

## The research on the evolution of economic disparity among counties in Chengdu-Chongqing economic zone

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**Abstract:** On the economic evolution of Chengdu-Chongqing economic zone in 2001, 2007 and 2013, the economic trend of this zone can be explored. The agglomeration has been proved to belong to dual-core cities, indicating the spatial agglomeration and significantly economic autocorrelation. The high spatial autocorrelation areas mainly gather at the region of Chengdu province and Chongqing city while the low areas mainly gather at northern part.

**Keywords:** regional economic evolution; ESDA; Moran's I; spatial autocorrelation.

### INTRODUCTION

Regional economic disparity refers to the ratio of each country's overall level of economic development of the phenomenon of unequal region [1]. In recent years, as the rapid expansion of the scale of economic, the economic disparity grows larger across inter-regions, which has become the serious issue in contemporaneous society and gets lots of attention from the academic community. Therefore analyzing the regional economic evolution is of great importance to enhance regional economic development and economic competition [2].

The research methods mainly include two types: traditional regional economic evolution measurement and research based on ESDA (Exploratory Spatial Data Analysis). The former part mainly employs the standard deviation, coefficient of variation, Theft index and Gini coefficient to focus on the certain evolution. But the practical and theoretical correlation of regional development shows that both diffusing effects and polarization effects exist in these certain areas, which can narrow or enlarge the disparity [3]. The traditional spatial disparity measurement lacks spatial perspective, making it hard to reflect the regional spatial disparity variations [4]. The latter approach is a combination of a series of spatial data analyzing technologies, regarding the spatial autocorrelation as the core value and revealing the interaction system [5] by interpreting and visualizing the spatial pattern and investigating the spatial agglomeration. Many scholars have achieved substantial results about economic development disparity in counties with ESDA technology.

This paper employs the GDP per capital to analyze the revolution of economic competitiveness in Chengdu-Chongqing economic zone and explores the driving force of spatial evolution.

### RESEARCH AREAS AND DESIGN

#### Research target and data selection

To explore economic development in counties, 118 counties of 13 different areas can be selected as the research units. The Chengdu-Chongqing economic area consists of two parts. The first part includes 14 prefecture-level cities in the Sichuan province, such as Chengdu city, Mianyang city and etc. The other part includes 23 counties in Chongqing city, such as Dadukou district and Fulin district and etc. These data come from Sichuan province statistical yearbook and Chongqing city statistical yearbook in 2001, 2007, 2013, and these boundary data come from national information center database.

### RESEARCH DESIGN

Mainly use spatial autocorrelation to analyze the spatial economic relationship in Chengdu-Chongqing economic zone. Spatial autocorrelation analysis tests whether the observed value of a variable at one locality is significantly dependent on the values of the same variable at neighboring localities [6], which determine whether one subject is prominently related to its neighborhood spatial unit [7]. The global spatial autocorrelation and local spatial autocorrelation will be introduced in the following paper.

#### Global spatial autocorrelation

Moran's I and Geary's C indexes are used to examine whether economic variables have global

spatial autocorrelation effect. In comparison, Moran's I tends to be easier to measure the distribution characters, enables to reflect the comparison between variables in neighborhood area units. Moran's I value changes from -1 to 1, the negative value means its spatial negative correlation.

**Local spatial autocorrelation**

Global spatial autocorrelation is applied to explore the spatial distribution of homogeneous area attributes while local spatial autocorrelation enables to explore the spatial distribution of heterogeneous area attributes. We employed "Local Indicators of Spatial Association" (LISA) in this paper.

**Features of spatial economic**

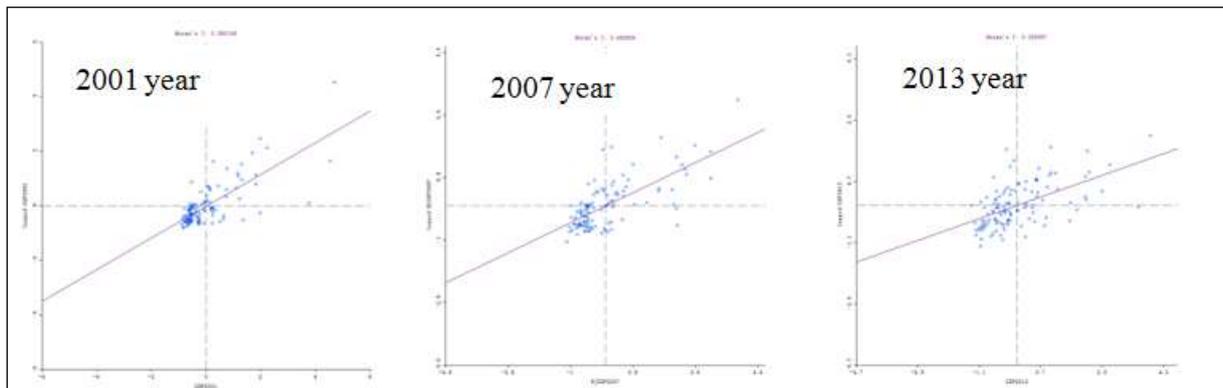
**Graph-1: Global spatial autocorrelation analysis**

Indicat or Year	Moran's I coe.	Z-Statistic	Prob.
2013	0.3539	6.3404	0.002***
2007	0.4828	8.8252	0.001***
2001	0.5802	10.5255	0.001***

Through Geoda's calculating, the value of Moran's I is 0.5802, 0.4828 and 0.3529 in 2001, 2007 and 2013

and the value of Z is 10.5255, 8.8252 and 6.3404, all pass the significance test ( $P \leq 0.05$ ). The value of Moran's I is positive, indicating there is spatial agglomeration in Chengdu-Chongqing economic zone. Also the value of Moran's I that economic autocorrelation is rather higher in Chengdu-Chongqing economic zone than other provinces. In these three different years, the value decreases as the pass of time series, denoting the increasing economic development disparity between counties in this area.

The value of Moran's I reflects the global feature of this area, but it cannot reflect the heterogeneous spatial distribution relations between one area and its neighborhood. The Moran scatterplot can be divided into four quadrants; each quadrant reflects different kinds of spatial relation. The first quadrant is High-High areas, which reflects that has little disparity with itself as well as its neighborhood areas. The second quadrant is Low-High areas, which means the area has huge disparity in itself but little with its neighborhood areas. The third quadrant is Low-Low areas, which means the area has huge disparity in itself and with its neighborhood areas. The fourth quadrant is High-Low areas, which means the areas have little disparity in itself but huge disparity with its neighborhood areas.



**Fig-1: Scatterplot of Chengdu-Chongqing economic zone in 2001, 2007 and 2013**

Graph 1 is the Moran scatterplot of Chengdu-Chongqing economic zone in 2001, 2007 and 2013. From the graph, in the three years, the quantity of the first and third quadrants counties all exceed that in the second and fourth quadrants, which indicates the development disparity in this area is narrowing down. Meanwhile, as time goes on, the scatterplot spread gradually, which indicates the same type areas in Chengdu-Chongqing economic zone has weaker concentration effect.

**Local spatial autocorrelation analysis**

The Moran scatterplot reflects the global spatial autocorrelation between different neighborhood

counties, while LISA agglomeration graph measures local spatial agglomeration intuitively. Using Geoda analysis software to calculate the LISA value of economic disparity between counties in 2001, 2007 and 2013 and draw the LISA agglomeration graph.

From the LISA agglomeration, we can draw the distribution graph of GDP per capita disparity in the economic zone. Though in these three years the economic development level in these counties show significantly agglomeration, showing the different change of the features.

The following three graphs indicate the High-High areas locating in Chengdu city and Chongqing city, showing that these areas have high level of economic development, indicating huge potential and dual-core developing pattern. Low-Low areas mainly locate at distant counties like Suining, Dazhou and Nanchong, which are far from the developed areas and have poor traffic infrastructures and low income. To be specific, the High-High areas in Chengdu are reducing and moving towards to eastern areas, enhancing the agglomeration effect in Chengdu city. In the Meanwhile, as the Chengdu-Chongqing economic zone becomes national level agglomeration, the economic

communication becomes more frequently, driving the High-High areas to the center of the economic zone. Also, with the implement of the strategy of overall opening up to the outside world, Chongqing city generated lots of High-High areas.

Through local spatial autocorrelation analysis, due to environment, location, history and etc., the northern part of the economic zone always includes the undeveloped areas and other areas have unsteady spatial agglomeration. Generally speaking, the areas' disparity is becoming stronger.

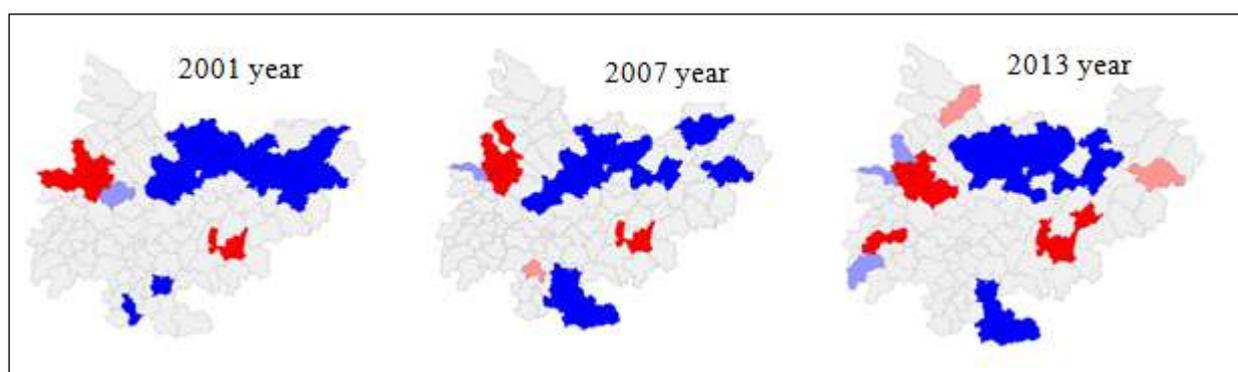


Fig-2: LISA map of Chengdu-Chongqing economic zone in 2001, 2007 and 2013

## CONCLUSION

This paper employs the spatial exploratory methods to analyze the economic disparity between counties from Chengdu-Chongqing economic zone in 2001, 2007 and 2013, studied the spatial evolution system and trend of regional economic development in this areas. The conclusion can be drawn as follows: in these three years, the values of Moran's I tend to be all positive and big. It shows spatial agglomeration features and significantly spatial autocorrelation in the country's economic; the value of Moran's I is decreasing as time series passing by, which indicates the autocorrelation between the counties are becoming smaller. The northern part is far from developed area and need further explorations and constructions.

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