

NEW FEATURES AND NEW PATTERNS OF THE ECONOMIC RADIATION OF KUNMING CITY TO ITS SURROUNDING AREA

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Abstract: Kunming is the capital of Yunnan Province, a Southwest Frontier Province in China. It is also one of the most important central cities in the southwestern frontier region of China. The Central Yunnan Urban Agglomeration plays an important role in the economic development of Southwest China and East Asia. In recent years, the situation of Kunming to its surrounding radiation areas shows some new features and patterns. Based on the panel data of cities and counties in the urban agglomerations in central Yunnan from 2015 to 2019, this paper uses spatial econometrics method to research the radiation pattern of Kunming, which is the central city of Central Yunnan Urban Agglomeration to its surrounding economic circle. The results show that unlike previous observations, the radiation pattern of Kunming to the central Yunnan region is dominated by the "regurgitation-feeding" effect, and the collaborative development effect of urban agglomerations has started to emerge.

Keywords: Central Yunnan Urban Agglomeration; Economic radiation pattern; Regional economic activity; Regional economic development

1 INTRODUCTION

Urban agglomerations have become the core carriers of China's regional economic growth. The quality of its operation depends to a large extent on whether a benign interactive relationship can be formed between the cities inside. Generally speaking, the relationship between the central city of the agglomeration and other cities is particularly important. Myrdal [1], an economist, has summarized the possible impact of the growth poles (central cities) of the two urban agglomerations on other cities (counties). This article uses Zhu et al.'s approach to describe it as the following two modes [2]: the first possible effect is the "backwash effects" ("suction" mode), and the second possible effect is the "spread effects" ("regurgitation-feeding" mode). The "suction" effect means that the central city (central growth pole) in the urban agglomeration has a negative effect on the development of surrounding cities and counties. The development of surrounding cities and counties is restricted because of a large amount of labor, capital and natural resources being evacuated by the central city. The "regurgitation-feeding" effect means that the central city in the urban agglomeration has played a positive role in promoting the development of the surrounding cities, counties and other areas. The central city exerts its mature industrial superiority, institutional strengths, technological and financial advantages and spreads these advantages to its surrounding cities, counties, and other areas based on industrial upgrading and gradient transfer. In this way, the central city will promote the development of sub-regions and achieve a win-win situation.

The Central Yunnan Urban Agglomeration is the core city group of Yunnan province and one of the main city groups in southwest China. It plays an important role in promoting the economic development of southwest China and southeast Asia. On May 27th, 2011, the Urban Agglomeration Plan of Central Yunnan (2009-2030) was officially approved by the People's Government of Yunnan Province. On August 3rd, Yunnan province officially released it. Therefore, Central Yunnan Urban Agglomeration was officially proposed. In recent years, in order to better promote the development of the Central Yunnan Urban Agglomeration, Yunnan province has also made a series of new policy measures and compiled the Urban Agglomeration Plan of Central Yunnan (2016-2049). Efforts will be made to create the Central Yunnan Urban Agglomeration into an urban agglomeration with open and coordination space, green livability, innovation, efficiency, harmonious humanity and integrated development in border areas. Under the influence of this series of new policies and measures, how has the Central Yunnan Urban Agglomeration developed in recent years? What new features and patterns does the situation of Kunming to its surrounding radiation area emerge? The exploration of these issues will help us better understand the current situation and its economic mechanism of the Central Yunnan Urban Agglomeration. Meanwhile it will also help us formulate more targeted policies for the development of the Central Yunnan Urban Agglomeration.

There are quite a few studies on the radiation patterns of Chinese urban agglomerations recently, but they mainly analyzed the urban agglomerations in East Midland, such as the Yangtze River Delta, Pearl River delta, Beijing-Tianjin-Hebei and so on. Some studies placed it in the entire process of "China's urbanization" and examined the "club" convergence characteristics when researching on China's regional economic development [3-4]. Some studies verified and analyzed the convergence characteristics of regional economic development through spatial econometric methods [5-6]. Zhang collected relevant data from 132 cities (counties) in the Yangtze River Delta in China from 1993 to 2006 and researched the spatial correlation and dependence between different regions [7]. Within the framework of spatial econometric regression, Zhu et al. conducted a comparative study on whether the radiation pattern of the two urban agglomerations (economic circles) centered on Beijing and Shanghai is the "suction" effect or the "regurgitation-feeding" effect [2]. Taking the production and service industry as an example, Yuan and Luo made a comparative study on the radiative

properties of the central cities of three urban agglomerations in the Yangtze River Delta, Pearl River delta, Beijing-Tianjin-Hebei [8]. At the same time, there are also some studies on the Central Yunnan Urban Agglomeration and the situation of Kunming to its surrounding radiation area. Pan used the relevant data from 2002 to 2010 of the Central Yunnan Urban Agglomeration to study the radiation pattern and found that Kunming had a "suction" effect on other regions [9]. However, the data were used before the concept of the Central Yunnan Urban Agglomeration was formally established. Zhang et al. measured the economic connections within the Central Yunnan Urban Agglomeration by using the modified gravity model [10], and found three types of economic relations: weak, general, and strong.

In recent years, a series of new policies and measures have been introduced for the development and construction of the Central Yunnan Urban Agglomeration. In this process, whether the radiation situation of Kunming in central Yunnan shows new features and new models. It is worth using the latest economic data to examine it in the framework of standardized measurement, which is also the research goal of this article. Contents of the paper are as follows: the second part introduces the study area and data and makes preliminary observations; the third part details the test methods of radiation patterns and features; the fourth part are empirical analysis and basic conclusion; the fifth part are the summary and discussion.

2 STUDY AREA AND DATA

2.1 Definition and Sample Division of Central Yunnan Urban Agglomeration

Definition of Central Yunnan Urban Agglomeration: the Central Yunnan Urban Agglomeration is mainly composed of Kunming, Qujing, Yuxi, Chuxiong Yi Autonomous Prefecture and seven counties and cities in northern Honghe Hani and Yi Autonomous Prefecture: Mengzi city, Gejiu city, Jianshui county, Kaiyuan city, Mile city, Luxi county and Shiping county. It is the most economically developed area in Yunnan Province, with a land area accounting for 29% of the province (114600 square kilometers) and a population accounting for 44.02% of the province. It is an area with dense transportation facilities, the strongest development foundation, the highest development level, and the best prospects for continued development in Yunnan Province. It is the leader of the province's economic and social development and the main body of Yunnan Province participating in regional cooperation and competition at home and abroad.

Sample range and division: the Central Yunnan Urban Agglomeration includes Kunming, Qujing, Yuxi, Chuxiong Yi Autonomous Prefecture and seven counties and cities: Mengzi city, Gejiu city, Jianshui county, Kaiyuan city, Mile city, Luxi county and Shiping county in northern Honghe Hani and Yi Autonomous Prefecture, forming an "a main four" spatial pattern. The Kunming metropolitan area is constructed by one-hour commute circle centered in Kunming, forming the core of development in the Central Yunnan Urban Agglomeration. The sub-core of the urban agglomeration is constructed by Qujing town cluster, Yuxi town cluster, Chuxiong town cluster and Mengzi town cluster, which generally forms spatial pattern with a leading core and mutual support.

Specifically, Kunming city area includes the following 14 sample points: the central city, Wuhua district, Panlong district, Guandu district, Xishan district, Chenggong district, Jinning district, Dongchuan district, Anning city, Fumin county, Songming county, Yiliang county, Shilin Yi Autonomous County, Xundian Hui Yi Autonomous County, Luquan Miao Yi Autonomous County. Qujing City District includes 9 sample points: the central city, Qilin district, Xuanwei city, Fuyuan county, Luliang county, Zhanyi district, Shizong county, Luoping county, Malong district, Huize county. Yuxi city district includes 9 sample points: the central city, Xinping county, Yuanjiang county, Eshan county, Yimen county, Hongta district, Jiangchuan district, Tonghai county, Chengjiang county, Huaning county. Chuxiong Yi Autonomous Prefecture includes 10 sample points: the central city, Chuxiong city, Shuangbai county, Mouding county, Nanhua county, Yao'an county, Dayao county, Yongren county, Yuanmou county, Wuding county, Lufeng county. The northern region of the Honghe Hani and Yi Autonomous Prefecture includes seven sample points: Mengzi city, Gejiu city, Jianshui county, Kaiyuan city, Mile city, Luxi county and Shiping county.

2.2 Data Sources and Preliminary Observations

The data used in this article are from the "Yunnan Statistical Yearbook" from 2015 to 2019 and the annual "Statistical Yearbook" of local cities and counties. From the selected sample, it was in 2011 when the Central Yunnan Urban Agglomeration was formally proposed, and 2015 to 2019 was exactly the time for its rapid development.

Table 1 describes the proportion of GDP of each city and county of the Central Yunnan Urban Agglomeration. According to Table 1, we can find that from the end of 2011 (in early 2012) when the Central Yunnan Urban Agglomeration formally proposed to 2019 when the Kunming-based urban agglomeration being formed. In recent years, Kunming's GDP showed a growth trend. In 2019, it accounted for 46.83% of the Central Yunnan Urban Agglomeration, up from 44.92% in 2015, with an average annual growth rate of 0.38 percentage points, which indicates that economic scale of Kunming has an absolute advantage in Kunming-based urban agglomeration. However, with the expansion of Kunming's economy, the economic shares of surrounding cities and counties (districts) have also increased or decreased at different amplitudes. The GDP proportion of Qujing dropped from 20.83% in 2015 to 18.71%, that of Yuxi dropped from 14.50% to 13.64%, and that of Mile city dropped from 2.99% to 2.77%. But that of Gejiu city increased from 2.32% to 2.35%, that of Kaiyuan city increased from 1.74% to 1.79%, and that of Chuxiong Yi Autonomous Prefecture increased from 8.32% to 9.04%. The proportion of Honghe Prefecture rose from 11.43% to 11.77%, and the economic share of its counties has also changed. The proportion of Mengzi rose from 1.56% to 1.84%, that of Jianshui county rose from 1.39% to 1.47%, that of Luxi county rose from 0.82% to 0.89%, and that of Shiping county rose from 0.61% to 0.66%. Thus, the share of the

Kunming's economy has been on the rise since 2015, but both Qujing and Yuxi are declining. Mengzi city, Gejiu city, Jianshui county, Kaiyuan city, Mile city, Luxi county and Shiping county in Chuxiong Yi Autonomous Prefecture are relatively underdeveloped and have been on a rising tendency. Although the proportion of GDP in these regions varies very little year by year, economy has grown in most areas. Therefore, from the whole urban agglomeration, the relative changes of the proportion of GDP in each region are still stable. Although the proportion of GDP in Kunming continues to rise, the central city-Kunming and its surrounding radiation areas have maintained a harmonious relationship of "common development and progress".

Table 1 The GDP Proportion of Each City and County in the Urban Agglomeration of Central Yunnan (%)

Year/Area	Kunming	Qujing	Yuxi	Chuxiong	Honghe (partial)
2015	44.92	20.83	14.50	8.32	11.43
2016	45.85	19.12	14.63	8.71	11.68
2017	45.97	18.89	14.42	8.84	11.89
2018	46.06	18.94	14.05	9.07	11.88
2019	46.83	18.71	13.64	9.04	11.77

Table 2 The GDP Per Capita of Each City and County in the Urban Agglomeration of Central Yunnan (Yuan)

Year/Area	Kunming	Qujing	Yuxi	Chuxiong	Honghe (partial)
2015	52093	24224	47216	23256	30355
2016	56236	25844	50500	25886	32518
2017	59656	27045	52812	27942	35287
2018	64156	29155	55389	30948	37705
2019	71906	31806	59510	34192	40555

Table 2 describes the GDP per capita of the cities and counties of the Central Yunnan Urban Agglomeration from 2015 to 2019, and the information described in the statistical table also reflects that Kunming keeps a "harmonious coexistence" with surrounding areas. From 2015 to 2019, Kunming's per capita GDP increased from 52,093 yuan to 71,906 yuan, reaching 38.03% increase during four years. The per capita GDP of surrounding radiation regions has also grown: the GDP per capita growth of Qujing reaches 31.30%, and that of Yuxi has increased to 26.04%. Chuxiong's GDP per capita has increased to 47.02%, and that of Honghe (partial) has grown to 33.60%. Changes in per capita GDP of some districts and counties are: the GDP per capita growth of Mile city has risen to 32.51%, and that of Gejiu and Kaiyuan city has increased to 37.37% and 27.44%, respectively. The GDP per capita growth of Mengzi county reaches 45.13%, Jianshui county, Luxi county and Shiping has grown to 59.21%, 47.84% and 55.96%, respectively. Thus, the GDP per capita of Kunming and its surrounding radiation areas keep the same increasing pace. The income gap between Kunming and other regions in the urban agglomeration of central Yunnan has always maintained a relatively stable gap, and it is tending to be reduced, which can be seen from Table 3. Looked from the coefficient of variation, economic gap in the urban agglomeration of central Yunnan is gradually decreasing, which indicates that the GDP per capita gap of the Central Yunnan Urban Agglomeration is reducing.

Table 3 Differences of Variation Coefficients in the Economic Circle Around Kunming

Year	2015	2016	2017	2018	2019
Variation coefficients	0.42	0.41	0.40	0.39	0.39

3 METHODOLOGY

Previously, a preliminary observation about the development of the central Yunnan urban agglomeration was made by analyzing the per capita GDP and the economic gap in each region. Next, in the third part, we conduct a more rigorous and detailed examination of the above observations to verify whether the results are reasonable. We first consider the traditional convergence verification model in economics as shown in (1) below:

$$\ln\left(\frac{y_{T,i}}{y_{0,i}}\right) = a + \beta_1 \ln(y_{0,i}) + \varepsilon_i \quad \varepsilon_i \sim N(0, \sigma^2) \quad (1)$$

In the above model (1), $\ln\left(\frac{y_{T,i}}{y_{0,i}}\right)$ indicates the growth rate of the per capita income of the i^{th} region in the central Yunnan urban agglomeration during the T period, y_T shows how much per capita income is at the end of T period, and ε_i is the error range. In the test model, if the value of β_1 is negative (<0), it means that economy in under developed regions has grown faster. The control variable of the test model is only the income level at the beginning of T period, not other variables that may affect economic growth. This shows absolute convergence model (1) mainly focuses on whether the economy converges, that is, underdeveloped regions economically grow faster in the early stages without considering the

specific factors that affect economic convergence (such as technical factors, capital factors, labor factors, etc.). However, the economic growth of a certain region may be affected by other regions in the same urban agglomeration. In order to verify the existence of this effect, we introduce explanatory variables that represent the effects of other regions based on the above model (1). Quite often, with different levels of economic development among each region, the economic growth of other areas in the same urban agglomeration will have a certain impact on the economic growth situation of the region, making significant differences in the impact intensity and pattern: Due to the relatively strong socio-economic strength, the influence of the central city in the urban agglomeration is significantly stronger than the surrounding peripheral areas, which is also consistent with connotation of the central city as a growth pole in the economic circle. But there are questions worth thinking how the various regions in the urban agglomeration affect each other and how to distinguish them. The spatial autocorrelation model takes into consideration the correlations existing in samples, which is mainly based on the spatial weight matrix to describe the interaction among samples [11]. Drawing from the research train of thought of the former, we use $n \times n$ order weight matrix $W = \sum_{j=1}^n w_{ij}$ to construct the virtual competitor region. Consider using the following model:

$$\ln \left(\frac{y_{T,i}}{y_{0,i}} \right) = a + \beta_1 \ln (y_{0,i}) + \beta_2 \sum_{j=1}^n w_{ij} \ln \left(\frac{y_{T,j}}{y_{0,j}} \right) + \varepsilon_i \tag{2}$$

The impact of other areas on the economic growth of the region is represented by item $\sum_{j=1}^n w_{ij} \ln \left(\frac{y_{T,j}}{y_{0,j}} \right)$.

The choice of the weight matrix W is the key to solving the problem. In the spatial econometric economic model, a geographical adjacency matrix [11-12] with the following elements is commonly used:

$$W_{ij} = \begin{cases} 1 & \text{if } i \neq j, \text{ and } i \text{ and } j \text{ are adjacent} \\ 0 & \text{if } i \neq j, \text{ and } i \text{ and } j \text{ are not adjacent} \\ 0 & \text{if } i = j \end{cases} \tag{3}$$

According to the matrix above, if $i=j$, it means that the two areas are adjacent. While $w_{ij}=1$ means that the influence factors of adjacent areas are the same, and similarly, the influence factor between non-adjacent regions is 0.

However, there are differences in the radiating ability between the central city and other areas in the urban agglomeration. On the one hand, it is obviously not enough to rely on this single matrix to describe the mutual influence and economic relations between regions in the urban agglomeration. On the other hand, advances in transportation and communication technology have greatly reduced the space-time distance, and the obstacles to social and economic exchanges between regions have been greatly weakened due to geographical location. We believe that the economic strength (size, etc.) of a certain region plays a crucial role in its radiation-affected ability. In general, there is a positive correlation between the radiation-affected ability and its economic strength, that is, the stronger the economic strength the region has, the stronger its radiation-affected ability is, and vice versa. Therefore, this paper introduces another correlation matrix as follows:

$$W_{ij} = \begin{cases} \frac{y_j}{\sum_{n=1}^N y_n} & \text{if } i \neq j \\ 0 & \text{if } i = j \end{cases} \tag{4}$$

We assume that y_j represents the socioeconomic level of the j region in the urban agglomeration (assuming there is a total of N regions in the urban agglomeration), The weight impact of area j influence on the area i is measured by the proportion of the j area's socioeconomic output (regional GDP) to that of the urban agglomeration (total GDP). If so, the central city, as a growth pole in the urban agglomeration, has a relatively large proportion due to its relatively large share of economic output. In the test model (2), we use coefficient β_2 to describe the economic interaction between various regions in the same urban agglomeration. In this paper, we describe the radiation effect of central city with strong economic strength to the surrounding areas in the urban agglomeration. If A is positive, it indicates that central city promotes the economic growth in the region, that is, the central city has a "regurgitation-feeding" effect, conversely, it has "suction" effect. The main research purpose of this article is to confirm whether the radiation central city Kunming to the central Yunnan region is a "suction" effect or a "regurgitation-feeding" effect. How the effects above-mentioned are formed will be not discussed for the time being, so some variables (such as capital, technology, resources, etc.) that may affect the economic interaction between regions are not controlled. These factors that has possible mutual influence on the economic growth of each region can be included in the coefficient β_2 , which can be used to describe the property of economic radiation. It is not necessary to worry about some endogenous problems that may be caused by the omission of such variables. However, model (2) is a cross-sectional regression of the sample data, so heterogeneity problem of sample must be considered. Although technology, labor, and other factors can be ignored, the differences (heterogeneity) formed by due to the natural environment in cities (counties) of the urban agglomeration have little to do with the central city's radiation effect. However, this heterogeneity is not eliminated in the model (2), because of the influence of other irrelevant factors, and the estimated coefficient β_2 will be biased. By referring to the model (2) transformation of panel estimation model proposed by Elhorst [13], the cross-sectional data regression is transformed into panel data regression [12].

$$\ln\left(\frac{y_{i,t+1}}{y_{i,t}}\right) = a + \beta_1 \ln(y_{i,t}) + \beta_2 \sum_{j=1}^n w_{ij} \ln\left(\frac{y_{j,t+1}}{y_{j,t}}\right) + \varepsilon_{i,t} \quad t=0,1,T-1 \quad (5)$$

Model (5) is a panel data estimation model which can give full play to the richness of panel data, it is also the main model used in this paper to test the radiation properties. The basic steps are to perform first-order difference on the model (5) and estimate the maximum likelihood after the difference. In this way, the influence of the factors that are not related to the radiation effect mentioned above can be eliminated, and the estimated coefficient β_1 and β_2 obtained by regression are more accurate. Meanwhile the radiation properties of the samples except Kunming City was tested in this paper. By comparing it with Model (5), we hope to more actually reflect the coordinated development of various regions in the urban agglomeration of central Yunnan.

4 RESULTS

According to the radiation pattern test method described above, the three time periods from 2015 to 2019, 2015 to 2017, and 2017 to 2019 are considered. We carry out regression analysis for this model, and results are shown in Table 4 below. It can be found that the regression results are not very satisfactory in Table 4, and the explanatory variables were significant only during the entire sample period from 2015 to 2019. However, it is very prominent under the β_2 level of 1% in the two sub-sample periods from 2015 to 2017 and 2017 to 2019, which also confirms the heterogeneity problem of the model (2) itself.

Table 4 Cross-Sectional Regression Results from 2015 to 2019

Model	coefficient	Coef.	Std. Err.	t-value	p-value	Sig.	observations
I	β_1	-0.017	0.016	-1.07	0.289		49×3
	β_2	-37.443	4.009	-9.34	0.000	***	
II	β_1	-0.014	0.016	-0.87	0.390		49×3
	β_2	-25.063	3.536	-7.09	0.000	***	
III	β_1	-0.043	0.024	-1.81	0.077	*	49×5
	β_2	-19.833	3.565	-5.56	0.000	***	

Notes: I indicates the regression results of the model from 2015 to 2017, using economic weight matrix in 2015. II indicates the regression results of the model from 2015 to 2019, using economic weight matrix in 2017. III indicates the regression results of the model from 2015 to 2019, using economic weight matrix in 2015. 4. ***, **, * means significant at 1%, 5% and 10% level, respectively.

The following Table 5 shows the regression results of the main test model 5, where the value of β_2 is the main reference coefficient used to test the radiation properties of the central city. In regression model, the values of the two coefficients β_1 and β_2 are significant, of which the value of β_1 is about -0.92 at 1% confidence level, which indicates that virtual competitors (regions) show positive correlation with the regional economic development in the urban agglomeration of central Yunnan. In the previous basic data description, far more than other regions, Kunming's share of GDP has remained at about 45% in the urban agglomeration of central Yunnan. The value of β_2 coefficient and its positive or negative values reflect the radiation of Kunming to its surrounding areas. From this, it can be concluded that Kunming has promoted the development of its surrounding areas in the urban agglomeration, which are consistent with the preliminary observations on the development of the urban agglomeration in the central Yunnan.

Table 5 Regression Results of Panel Data

coefficient	Coef.	Std. Err.	z	P>z	Lower 95% CI
β_1	-0.915	0.057	-16.060	0.000	-1.027
β_2	0.903	0.391	2.310	0.021	0.136

Note: the model is calculated based on the economic weight matrix for each year from 2015 to 2019.

We further test the economic radiation effects between samples of the Central Yunnan Urban Agglomeration after excluding the central city Kunming from panel data. Obviously, if the main radiation effect of the urban agglomeration in the central Yunnan is from the central city Kunming, then the value of β_2 should theoretically significantly change after excluding it. Conversely, if the radiation effect is not caused by Kunming, the panel regression value should not obviously change compared with the previous results after removing the central city.

Table 6 below shows panel data regression results of the Central Yunnan Urban Agglomeration after excluding the central city of Kunming. By comparing the two coefficients β_1 and β_2 in Table 5 and Table 6, it can be found that β_1 has not changed much as a test coefficient for measuring economic convergence, but the radiation property test coefficient β_2 has changed. Absolute value is reduced, and other values are not significant, which indicates that the radiation effect in the urban agglomeration of central Yunnan is mainly caused by Kunming. In conclusion, it can be considered that the central city Kunming and other areas coordinate with each other and coexist with each other in the urban agglomeration. Interdependent relationships have been formed, and the development characteristics of regional economic integration in

the Central Yunnan Urban Agglomeration are also obvious.

Suggestion: For consistency, if the standard formatting is to leave only one blank line before all tables, an extra line should be deleted here.

Table 6 Interaction Between Growth Rates after Excluding Central City Sample: Panel Data

coefficient	Coef.	Std. Err.	z	P>z	Lower 95% CI
β_1	-0.894	0.0712	-12.57	0.000	-1.034
β_2	0.637	0.519	1.230	0.220	-0.381

Notes: the model is calculated based on the economic weight matrix for each year from 2015 to 2019.

5 CONCLUSION AND DISCUSSION

In the framework of spatial econometrics, this paper uses two-level panel data of the city and county (district) in the economic circle around Kunming from 2015 to 2019 to empirically analyze the situation of Kunming City to its Surrounding Area, and shows that the radiation situation presents new features and new models: The radiation pattern of Kunming to other areas in the economic circle around Kunming has shifted from the "suction" effect-dominated to the "regurgitation-feeding" effect-dominated, and the effect of the coordinated development of the Central Yunnan Urban Agglomeration is starting to show.

However, there are still many difficulties and problems in the course of development especially in coordinating the relationship between the central city-Kunming and other cities. First of all, with a relatively low level of development, although some progress has been made in recent years, but the Central Yunnan Urban Agglomeration is obviously far behind leading regions such as urban agglomerations such as Chengdu-Chongqing urban agglomeration, and the gap is even enlarging. Secondly, Kunming, as the central city and region's economic growth pole, still has structural problems in the economic radiation of the economic circle and even the entire Yunnan Province. The complementary and coordinated economic and industrial structure of Kunming and other important cities in central Yunnan has not yet been formed, and the policy coordination mechanism between local governments of cities in the central Yunnan has not been effectively established. Thirdly, Kunming plays little node function in introducing resources from developed regions for the province resource. With the densest population, Kunming is the most developed economic region and the demonstration area planning for the transfer of industries of Yunnan Province. From the current situation, the effect of introducing resources from developed regions was not satisfactory. The development of urban agglomerations or the interaction and coordination of the cities in the urban agglomerations is an extremely complicated process. This paper tentatively explores and studies economic radiation pattern of the Central Yunnan Urban Agglomeration. As for how the economic radiation pattern is formed and the deeper economic mechanism behind it needs to be further studied.

COMPETING INTERESTS

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