 25 January 2021

http://www.aimspress.com/journal/NAR

*Research article*

# The unbalanced development and trends of China's regional tourism

**Yuyi Huang, Qian Guo and Manxiang Xiao***

School of Information, Beijing Wuzi University, Beijing, China

* **Correspondence:** Email: 1902020801@bwu.edu.cn.

**Abstract:** In this paper, taking the per capita tourism revenue of the administrative units of Chinese mainland from 2007 to 2018 as an indicator, we analyze the unbalanced regional tourism growth in Chinese mainland and its trends by using kernel density estimation (KDE), the Gini index, and exploratory spatial data analysis (ESDA). The results demonstrate that (1) the distribution of regional tourism data in Chinese mainland and its four economic regions tends to converge, and the relative difference in tourism development among cities is slowly decreasing. (2) The differences in regional tourism development within the four economic regions in China are different, and each part shows its own degree of decline, with the gap in regional tourism development in Western China being the largest, and that in regional tourism growth in Northeast China the smallest. The difference in regional tourism development in both East and Northeast China decreased significantly and that in Central China decreased the least. (3) Finally, the difference in regional tourism development is dominated by a positive spatial correlation. The range of high-high types has expanded, and low-high and high-low types have decreased.

**Keywords:** unbalanced tourism growth; kernel density estimation; ESDA; China's regional tourism

**JEL Codes:** L83

## 1. Introduction

As the world's largest developing country, China has become the second-largest economy since the implementation of reform and opening-up. Simultaneously, as a large country with abundant tourism resources, it also saw rapid growth in its tourism industry. On domestic tourism, the number

of China's domestic tourists increased from 524 million in 1994 to 6.01 billion in 2019, which is almost 12 times that of 1994. Domestic tourism revenue increased from 102.35 billion yuan (24.4 billion PPP US dollars)[1] in 1994 to 5725.1 billion yuan (13638 billion PPP US dollars). For international tourism, the number of inbound tourists reached 145.31 million in 2019, including 31.88 million foreigners. In 2019, international tourism revenue reached 550.3578 billion yuan (131.3 billion US dollars). China's GDP per capita in 2019 reached 70892 yuan (16887 PPP US dollars), indicating that Chinese mainland has entered a period of holiday economy. The main features of this period are that tourists are more willing to spend time and money on products and services and focus on tourist destinations' humanistic spirits (Wang et al., 2008).

The tourism development level in a region is often inseparable from its local economic development. Therefore, affected by economic development and geographical location, the tourism development levels in China's various areas are uneven. From the regional economic growth theory perspective, balanced regional tourism development means that various regions' tourism economies tend to converge (Luo et al., 2015). Therefore, differences in regional tourism development are often related to those in regional economic development. The imbalance of tourism development needs urgent corresponding improvement measures. Striking a balance in tourism growth is conducive to the coordinated development of tourism in various regions and that of regional economies.

The differences in regional economic development have always been the focus of scholars' research. Rozelle believed that rural economic structure changes from 1984 to 1989 could reduce those in the eastern coastal provinces (Rozelle, 1994). Chinese scholars often associate economic polarization with developmental differences. Ou et al. used indexes (including the Wolfson index) to analyze the regional economic differences and polarization in Jiangsu Province since the reform and opening-up based on per capita GDP (Ou and Gu, 2004). Zhao et al. used the Gini coefficient and polarization index models to measure economic development differences and polarization development of the three major urban agglomerations in Northeast China since 1990 (Zhao et al., 2011). Lu et al. used data of 355 prefecture-level administrative units across China to quantitatively analyze the evolution process and pattern of China's regional economic disparity and polarization with the Gini coefficient and KZ and ER indexes (Lu et al., 2013).

In the context of regional economic imbalance, unbalanced tourism growth has become increasingly prominent. Unbalanced development of regional tourism refers to a phenomenon that occurs under the combined effects of economic development, tourism resources, and political culture. Tourism in a city is often essential in the city's economic development (Tosun et al., 2003). Phasic research on differences in tourism development began in the 1960s. It often links tourism and economic balance together (Lv, 2019) and mainly involves comparisons among tourism resources, markets, and competitiveness, and sociology and psychology knowledge are often applied in case analyses (Han and Zhang, 2014). Pearce used civil aviation time-series data to show that geographic location has a dynamic but unsustainable impact on tourism development (Pearce, 1987). Moreover, the development

[1] The purchasing power rate parity conversion rate of 4.198 we used was derived from the OECD: https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm#indicator-chart. The data we used was taken from Statistical Communiqué of the People's Republic of China on the 2019 National Economic and Social Development: http://www.gov.cn/xinwen/2020-02/28/content_5484361.htm.

of the regional tourism economy often has spatial differences (Sarrión-Gavilán et al., 2015). Thus, when studying the unbalanced development of regional tourism, Chinese scholars often discuss it from the overall city or provincial level and explain why tourism's unbalanced development industry exists from many aspects. Zhu et al. analyzed the differences in domestic tourism demand among three major regions in China regarding supply and demand to prove that tourism development in these significant regions is closely connected with their economic development (Zhu et al., 2001). Wang and Huang concluded that the regional tourism competitiveness of Chinese mainland presents a pattern of "strong east and weak west" by using the DEA model and cluster analysis from the perspective of regional tourism competitiveness (Wang and Huang, 2014). Similarly, Liu et al. using a quality of tourism economic growth perspective, concluded that the quality of tourism economic growth is the result of the combined effects of many economic and noneconomic factors by using comprehensive index evaluation models. Moreover, the growth quality of China's tourism economy shows a significant spatial difference of "high in the east, low in the west" (Liu et al., 2016). Yang concluded that industrial agglomeration positively affects regional tourism development using dynamic panel data with provinces as a unit (Yang, 2012).

Scholars have also conducted corresponding research on the unbalanced development of tourism trend. The unbalanced development of regional tourism in China has always been changing. For example, from the perspective of the center of the tourism economy, Li and Huang have proved that various factors caused the shift of the center of the regional tourism economy in Jiangsu Province by using the center-of-gravity model (Li and Huang, 2014). Ma and Zhang, using the Gini coefficient and the center-of-gravity model and about 20 years' relevant data of 31 provinces and regions in China, have proved that a certain degree of synchronization exists between balanced tourism development and balanced economic development. However, synchronization strength will change due to regional location, and the imbalance of regional tourism development is gradually decreasing (Ma and Zhang, 2020). L. U. and Y. U., from the perspective of economic geography, with the tourism foreign exchange income of 31 provinces and regions from 1990 to 2002, using standard deviation and coefficient of variation to show that the relative difference in the provincial tourism economy tends to decrease and the absolute difference tends to increase (Lu and Yu, 2005).

Many scholars have also discussed the reasons for the reduced tourism development gap in China. Wang and Xu proved that the number of employees in the tourism industry, disposable income of urban residents, and tourism resource endowment level lead in promoting the balanced development of the tourism economy by using spatial analysis methods and club convergence (Wang et al., 2011). Wang and Chen used the two-stage nested Theil decomposition method to prove that the overall difference between China's inbound and domestic tourism was shrinking, and tourism resources, transportation accessibility, and economic development level contributed to the spatial differences in China's regional tourism (Wang and Chen, 2020). Wang et al. believed that China's inbound tourism economy tended to converge from 1996 to 2008 because of star-rated hotels and fixed asset investment (Wang et al., 2011).

In this paper, we will study the distribution characteristics and dynamic trends of regional tourism from a regional perspective using tourism and population data from 2007 to 2018.

## 2. Methods

In studying the unbalanced development and trends of regional tourism, we mainly adopt nonparametric kernel density estimation (KDE), the Gini coefficient, and spatial autocorrelation analysis. Kernel density estimation can analyze the dynamic characteristics of the distribution of tourism development. It uses the kernel function to smooth the density curve obtained from the uneven distribution to judge the index's dynamic trend, including analyzing the data distribution characteristics, the curve position, and shape changes in different years. We can also use the Gini coefficient to analyze the differences in tourism development. It calculates the ratio of the area between the line of equality and the Lorenz curve over the total area under the line of equality. This is useful in social science to analyze income distribution and poverty, and is widely used in studies on tourism (Mang and Zhang, 2020). In the spatial analysis, we mainly apply Global Moran's I and Local Moran's I. The two indexes can clearly reflect the dynamic changes in the grouping phenomenon of one indicator. Feng et al. studied how the differences in the regional economies of China changed from 2000 to 2012 by using ESDA exploratory spatial analysis (Feng et al., 2015).

### *2.1. Kernel density estimation*

The data $x_1, x_2, \cdots, x_n$ are from a continuous distribution $f(x)$. The kernel density at any point is defined as follows:

$$\hat{f}(x) = \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{x - x_i}{h}\right) \tag{1}$$

$$K(x) \geq 0, \int K(x)du = 1, \text{ and} \tag{2}$$

$$h \approx 1.06\hat{\sigma}\mathrm{n}^{-0.2} \tag{3}$$

In Equation (1), h is the bandwidth. The larger the value of h, the smoother the curve. We decided to use the Epanechnikov kernel as it is optimal in a mean square error and the loss of efficiency is small. The bandwidth adopts the Silverman variable bandwidth, and the specific form is Equation (3) (where $\hat{\sigma}$ is the sample standard deviation, n is the sample size), and the bandwidth also meets the asymptotic mean integrated squared error (AMISE). The formula variable is the log value of the city's tourism revenue per capita (total tourism revenue divided by the permanent population). Using KDE does not require including the distribution conditions of data and can reflect how the tourism industry develops. It has good statistical properties and can avoid the problems caused by the insignificant changes in the tourism revenue per capita.

### 2.2. The Gini coefficient

The Gini coefficient refers to a standard indicator used internationally to measure residents' income gap in a country or region. We use this to reflect the balance of regional tourism development. The Gini coefficient is between 0 and 1. The greater the imbalance of tourism development in a region, the greater the Gini coefficient. The smaller the imbalance of tourism development in a region, the smaller the Gini coefficient. It can be calculated as follows:

$$G = \frac{1}{2m(m-1)n} \sum_{j=1}^{m} \sum_{i=1}^{m} | x_j - x_i | \tag{4}$$

In Equation (4), G is the Gini coefficient, m is the number of cities in a region, n is the mean value of the total tourism revenue per capita in each area, and $|x_j - x_i|$ represents the absolute value of the difference between the total tourism revenue per capita of any two cities.

In this paper, we use the Gini coefficient to calculate the degree of difference among the cities of Chinese mainland and those among four economic regions in China: East, Central, Northeast, and Western China.

### 2.3. ESDA exploratory spatial analysis

From geography, spatial correlation indicates that the correlation between surface features is related to distance. Generally, the closer the distance, the more significant the correlation between surface features. In contrast, the farther the distance, the greater the dissimilarity between surface features. In this study, we conduct a spatial analysis of per capita tourism revenue from global and local autocorrelation. We use the Global Moran's I to analyze the relationship between spatial elements in the overall study area and reflect the degree of aggregation of observations of some attributes in geographic space, and its value range is [−1,1]. When Moran's I is greater than 0, the data presents a positive spatial correlation, and the larger the value is, the more obvious is the spatial correlation. When Moran's I is less than 0, it means the data presents a negative spatial correlation. When Moran's I is 0, no correlation in the space exists (Changchun et al., 2015). We use the following formulas to calculate the Global Moran's I of per capita tourism revenue from 2007 to 2018:

$$I = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} W_{ij} (X_i - \bar{X})(X_j - \bar{X})}{S^2 \sum_{i=1}^{n} \sum_{j=1}^{n} W_{ij}} \tag{5}$$

$$S^2 = \frac{1}{n} \sum_{i=1}^{n} (X_i - \bar{X})^2 \tag{6}$$

Here, $\bar{X}$ represents the average value of the sum of the tourism revenue per capita $X_i$ of all cities in the region $i$, and $W_{ij}$ is the spatial weight matrix. We adopt the Queen adjacency matrix based on the adjacency criterion and suppose that the two regions are considered adjacent as long as a vertex connectivity remains.

The local Moran's I is used to measure the spatial relationship between each region and its neighbors, and its calculation formula is as follows:

$$I_i = \frac{(X_i - \bar{X})\sum_{j \neq i}^{n} W_{ij}(X_j - \bar{X})}{S^2} \tag{7}$$

In analyzing local spatial autocorrelation, the Moran scatter plot and Lisa cluster map can describe the spatial relationship between different regions. The four quadrants of the Moran scatter plot indicate four basic types of geographical elements. The first quadrant represents the high-high (HH) type: an element is at a higher level, and its neighbors are also at a higher level. The second quadrant represents the low-high (LH) type: an element is at a lower level, but its neighbors are at a higher level. The third quadrant represents the low-low (LL) type: an element is at a lower level, and its neighbors are also at the lower level. Finally, the fourth quadrant represents the high-low (HL) type: an element is at a high level, but its neighbors are at a lower level.

### *2.4. Data sources*

We use the total tourism revenue and the permanent population data of 323 administrative units including cities in Chinese mainland from 2007 to 2018 in the calculation. Simultaneously, these administrative units are divided into four major economic regions decided by the Chinese government in 2011 relative to their economic and social development and geographic locations. Specifically, 87 administrative units were located in East, 83 in Central, 119 in Western, and 34 in Northeast China, respectively.

The abovementioned administrative unit data are derived from the China Statistical Yearbook for Regional Economy, Statistical Yearbook of China's Cities, Statistical Yearbooks of various provinces, and Statistical Bulletins of Economic and Social Development issued by cities.

## 3. Data analysis and results

### *3.1. The changing distribution of regional tourism development*

We first use KDE to study the dynamic distribution characteristics of tourism development in the cities of Chinese mainland and four economic regions from 2007 to 2018. The kernel density function value of tourism economic development of cities in Chinese mainland and the four economic regions can be calculated according to Equation (1). The paper selects the tourism nuclear density curves for 2007, 2012, and 2018 for comparison. As shown in Figure 1–5, the curve's abscissa is the logarithmic value of tourism revenue per capita, and the ordinate is the nuclear density value. Since the nuclear density curve is also a type of density curve that does not change data distribution characteristics, the kurtosis coefficient and skewness coefficient can be combined to interpret distribution shape.

As shown in Figure 1, the horizontal position of the regional tourism density curve has continuously shifted to the right, reflecting the gradual increase in the level of regional tourism development in Chinese mainland. The per capita tourism revenue's log value corresponding to the peak has increased, so a comprehensive development pattern has taken shape. From the vertical direction, the width of the curve's

peak narrows, which indicates that the difference in regional tourism development in Chinese mainland is shrinking and an apparent trend of convergence is seen. The coefficient of kurtosis increased from −0.47 to −0.11, with the curve developing from an approximate flat to sharp peak, and the data being more concentrated than in 2007. The skewness coefficient decreased from 0.09 to −0.25, from an approximately symmetrical distribution to a negatively skewed distribution, with a slight tail shifting towards the left side, indicating that the number of cities with per capita tourism revenue above the average is more than that below the average. Simultaneously, the curve presents a single-peaked distribution, and no multi-peak exists, indicating that the regional tourism industry in Chinese mainland has converged to a "monopolar" rather than "multipolar" phenomenon.

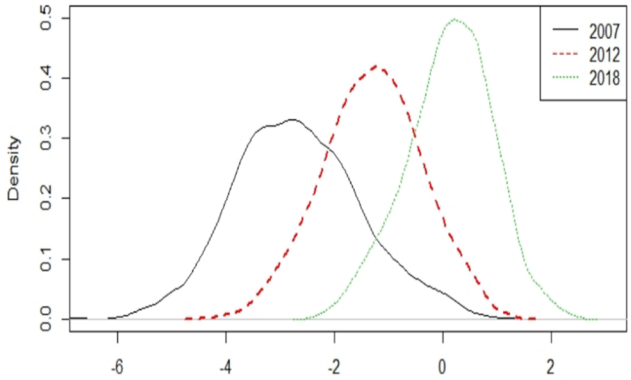


**Figure 1.** The tourism density curve of cities in Chinese mainland from 2007 to 2018.

Similar to the tourism development trend in Chinese mainland, the regional tourism core density curves in the four regions of 2007–2018 shifted right in varying degrees, indicating that the tourism development level in the four areas has gradually increased. The peak heights of curves rise, and their widths narrow, indicating that the difference in tourism development within regions decreases, indicating a noticeable trend of convergence, and with that shapes all turn into the direction of "one pole" global convergence. However, regional tourism characteristics in different regions are different: the kurtosis coefficient of regional tourism in East China has increased from −0.12 to 0.02 from 2007 to 2018, respectively. It is greater than the average counterpart of Chinese mainland and other regions, indicating that eastern cities' data are highly concentrated and more convergent than those of any other area. The skewness coefficient increased from −0.26 to −0.07, indicating that the curve distribution's asymmetry has lessened, and data distribution being symmetrical. Therefore, more cities have per capita tourism revenue close to the average. Although cities in Central China are generally developing towards convergence, a divergence trend occurred after 2012. Figure 3 shows that the peak height first rises and then decreases, the width first narrows and then widens, and its coefficient of kurtosis increased from −0.61 to 0.09 in 2007 and 2012, respectively, and then dropped to −0.56 in 2018. Its skewness coefficient changed from 0.24 to −0.24 (right-skewed to left-skewed distribution) indicating that the number of cities with per capita tourism revenue below the average has decreased. Tourism in western cities has been developing in the direction of convergence, with peak heights becoming higher and narrower. The coefficient of kurtosis also changes from −0.56 to −0.04, so the data is a more concentrated distribution with its peak becoming sharper than that in 2007. Its coefficient of skewness

has decreased, indicating that the number of cities with per capita tourism revenue lower than the average has reduced, and the number is roughly equal to that of the cities above the average. The tourism industry in Northeast China has been developing in the direction of convergence, with the width of the curve peak height narrowing. The coefficient of kurtosis was always negative, which indicates that Northeast China's tourism data distribution is relatively scattered. However, the absolute value of kurtosis' coefficient has a decreasing trend, meaning that the data is developing in a centralized direction. The left-skewed distribution in Figure 5 shows that the absolute value of the skewness coefficient becomes more extensive than that of 2007, which means that skewness is intensified and that more cities than before in the region with per capita tourism revenue are higher than the average.

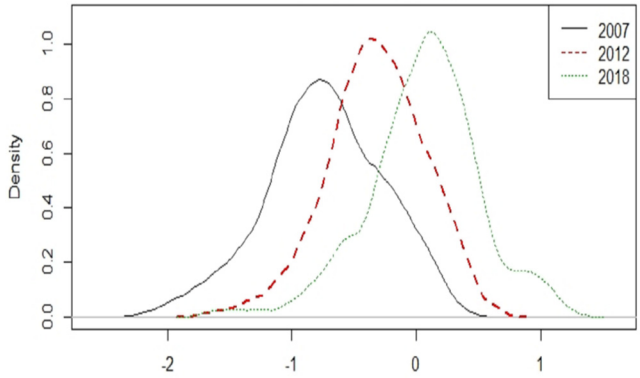


**Figure 2.** The tourism density curve of cities in East China from 2007 to 2018.

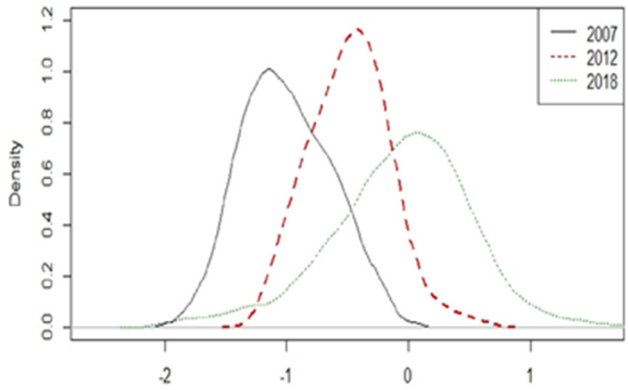


**Figure 3.** The tourism density curve of cities in Central China from 2007 to 2018.

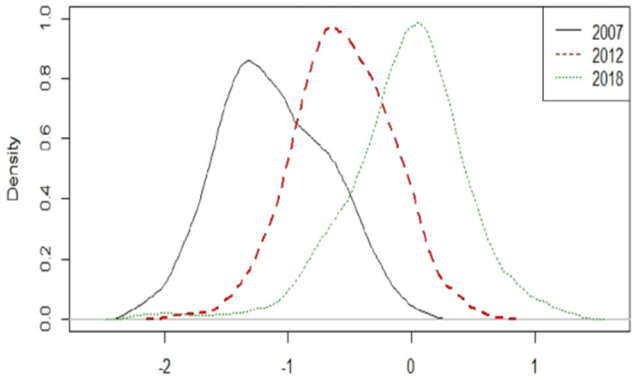


**Figure 4.** The tourism density curve of cities in Western China from 2007 to 2018.

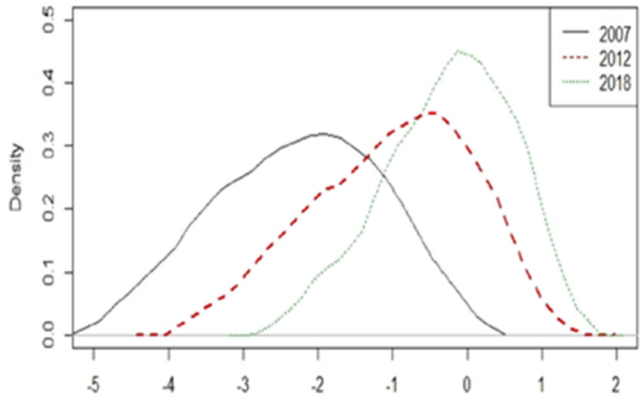


**Figure 5.** The tourism density curve of cities in Northeast China from 2007 to 2018.

### *3.2. The changes in the Gini coefficients of China's regional tourism*

Based on relevant data and Equation (4), we calculate the Gini coefficients of tourism in Chinese mainland and four major regions across the country separately from 2007 to 2018, and the data are plotted in Figures 6 and 7. It can be seen from Figure 6 that the Gini coefficient of tourism in Chinese mainland fluctuated widely, from 0.526 to 0.402 in 2007 and 2018, respectively. This is a 24% decrease, and 0.402 is close to the warning level set by the United Nations. It can indicate that overall, regional tourism development in the Chinese mainland has improved. On changing trends, except for a slight increase in the Gini coefficient from 2016 to 2017, the coefficient has been on a downward trend, indicating that the difference in regional tourism development gradually shrinks across Chinese mainland.

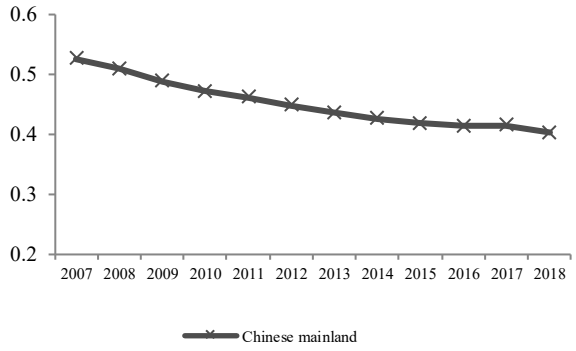


**Figure 6.** The tourism Gini coefficient of cities in Chinese mainland from 2007 to 2018.

Figures 7 to 11 present the Gini coefficients of tourism in the four regions, respectively, and these are compared in the former. In line with the trend of changes in the Gini coefficient of regional tourism in Chinese mainland, the Gini coefficients of tourism in the four regions also show a downward trend. This indicates that the differences in tourism within cities in different areas are getting smaller and smaller. However, cities in different regions have different characteristics: the Gini coefficients of tourism in eastern and central regions have almost always been between those of the western and northeastern regions, which indicates that the gap in tourism development within the central and eastern regions is narrower than that of Western China and broader than that of Northeast China. From the changing trend, the Gini coefficient of tourism in eastern cities declined the largest, from 0.507 to 0.391, a decline of 23%, indicating that the difference in tourism development in East China has narrowed the most. In Central China, the Gini coefficient of regional tourism has the smallest decline, representing a slight improvement in the degree of difference in tourism development. The coefficient in the western region is at a relatively high level generally, which means that the development of regional tourism in the area is relatively unbalanced. The coefficient of Western China was always on the decline, with a 20% decrease, except for a slight increase from 2014 to 2015. Finally, the Gini coefficient of Northeast China has always been at the lowest level compared with the other three counterparts, indicating that the difference in regional tourism development here is the smallest. From the perspective of the changing trend, the Gini coefficient of tourism in Northeast China has dropped by 21%, and a considerable drop occurred in 2014–2015, which is a slight increase from 2017 to 2018.

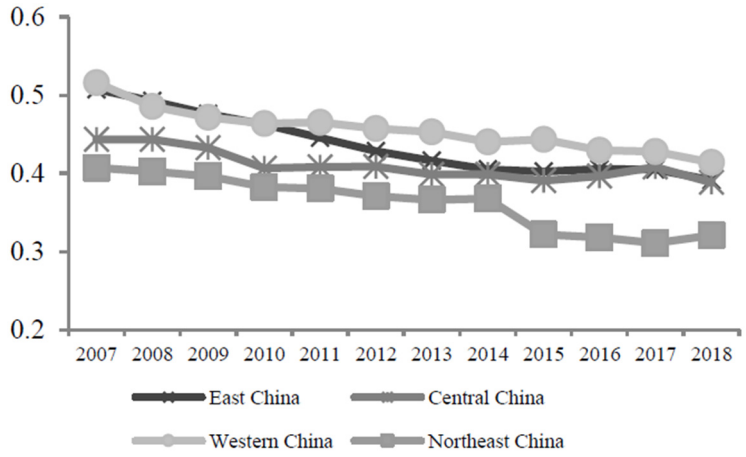


**Figure 7.** The Gini coefficients of tourism in the four economic regions of Chinese mainland from 2007 to 2018.

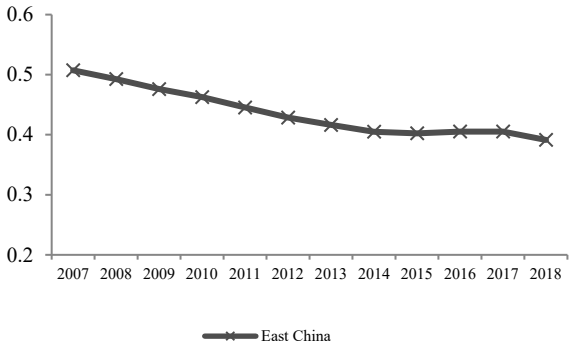


**Figure 8.** The Gini coefficient of tourism of cities in East China from 2007 to 2018.

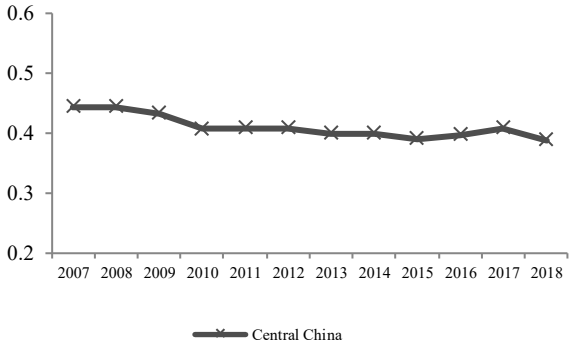


**Figure 9.** The tourism Gini coefficient of cities in Central China from 2007 to 2018.

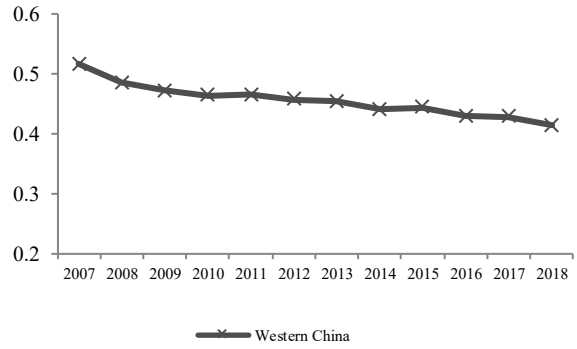


**Figure 10.** The tourism Gini coefficient of cities in Western China from 2007 to 2018.

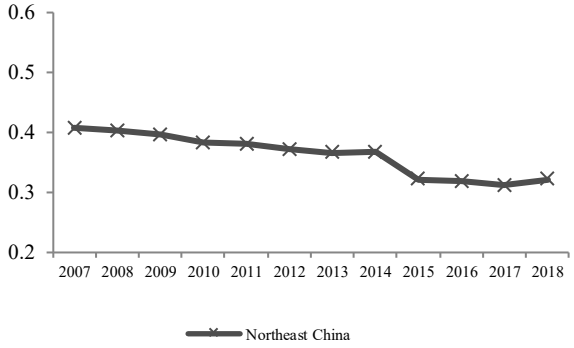


**Figure 11.** The tourism Gini coefficient of cities in Northeast China from 2007 to 2018.

### *3.3. The spatial correlation of regional tourism differences*

We use both Global and Local Moran's I to study the spatial correlation of regional tourism differences in Chinese mainland, with administrative units including districts, cities, autonomous prefectures, and leagues as the primary spatial units (some western units are not included in the analysis due to missing data). After using Geoda to calculate the Global Moran's I of 318 units in Chinese mainland from 2007 to 2018, we find that the Global Moran's I value is between 0.173 and 0.285, and it shows a downward trend. Thus, the per capita tourism revenue in Chinese mainland always exhibited a positive spatial autocorrelation from 2007 to 2018. Tourism development with cities as the unit is becoming less and less agglomerated, and per capita tourism revenue tends to be increasingly random in the spatial pattern.

The LISA cluster results of administrative units at the prefecture level and above are shown in Figures 12 and 13. The types of associations are dominated by the HH type and the LL one. HH types are concentrated in the coastal cities of China. LL types are concentrated in Central China, and a few cities appear in the northeastern region. A few cities of LH and HL types are scattered. In 2007, 66 cities had local spatial autocorrelations, wherein 16 were HH types, 36 were LL types, 19 were low-high types, and five were types of HL, which accounted for 24.2%, 54.5%, 28.8%, and 7.5%, respectively. In 2018, 60 cities had local spatial autocorrelations, of which 16 were HH types, 36 were LL types, 4 are LH types, 4 are HL types, which accounted for 26.75%, 60%, 6%, and 6%, respectively. Compared with the year 2007, a slight decrease in the statistically related

cities in space occurred in 2018, especially among cities of LH and HL types, but cities of HH and LL types did not change in quantity.

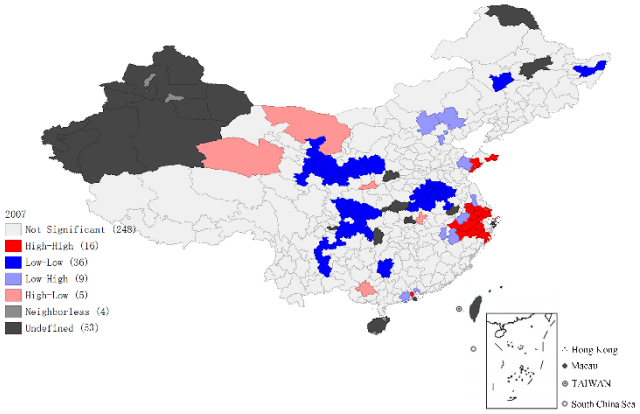


**Figure 12.** The LISA cluster map for per capita tourism revenue in 2007.

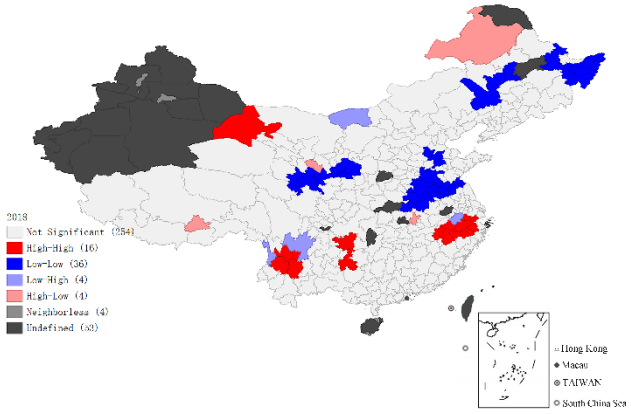


**Figure 13.** The LISA cluster map for per capita tourism revenue in 2018.

In 2007, HH cities were mainly concentrated in Shanghai, the Shandong Peninsula, Sanya City, and other coastal provinces of Jiangsu and Zhejiang. These regions are home to rich tourism resources, convenient transportation, and high tourism development levels. The other cities surrounding them enjoy a relatively high tourism development levels. LL types are mainly distributed in the central, western, and northeast regions, such as the cities of Nanchong and Dazhou in Sichuan Province, Qingyang and Baiyin in Gansu Province, and Shuangyashan in Heilongjiang Province. These regions and the surrounding areas have relatively low tourism development levels. The cities of LH types are relatively scattered but are mainly distributed in third- and fourth-tier cities in East China. Those cities enjoy low tourism development levels, with their surrounding cities enjoying high tourism development levels. The HL

types are concentrated in Qinghai Province and the Alxa League in Inner Mongolia, Nanning City in the province of Guangxi, and Wuhan City in the province of Hubei, indicating that the tourism development level in these areas is high, but that in their surrounding cities is low.

The spatial change in the city's per capita tourism revenue could also reflect the decline in the differences in regional tourism development in Chinese mainland. Compared with 2007, the number of HH cities in 2018 decreased in East China but increased in the central and western regions. The HH cities spread from the eastern coastal areas to Jiuquan City in Gansu Province and Lijiang City in Yunnan Province in the west. Qingdao City no longer belonged to the HH type, indicating that the tourism development level in the western region has relatively improved. The number of cities belonging to the LL type decreased in the central and western regions but increased in the eastern and northeastern regions, indicating that tourism development in the eastern and northeastern regions has slowed down. For example, the LL type in Chongqing City disappeared, and the LL types appeared in Tongliao City and Yichun City; the HL types only moved from Qinghai Province and Alxa League to Hulunbuir City in the Inner Mongolia Autonomous Region. The number of LH and HL types has dramatically reduced from a total of 14 cities in 2007 to 8 cities in 2018, a reduction of 42.9%, with the number of LH types reducing from 9 to 4, with the exception of Xuancheng City. Because the LH and HL cities that decreased from 2007 to 2018 are mainly located in the central and western regions, it can show that the difference in tourism development between Central and Western China has declined.

## 4. Reasons for the narrowing of the regional tourism gap in Chinese mainland

The following aspects can explain the narrowing of the regional tourism gap in Chinese mainland. One of the main reasons is the changes in economic differences among regions. From 2007 to 2018, the economies of various regions in the Chinese mainland have developed rapidly, and regional economic growth tends to be balanced; therefore, the level of differences in tourism development has also decreased. From 2003 to 2018, the proportion of the eastern and northeastern regions in the national GDP declined from 55.16% and 9.12% to 52.58% and 6.21%, respectively. The GDP proportion in the central and western regions in the national GDP has shown a slow upward trend, from 18.54% and 17.18% to 21.06% and 20.15%, respectively (Niu and Yang, 2020).

In addition, the increase in leisure time and per capita disposable income has also provided conditions for increased Chinese residents' tourism consumption.

With China's holiday system evolution, people began to spend more time putting themselves in travel. After 2007, all Chinese citizens' holidays (plus weekend rest days) reached 115.3 days, with the average vacation time in a year almost reaching 1/3 of a year (Xie and Duan, 2013). In 2018, although the number of holidays for Chinese citizens did not change much, paid leave and welfare systems have improved, and people would prefer pursuing spiritual enjoyment, no longer wanting to work overtime on holidays for extra money. In 2007, the per capita disposable income of urban and rural residents in China was just 13,786 yuan (3305 PPP US dollars)[2] and 4,140 yuan (986 PPP US dollars), but these two figures were 39,250 yuan (9349 PPP US dollars) and 14,617 yuan (3482 PPP

[2]The data comes form Statistical Communiqué of the People's Republic of China on the 2007 and 2018 National Economic and Social Development.

US dollars) by 2018, with growth rates of 185% and 253%, respectively, indicating that the per capita disposable income of Chinese residents has increased rapidly. With more money and leisure time, Chinese people are more willing to travel.

Simultaneously, relying on the superior natural environment and cultural tourism resources, the tourism industry in China's central and western regions has achieved rapid development and overall rise. In addition, with the improvement of infrastructure in Central and Western China and the development of the tourism economy, many Chinese people no longer travel long distances to traditional tourist cities during short vacations of 2 or 3 days but prefer to spend their holidays nearby. According to the 2007 Statistical Bulletin of China's Tourism, cities with high rankings in the number of receiving tourists and international tourism revenue include traditional tourist cities such as Shanghai and Beijing. The two cities' tourism revenue has risen by 151% and 180% from 2007 to 2018. The growth rates of the number of tourists were 220% and 118%, respectively[3]. By 2018, some central and western tourist destination cities emerged, such as Lanzhou and Jiuquan City in Qinghai Province. Here are the world-famous Zhongshan Bridge, Wuquan Mountain Park, and Dunhuang Mogao Grottoes. In the Chengdu City of Sichuan Province, Dujiangyan and Chengdu Research Base of Giant Panda Breeding can attract a large number of tourists. From 2007 to 2018, Chengdu, Jiuquan, and Lanzhou saw increases of 794%, 1748%, and 2280% in tourism revenue and 454%, 1106%, and 1422%, respectively. These emerging cities are all greater than traditional tourist destination cities in the growth rates of tourism revenue and in tourist arrivals, showing that Chinese residents' tourist destination cities have changed from economically developed eastern coastal areas to central and western cities with rich tourist resources and local characteristics.

## 5. Conclusions

Regional tourism development is unbalanced because of various reasons. The tourism development level in a region is often inseparable from its economic development. Therefore, different regional economy levels lead to the uneven development of regional tourism in Chinese mainland. Overall, cities in Western China are more economically disadvantaged than those in East China. In addition, because of different geographic conditions, the four economic regions differ in their transportation conditions. East China, enjoying more convenient and efficient transportation conditions with a higher degree of modern civilization, is home to large cities, large buildings, and manmade tourism resources, making it more attractive than Western China to tourists from home and abroad.

The Chinese government should prioritize the development of the economies of Middle and Western China to strike an economic balance among the four economic regions. If citizens in the four regions have roughly the same level of disposable income, people in less-developed regions would spend as much money on traveling as those in economically developed regions, and tourist spots in Western and Central China would attract larger numbers of people, close to those in Eastern China. Infrastructure is the foundation wherein tourism development is built on, so local governments in Western and Central China should accelerate their own infrastructure development. They should fully utilize the opportunities provided by China's Western Development Drive—a

[3]The data we used in the calculation comes from 2007 Statistical Bulletin of China's Tourism and 2018 Statistical Bulletin of China's Tourism.

policy proposed by the Chinese government for attracting foreign and domestic investment and promoting rapid tourism development.

In this paper, we analyzed the differences and trends of regional tourism development in Chinese mainland from 2007 to 2018 and proved that the imbalance of tourism development in administrative units in Chinese mainland is gradually shrinking. We also explained the potential reasons for reducing regional tourism differences by using kernel density estimation, Gini coefficient, and exploratory spatial data analysis. The reduction of regional tourism differences in Chinese mainland can be explained by economic development, tourism conditions, and changes in residents' concepts.

First, there has been a long-term imbalance in regional tourism development in Chinese mainland and the four major regions separately, and the relative difference in regional tourism development has presented a downward trend.

Second, unbalanced tourism economic growth in China's four major economic regions has decreased with corresponding characteristics, and internal differences of regional tourism development within each area are quite different.

Third, the spatial correlation of tourism differences at the prefecture level and above is dominated by positive correlation and, the distribution range of the HH has expanded and that of the LH type decreased. The range of HL and LL cities has changed.

Finally, the shrinking economic gap in the four economic regions of Chinese mainland, the increase in leisure time and disposable income, and the rise of the tourism industry in the central and western areas are the reasons for reducing regional tourism development differences.

## Conflict of interest

All authors declare no conflicts of interest in this paper.

## References

Feng CC, Zeng ZR, Cui NN (2015) The temporal and spatial evolution of China's regional economic differences since 2000. *Geogr Res* 34: 234–246. [Article in Chinese].

Han BN, Zhang JJ (2014) A review of foreign regional tourism differences. *Human Geogr* 29: 21–28. [Article in Chinese].

Liu J, Wang J, Xi YD (2016) The evolution of the spatial pattern of China's tourism economic growth quality. *Bus Manage J* 38: 160–173. [Article in Chinese].

Li RY, Huang CZ (2015) The evolution pattern and driving mechanism of the center of the tourism economy in Jiangsu Province. *Areal Res Dev* 34: 93–99. [Article in Chinese].

Lu L, Yu FL (2005) A study on the spatial characteristic of the provincial difference of tourism economy. *Econ Geogr* 25: 406–410. [Article in Chinese].

Lu H, Ou XJ, Li X, et al. (2013) Space-time analysis of the regional economic inequality and polarization in China. *Econ Geogr* 33: 15–21. [Article in Chinese].

Luo ZS, Lin BS (2015) Research on the evolution characteristics and convergence of the tourism economy in Henan Province. *J Arid Land Resour Environ* 29: 197–202. [Article in Chinese].

Lv Z (2019) Deepening or lessening? The effects of tourism on regional inequality. *Tourism Manage* 72: 23–26.

Ma LJ, Zhang JF (2020) The impact of regional tourism development spatial differences on the balance of economic development. *Econ Geogr* 40: 197–203. [Article in Chinese].

Niu SH, Yang MY (2020) China's regional economic gap changes and policy adjustment suggestions. *Reg Econ Rev*, 37–43. [Article in Chinese].

Ou XJ, Gu CL (2004) Quantitative analysis of regional economic polarization and dynamical mechanisms in Jiangsu Province. *Acta Geogr Sinica* 59: 791–799. [Article in Chinese].

Pearce DG (1987) Mediterranean charters—a comparative geographic perspective. *Tourism Manage* 8: 291–305.

Rozelle S (1994) Rural industrialization and increasing inequality: Emerging patterns in China's reforming economy. *J Comp Econ* 19: 362–391.

Sarrión-Gavilán MD, Benítez-Márquez MD, Mora-Rangel EO (2015) Spatial distribution of tourism supply in Andalusia. *Tourism Manage Perspect* 15: 29–45.

Tosun C, Timothy DJ, Öztürk Y (2003) Tourism growth, national development and regional inequality in Turkey. *J Sust Tourism* 11: 133–161.

Wang QA, Ma YF, Wang LF (2008) A discussion on the new trend of my country's tourism development in the early 21st century. *Soc Sci,* 92–94, 98. [Article in Chinese].

Wang QY, Huang YY (2014) Dynamic analysis of China's urban tourism competitiveness. *Inquiry Into Econ Issues*, 167–172. [Article in Chinese].

Wang SX, Wang XD, Xu JW (2013) Research on the spatial change trend and influencing factors of the tourism economy in the western region. *Tourism Sci* 26: 55–67. [Article in Chinese].

Wang DG, Chen T (2011) A spatial analysis of regional differences in China's tourism economy. *Scientia Geogr Sinica* 3: 528–536. [Article in Chinese].

Wang S, He Y, Wang X, et al. (2011) Regional disparity and convergence of China's inbound tourism economy. *Chinese Geogr Sci* 21: 715–722.

Xie WY, Duan HB (2013) Research on my country's Current Holiday System. *J Sichuan Normal Univ* 40: 49–57. [Article in Chinese].

Yang Y (2012) Agglomeration density and tourism development in China: An empirical research based on dynamic panel data model. *Tourism Manage* 33: 1347–1359.

Zhao YH, Xiu CL, Jiang B, et al. (2010) Polarization development of three urban groups in Northeast China since 1990. *Econ Geogr* 30: 738–743. [Article in Chinese].

Zhu JJ, Ding DS, Han NS (2001) An analysis of the Regional Imbalance of China's Tourism. *Human Geogr*, 27–30. [Article in Chinese].


AIMS Press