

## Population Mobility Model & Floating Growth Spatial Types and Their Influencing Factors in Southwest China

Xiangyun Dong, Xiaohan Jiang

Yunnan Normal University, Kunming, Yunnan 650500, China

**Keywords:** Population mobility model; Floating growth spatial type; Floating population; Southwest China

**Abstract:** As a social and economic phenomenon, population mobility is an important indicator of the continuous advancement of urbanization and modernization; it is not only an inevitable outcome of the market economy, but also has a profound impact on economic and social development. Studying the mobility model, spatial agglomeration characteristics and influencing factors of floating population is of great significance for rationally predicting and planning the future population mobility pattern and promoting the positive interaction between urban and rural areas. On the basis of summarizing and analyzing previous research works, this paper applies spatial autocorrelation test method, exploratory spatial data analysis technology and spatial statistical analysis software to study the population mobility model and population growth spatial type in southwest China and proposes the influential factors of population mobility in this region. The results show that the population in the southwestern region has a positive effect on the migrations of the inter-provincial population mobility and the greater the difference between the population of the outflow and the inflow lands, the greater the intensity of the population mobility between them, that is, There is a potential difference between regions, and the region with a large population has the potential to move to regions with small populations. The study results of this paper provide a reference for further research on population mobility in southwest China.

### 1. Introduction

Population has always been one of the most important factors in regional development; and whether it has order mobility or reasonable distribution directly affects the coordinated development of this region. Whether the main functional area planning that is currently being promoted can achieve the expected results depends on whether the population spatial redistribution is reasonable. The policy proposes to foster an important growth pole that promotes balanced development of land and space and leads regional economic development; at the same time, it enhances the population economic agglomeration capacity of small and medium-sized cities and small towns within the urban agglomeration, and guides the population and industry from the main city of the mega city to the surrounding areas and other cities. The transfer and the promotion of the central city's radiation-driven function, focus on the development of small towns, and promote the coordinated development of large, medium and small cities and small towns. Its essence is also to guide the orderly population mobility through urbanization construction and achieve a rational distribution. The rational distribution of population affects the equalization of basic public services. In view of these, it is important to study the trend and influencing factors of population spatial mobility in the Southwest China, accurately grasp the spatial distribution pattern of the future population, and achieve balanced development of population regional distribution and resources, environment, economy and society. It is important for building beautiful southwest, promoting regional harmony and realizing economic development [1].

In recent years, many scholars have discussed issues related to rural labor transfer and floating population. The research content mainly involves the spatial distribution and evolution of population, the spatial pattern and characteristics of population migration, the spatial pattern and motivation of migrant population, the pattern of migration and its economic development. The relationship between the factors affecting the floating population mainly includes population size

and economic development level, income level, regional difference, education level with research scales include national, provincial, and provincial capitals. However, there is relatively little discussion on the relationship between the nature of the inflowing city and the floating population. There are also existing literatures on the factors affecting the spatial distribution of floating population from the aspects of population factors, natural geographical factors, social development level, economic development level and urbanization level [2].

On the basis of summarizing and analyzing previous research works, this paper applies spatial autocorrelation test method, exploratory spatial data analysis technology and spatial statistical analysis software to study the population mobility model and population growth spatial type in southwest China and proposes the influential factors of population mobility in this region; the study results of this paper provide a reference for further research on population mobility in southwest China. The detailed chapters are organized as follows: Section 2 introduces the population mobility model in Southwest China; Section 3 describes the spatial types of population mobility growth; Section 4 analyzes the influencing factors of population mobility; and Section 5 is conclusion.

## 2. Population Mobility Model in the Southwest China

Spatial autocorrelation refers to the potential interdependence of observations of some variables in the same distribution. The statistic for spatial autocorrelation is commonly used by Moran's I. The key difference between spatial autocorrelation statistics and traditional geographic statistics is the introduction of spatial weight matrices; Moran's I formula is defined as [3]:

$$I = \frac{n \sum_i \sum_j w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_i \sum_j w_{ij} (x_i - \bar{x})^2} = \frac{\sum_i \sum_j w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{s^2 \sum_i \sum_j w_{ij}} \quad (1)$$

Where n is the sample size,  $x_i$ ,  $x_j$  are the observed values of the spatial positions i, j, and  $w_{ij}$  represents the neighboring relationship of the spatial positions i, j. When i and j are spatially close,  $w_{ij}=1$ , otherwise  $w_{ij}=0$ .

The western China has the most sparsely populated area, but the eastern part of Sichuan is a relatively dense area of the area; the sex ratio in this area is 2.06, which is much higher than the national average; the temporary residence time is 61% in January-Year, which is higher than the national level. The average is 57%; the proportion of floating population in the province is as high as 63%, which is much higher than the average of provinces, districts and cities. In Yunnan, Chengdu and Kunming are the areas where the floating population gathers; the sex ratio is 2.1, which is much higher than the national average; the temporary residence time is less than 29%, which is much higher than the national average. The number is 21%; the floating population outside the province accounts for 51%, much higher than other provinces in the west [4]. The Southwest economic zone (Sichuan, Chongqing, Yunnan, Guizhou) and the Tibetan economic zone (Xinjiang and Tibet) have become the areas where the floating population network is more concentrated.

In the southwestern region, small towns at county-level cities, counties, and below are basically in a state of population stagnation or negative growth. The urbanization model is mainly urbanization caused by internalization, that is, farmers migrate from rural areas in the city to the same city. Moreover, it is also learned from the survey of farmers that the older the person chooses the local desire, the stronger the desire is. This is the urbanization model chosen by middle-aged and elderly people in rural areas. Therefore, for small and medium-sized cities in the southwestern region that do not have economic charm and can not attract a large number of external populations, only such internal urbanization is the main source of urbanization, and urban development strategies that seek to attract external populations are there may be a lack of rationality.

## 3. Floating Growth Spatial Types in the Southwest China

The spatial autocorrelation analysis can only understand the spatial agglomeration characteristics of things as a whole, but it is difficult to accurately understand whether there are further

agglomerations and differences within each space, and some heterogeneous regions may appear in local areas. Therefore, this paper further explores the distribution of high-value clustering and low-value clustering of the social integration of migrants through hotspot analysis methods; the calculation formula of hotspot analysis is as follows [5]:

$$G_i^* = \frac{\sum_{j=1}^n W_{ij} x_j - \bar{x} \sum_{j=1}^n W_{ij}}{S \sqrt{\frac{n \sum_{j=1}^n W_{ij}^2 - \left( \sum_{j=1}^n W_{ij} \right)^2}{n-1}}} \quad (2)$$

Where  $w_{ij}$  represents the weight of the degree of influence between spatial units,  $x_i$  is the mean of the spatial unit attribute values, and  $S$  is the standard deviation of the spatial unit attribute values. When the  $Z$  value is high and positive, it indicates that the level of social integration is high or a hot spot; when the  $Z$  value is high and negative, it indicates that the level of social integration is low or a cold spot.

The spatial autocorrelation analysis results are shown in Figure 1. The advantages and disadvantages of the inflow into the urban space are also a more important factor in determining the level of population movement. The model results show that the proportion of the population flowing into the city is superior, and the proportion of its population mobility is higher. The reason is that cities with better location conditions, especially those located in coastal urban agglomerations, the more obvious the agglomeration effect of population, land, capital, technology and other factors, which is conducive to creating stable employment opportunities and higher. The income level, therefore, in the context of the pursuit of economic pursuits, the higher the population turnover is reasonable [6]. The place where the economy is growing at a high rate is also the area where the number of immigrants is concentrated. The period of fastest economic growth is also the period when labor mobility is the most. In population geography, theoretical and empirical studies of population mobility and spatial differences suggest that spatial imbalances, especially the imbalance of space economy, are the main reasons for population mobility.

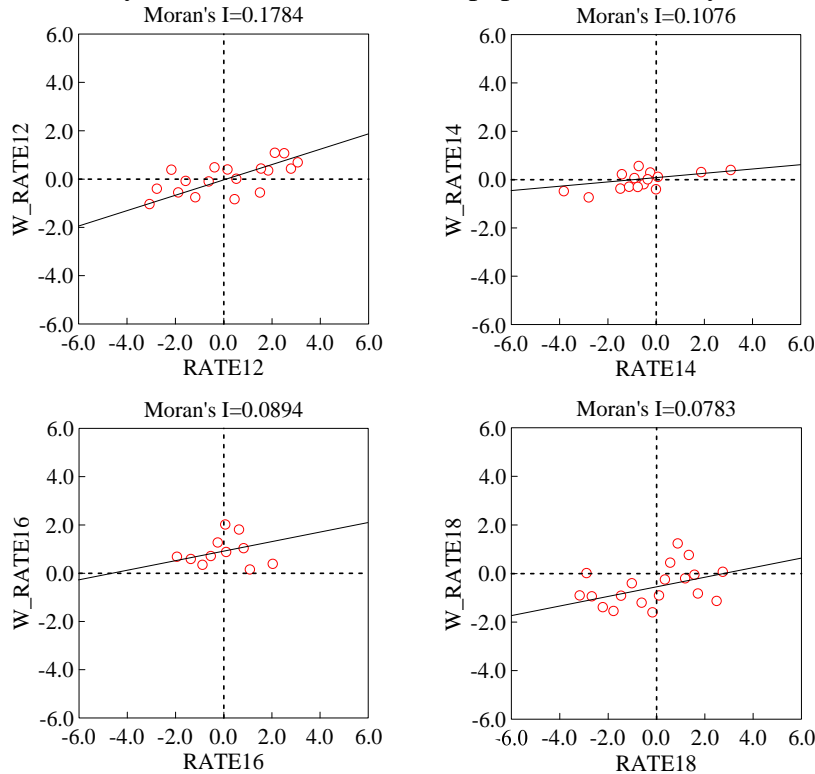


Figure 1 Spatial autocorrelation analysis results of population mobility in Southwestern China  
Among the influencing factors of population mobility, geographical factors can not be ignored,

and it has a significant impact on population turnover rate; medical conditions have little direct impact on population mobility, and it may indirectly affect population mobility in regions through spatial factors and economic factors. Further analysis of the results of the spatial error model shows that the factors affecting the net economic growth rate, such as the economic development level, capital investment, economic structure, income difference, and medical conditions, are all positive, which indicates the economy. The higher the level, the more perfect the medical and health conditions, the larger the investment scale, the higher the proportion of the output value of the second and third countries, the greater the income gap, and the higher the net population turnover rate of the region.

#### **4. Factors Affecting Population Flow in Southwest China**

The scale and timing of population inflows in prefecture-level cities mainly depend on the comprehensive opportunities that cities can provide. The modernity and international characteristics of cities have become important conditions for attracting migrants. Consistent with the current stage of urbanization and industrialization, industrialization and the factors associated with industrialization are still important factors in the current population inflow; and the transfer of rural surplus labor among the floating population is still in the main position. The floating population in prefecture-level cities has obvious zonal differences. The growth of the floating population in the central and western cities shows relatively complex characteristics. Relatively speaking, it is closely related to the urban traffic conditions, especially the railway transportation attributes. However, the change of highway attributes does not seem to be an important condition affecting the growth of urban floating population [7].

The higher the level of public service, the more favorable the floating population can obtain higher quality of life and enjoy more social welfare, thus forming a situation in which the urban population with high public service level is continuously flowing and the urban population lacking public services is continuously lost. The income difference index is significantly positive, indicating that the income gap between regions is also a factor determining the flow of people. If the flow to other cities can obtain higher income, then rational workers often choose to migrate, so the higher the income, the more the city can the population of the land forms an attraction. It can be seen from the regression results of the above two variables that people will take into account the income status of the target city and the urban public service capacity when making the flow decision, and the two often coexist in the developed cities in the east, which explains The reason why the population continues to gather in the eastern developed cities.

The size of the floating population is also related to the living conditions of the inflowing area, including income levels, infrastructure levels and levels of public service facilities. The floating population has shifted from the social floating population to the economic floating population, and the income level has gradually become a major factor affecting the flow of migrants. Regression analysis is carried out on the logarithm of the average labor compensation of employed persons and the logarithm of the size of the floating population. The income level is the main reason for affecting the floating population. While pursuing economic goals, migrants, especially rural migrants, are also pursuing better public facilities services, including roads, education, and medical care.

#### **5. Conclusions**

On the basis of summarizing and analyzing previous research works, this paper applies spatial autocorrelation test method, exploratory spatial data analysis technology and spatial statistical analysis software to study the population mobility model and population growth spatial type in southwest China and proposes the influential factors of population mobility in this region. The western China has the most sparsely populated regions, but the eastern part of Sichuan is a relatively dense area of the area. In the southwestern part of the country, small towns at county-level cities, counties and below are basically in a state of population stagnation or negative growth, and

their urbanization model is mainly urbanization caused internally. The scale and timing of population inflows in prefecture-level cities mainly depend on the comprehensive opportunities that cities can provide. The modernity and international characteristics of cities have become important conditions for attracting migrants. The higher the level of public service, the more favorable the floating population can obtain higher quality of life and enjoy more social welfare, thus forming a situation in which the urban population with high public service level is continuously flowing and the urban population lacking public services is continuously lost. The size of the floating population is also related to the living conditions of the inflowing area, including income levels, infrastructure levels and levels of public service facilities.

## References

- [1] Zhang Y.J., Cen Q. Spatial patterns of population mobility and determinants of inter-provincial migration in China. *Population Research*, 2014, 38(5): 54-71.
- [2] Liu A.H. Analysis on the spatial agglomeration and its influence factors of the floating population in Beijing-Tianjin-Hebei. *Population and Economics*, 2017, (6): 71-78.
- [3] Wang X.Y., Zeng Y.M. Research on population distribution and terrain factors based on spatial econometric modeling in Chuanxi area of China. *Chinese Journal of Population Science*, 2013, (3): 85-93.
- [4] Zhu C.G., Gu C.L., Ma R.H., Zhen F., Zhang W. The influential factors and spatial distribution of floating population in China. *Acta Geographica Sinica*, 2001, 56(5): 449-456.
- [5] Guo Q., Yu Y.J., Huang Z.H. The study about the spatial disparity and determinants of the social integration feelings of the floating population based on ESDA. *Population and Development*, 2015, 21(4): 52-59.
- [6] Lin L.Y., Zhu Y. Spatial variation and its determinants of migrants' Hukou transfer intention of China's prefecture- and provincial-level cities: Evidence from the 2012 national migrant population dynamic monitoring survey. *Acta Geographica Sinica*, 2016, 71(10): 1696-1709.
- [7] Yu T.F. Spatial-temporal features and influential factors of the China urban floating population growth. *Chinese Journal of Population Science*, 2012, (4): 47-58.