Analysis on the Regional Spatial Distribution of Employment of College Students and Evaluation of Employment Quality

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Abstract—Analyzing the spatial distribution of the employment of college students and developing strategies to improve the quality of their employment are the key to helping college students get employed and retained in the region. However, there are few systematic and comprehensive research results on the employment of college students, and the existing employment quality indicator systems are not objective enough. To this end, this paper analyzes the regional spatial distribution of employment of college students and carries out extended study on employment quality evaluation. Firstly, an analysis model map of the regional spatial distribution of employment of college students was given. Based on the spatial lag model, the regional spatial distribution of employment of college students was preliminarily analyzed, with the influencing factors to the regional spatial distribution of employment of college students as the independent variables, and the regional spatial agglomeration level of employment of college students as the dependent variable. A spatial econometric model for the employment quality of college students was proposed, which introduced spatial effects, and realized the quantitative analysis on the contributions of the influencing factors to the regional spatial distribution of employment of colleges students. Finally, the analysis results were given, and the corresponding employment quality evaluation results were also provided.

Keywords—employment of college students, spatial distribution of employment, employment quality of college students

1 Introduction

The "thickness" of the college student group in a region affects the efficiency and quality of its economic development, especially the balanced distribution of employment of college students, which is a significant contributor to the sustainable, healthy development of the regional economy [1–5]. The metropolitan circles and urban agglomerations in a region have now become important spatial carriers of the employment pattern of college students. Full understanding and excavation of the spatial distribution characteristics of the employment pattern of college students in the region is the precondition for improving the employment quality of college students in the region and achieving the rapid development of regional economy [6–14]. Currently, there are certain differences in the employment agglomeration level of college students in a region, and such obvious gaps and competition among cities, counties and districts are the main reasons for the imbalance of employment quality among these sub-regions [15–23]. Lowering the requirements for household registration can only attract college students in the region for a short period of time, while analyzing the spatial employment distribution of college students and developing strategies to improve their employment quality is the true way to attract and also retain them.

According to the actual situation and characteristics of employment in higher vocational colleges, Fang [24] preprocessed the data related to the employment of students, and analyzed their employment decisions. It mined and analyzed the employment data of students to obtain the potential patterns, and finally generated a model for prediction of students' employment and employer types. Luo and Zhao [25] aimed to study the education reform with Chinese characteristics and analyze the employment quality of students who studied big data management courses. It conducted a comprehensive and systematic study on how to promote the application of big data education and education management with Chinese characteristics in college education, curriculum reform with Chinese characteristics and college student management, and also analyzed the employment quality data. The research results show that the employment quality of students who studied the course of big data analysis with Chinese characteristics was 16.8% higher than that of students from traditional colleges. In order to improve the employment management of college students, Shi and Pan [26] proposed an evaluation model for college students' employment quality based on AHP. It firstly analyzed the evaluation indicator system for college students' employment quality, and then used AHP to evaluate the employment quality of college students. The empirical data analysis results show that the use of AHP can help achieve accurate evaluation of the employment quality of college students. In order to fully identify the influencing factors to college students' employment in Hubei Free Trade Zone, Lv et al. [27] used the questionnaire survey method to conduct a survey among more than 1,500 college students. The questionnaire data were quantitatively analyzed by reliability analysis, t-test and multiple linear regression analysis methods in SPSS statistical analysis. Through analysis, on the basis of clarifying the factors influencing the employment of college students in Hubei Free Trade Zone, it provided some guidance for Hubei Free Trade Zone to further attract outstanding talents. Xiang [28] proposed applying the data mining technology to the employment analysis of college students, which has important practical significance. On this basis, the factors affecting the employment of college students were studied using the data mining algorithm. The experimental results show that college students should improve their professional foundation and quality, constantly change their employment concepts, reasonably adjust their employment expectations, and actively acquire, accumulate and use appropriate social capital.

Through review of the existing literature, it can be found that domestic and foreign scholars have conducted research on regional employment issues from multiple perspectives. However, most of the research has focused on the employment of migrant workers, and little systematic and comprehensive research has been done on the employment of college students, and in addition, the existing employment quality indicator systems are not objective enough. In light of such deficiencies, this paper analyzes the regional spatial distribution of employment of college students and carries out extended study on employment quality evaluation. Firstly, Section 2 gives an analysis model map of the regional spatial distribution of college students' employment. Based on the spatial lag model, it performs preliminary analysis on the regional spatial distribution of employment of college students, with the influencing factors to the regional spatial distribution of employment of college students as the independent variables, and the regional spatial agglomeration level of employment of college students as the dependent variable. Section 3 constructs a spatial econometric model for the employment quality of college students, which introduces spatial effects, and realizes the quantitative analysis on the contributions of the influencing factors to the regional spatial distribution of employment of colleges students. The subsequent section gives the analysis results and also provides the corresponding employment quality evaluation results.

2 Analysis on the regional spatial distribution of employment of college students

Based on the spatial lag model, a preliminary analysis was performed on the regional spatial employment distribution of college students. Figure 1 shows the analysis model for the regional spatial employment distribution of college students, from which, it can be seen that college students' value orientation of career choice, salary standard, employment location, satisfaction about major-job match, sentiment of career selection, motivation of career choice and employment service can all affect the regional spatial employment distribution of college students.

Employers and college graduates are two parties that develop and grow together. Figure 2 shows a schematic diagram of the career goals of college students and the recruitment goals of employers. Appropriate employers can promote the continuous growth of college students, and in turn, they can also improve production efficiency and achieve corporate reform and innovation because of the continuous supply of outstanding talents. The spatial distribution of enterprises in the region, that is, job locations, greatly affects the spatial employment distribution of college students in the region. Therefore, this indicator is the core one of all indicators.

The above indicators can be used as independent variables, and the spatial agglomeration level of employment of college students in the region as the dependent variable for analysis. Different from the classical econometric model, the spatial lag model introduces the spatial lag term of the dependent variable-spatial agglomeration level of the employment of college students in the region. Suppose that the dependent variable is represented by b, that the spatial lag term of the dependent variable by ζQb, that the spatial weight matrix by Q, that the independent variable matrix by A, that the regression coefficient matrix of the independent variable A by γ, and that the error term of the spatial lag model by μ, then the model can be expressed as follows:

$$b = \zeta Qb + A\gamma + \mu \quad (1)$$

If there is a spatial correlation between the independent variables, i.e. the influencing factors to the changes in the employment distribution of college students in different sub-regions, and if only the spatial agglomeration level of the employment of college students in a sub-region is considered, while the influences of other surrounding sub-regions are ignored, then there will be errors in the setting of the model, and it is not sufficient to characterize the spatial agglomeration level of college students' employment in this sub-region. For the spatial lag model, if q_b and A satisfy the orthogonality condition, then there is:

$$O\left[(q_b)'A\right] = 0 \quad (2)$$

At the same time, there is:

$$O\left[\left(q_b\right)'\mu\right] = O\left[b'Q'\left(b - \phi q_b - A\gamma\right)\right] = O\left[b\left(Q' - \phi q'Q\right)b\right] - O\left[b'Q'A\gamma\right] \quad (3)$$

$$O\left[\left(q_b\right)'\mu\right] = O\left[b\left(Q' - \phi q'Q\right)b\right] \neq 0 \quad (4)$$

Estimate the constructed model based on the maximum likelihood estimation method:

$$\begin{aligned} &b = \phi Qb + A\gamma + \mu \\ &b - \phi Qb - A\gamma = \mu \sim (0, \varepsilon^2 QU_m) \end{aligned} \quad (5)$$

The following is the expression of the likelihood function:

$$SQ = \left(\frac{1}{\sqrt{2\pi\xi}}\right)^M exp\left\{-\frac{\left(b - \phi qb - A\gamma\right)'\left(b - \phi qb - A\phi\right)}{2\xi^2}\right\}\left|I - \phi Q\right| \quad (6)$$

Therefore, there exists the following equation:

$$\ln SQ = -\frac{M}{2} ln2\pi - \frac{M}{2} ln\varepsilon^2 + ln\left|I - \phi Q\right| - \left(b - \phi Qb - A\gamma\right)'\left(b - \phi Qb - A\gamma\right) / 2\xi^2$$

$$\begin{aligned} &\frac{\partial \ln SQ}{\partial \gamma}\Big|_{\gamma=\hat{\gamma}_{NK}} \\ &= \frac{\partial\left(\frac{b'b - b'\phi Qb - b'A\gamma - \phi b'Q'b + \phi b'Q'Qb + \phi b'Q'A\gamma - \gamma'A'b + \gamma'A'\phi Qb + \gamma'A'A\gamma}{2\xi^2}\right)}{\partial \gamma} \\ &= \frac{1}{2\xi^2}\left(-A'b + \phi A'Qb - A'b + A'\phi Qb + 2A'A\gamma\right) \end{aligned} \tag{7}$$

Assuming that the following partial derivative calculation formula is 0:

$$\partial \ln SQ / \partial \gamma \,|_{\gamma=\hat{\gamma}_{NK}} = 0 \tag{8}$$

then there is:

$$\begin{aligned} &-A'b + \phi A'Qb - A'b + A'\phi Qb + 2A'A\gamma \\ &= -2A'b + 2\phi A'Qb + 2A'A\gamma \\ &= 0 \end{aligned} \tag{9}$$

Solve it, and there is:

$$\hat{\gamma}_{NK} = (A'A)^{-1} A'(b - \phi Qb) \tag{10}$$

Then suppose that the following partial derivative calculation formula is 0:

$$\partial \ln K / \partial \gamma \,|_{\varepsilon^2=\hat{\varepsilon}^2_{NK}} = 0 \tag{11}$$

that is,

$$-\frac{M}{2}\frac{1}{\varepsilon^2} + \frac{1}{2\varepsilon^4}(b - \phi Qb - A\gamma)'(b - \phi Qb - A\gamma) = 0 \tag{12}$$

Solve it, and there is:

$$\hat{\varepsilon}^2_{NK} = (b - \phi Qb - A\hat{\gamma}_{NK})'(b - \phi Qb - A\hat{\gamma}_{NK}) / M \tag{13}$$

In order to expand the spatial agglomeration level of employment of college students in the region from univariate autoregression to multivariate time series autoregression, a vector autoregression model was constructed to analyze and predict multiple influencing factor. Assuming that there is a correlation between the dependent variables $b_{1,p}$ and $b_{2,p}$ of the spatial agglomeration level of college students' employment in different regions, the autoregression model can be constructed as follows:

$$\begin{aligned} b_{1,p} &= g(b_{1,p-1}, b_{1,p-2}, \cdots) \\ b_{2,p} &= g(b_{2,p-1}, b_{2,p-2}, \cdots) \end{aligned} \tag{14}$$

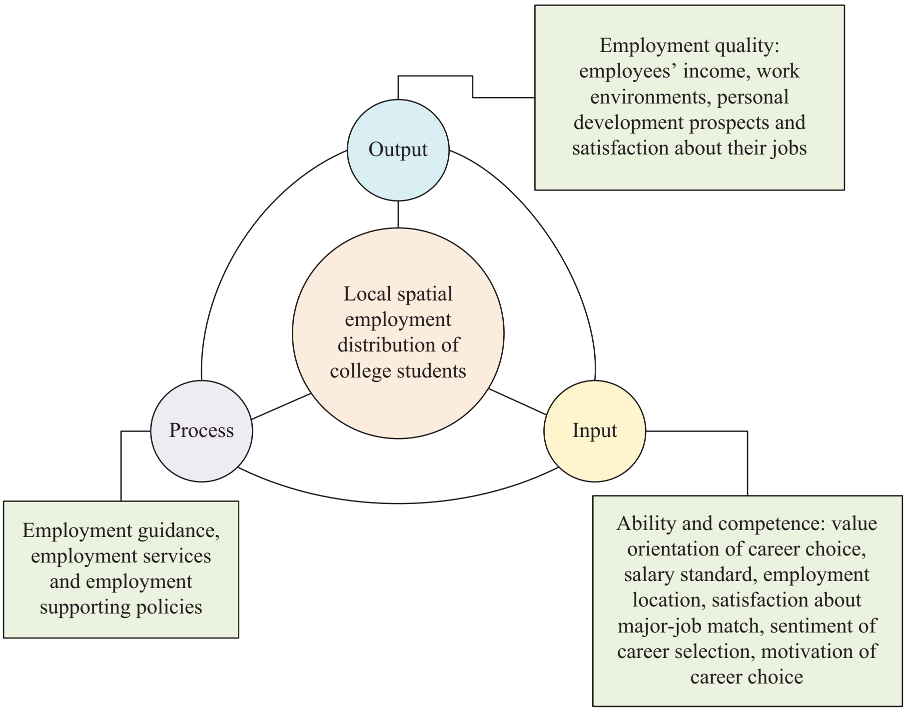

Fig. 1. Analysis model for the regional spatial employment distribution of college students

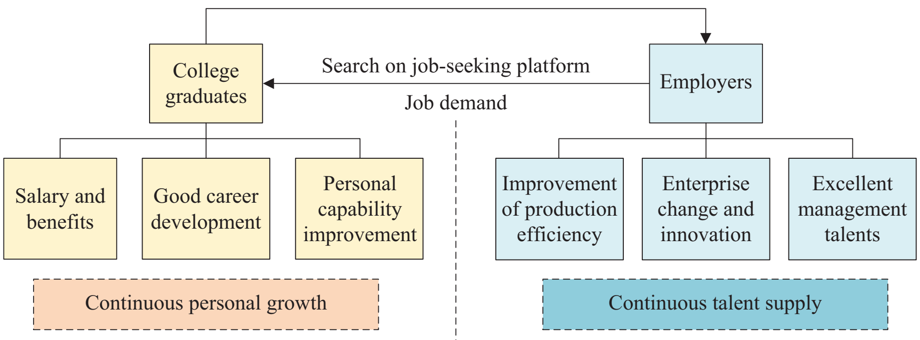

Fig. 2. College students' career goals vs. employers' recruitment goals in the region

The above model cannot accurately characterize the relationship between the dependent variables $b_{1,p}$ and $b_{2,p}$. This paper built the relationship between the two based on the simultaneous form. The following is the expression of the vector autoregression model for the dependent variables $b_{1,p}$ and $b_{2,p}$ with a lag of 1 period:

$$\begin{cases} b_{1,p} = d_1 + \pi_{11,1} b_{1,p-1} + \pi_{12,1} b_{2,p-1} + v_{1p} \\ b_{2,p} = d_2 + \pi_{21,1} b_{1,p-1} + \pi_{22,1} b_{2,p-1} + v_{2p} \end{cases} \tag{15}$$

Let v_{1p}, v_{2p}~$IDN(0,\varepsilon^2)$, $cou(v_{1p},v_{2p})$. The matrix form of the model is as follows:

$$\begin{bmatrix} b_{1,p} \\ b_{2,p} \end{bmatrix} = \begin{bmatrix} d_1 \\ d_2 \end{bmatrix} + \begin{bmatrix} \pi_{11.1} & \pi_{12.1} \\ \pi_{21.1} & \pi_{22.1} \end{bmatrix} \begin{bmatrix} b_{1,p1} \\ b_{2,p1} \end{bmatrix} + \begin{bmatrix} v_{1p} \\ v_{2p} \end{bmatrix} \tag{16}$$

Let

$$B_p = \begin{bmatrix} b_{1,p} \\ b_{2,p} \end{bmatrix}, d = \begin{bmatrix} d_1 \\ d_2 \end{bmatrix}, \Gamma_1 = \begin{bmatrix} \pi_{11.1} & \pi_{12.1} \\ \pi_{21.1} & \pi_{22.1} \end{bmatrix}, v_t = \begin{bmatrix} v_{1p} \\ v_{2p} \end{bmatrix} \tag{17}$$

Then there is:

$$B_p = d + \Gamma_1 B_{p-1} + v_p \tag{18}$$

It is assumed that the time series column vector of the spatial agglomeration level of college students' employment is represented by B_p, that the column vector of the constant term by d, that the parameter matrix by Γ_j, and that the column vector of random errors by v_p. The following formula expresses the vector autoregression model of M dependent variables with a lag of l periods:

$$\begin{aligned} & B_p = d + \Gamma_1 B_{p-1} + \Gamma_2 B_{p-2} + \cdots + \Gamma_l B_{p-l} + v_p, v_p \sim IIDN(0, \varepsilon^2) \\ & B_p = (b_{1,p}, b_{2,p} \cdots b_{M,p})' \\ & d = (d_1, d_2 \cdots d_M)' \\ & \Gamma_j = \begin{bmatrix} \pi_{11,j} & \pi_{12,j} & \cdots & \pi_{1M,j} \\ \pi_{21,j} & \pi_{22,j} & \cdots & \pi_{2M,j} \\ \vdots & \vdots & \ddots & \vdots \\ \pi_{M1,j} & \pi_{M2,j} & \cdots & \pi_{MM,j} \end{bmatrix}, j = 1, 2, ..., l \end{aligned} \tag{19}$$

3 Spatial econometric analysis of the regional employment quality of college students

In order to perform quantitative analysis on the contributions of the influencing factors to the improvement of the employment quality of college students, a spatial econometric model was constructed, which introduced the spatial effect.

In the traditional econometric model, the variables used are independent of each other by default, while the spatial econometric model constructed in this paper ignores the independent observations when processing the data of factors affecting the regional employment distribution of college students. Based on the spatial effect, the structure of the spatial employment pattern is quantitatively described using the spatial matrix, which characterizes the correlations between the influencing factors to the spatial employment pattern of college students in two random regions. The general form of the matrix is expressed as follows:

$$Q = \begin{bmatrix} q_{11} & q_{12} & \cdots & q_{1m} \\ q_{21} & q_{22} & \cdots & q_{2m} \\ \vdots & \vdots & \vdots & \vdots \\ q_{m1} & q_{m2} & \cdots & q_{mm} \end{bmatrix} \tag{20}$$

The spatial matrix is usually a symmetric matrix with elements on the main diagonals being 0. Any element value in the matrix is represented by Q_{ij}. The corresponding spatial weight matrix can be constructed according to the proximity principle or the distance principle. The following formula shows the spatial weight matrix constructed based on the proximity rule:

$$Q_{ij} = \begin{cases} 1, When\ regions\ i\ and\ j\ are\ adjacent\ to\ each\ other \\ 0, When\ regions\ i\ and\ j\ are\ not\ adjacent\ to\ each\ other \end{cases} \tag{21}$$

In the above formula, Q_{ij}=1 indicates that the two sub-regions are adjacent, and Q_{ij}=0 indicates that the two are not adjacent.

The spatial dependence, restriction and influence of the regional employment pattern of college students can be defined as the spatial dependence of the regional employment of college students. This indicator reflects the state that the observed value of an influencing factor of a sub-region depends on the observed value of the same in an adjacent region, which can be characterized by the following formula:

$$\begin{aligned} & b_i = \beta_i b_j + A_i \gamma + \mu_i \\ & b_j = \beta_j b_j + A_j \gamma + \mu_j \\ & \mu_i \sim M(0, \varepsilon^2), i = 1 \\ & \mu_j \sim M(0, \varepsilon^2), j = 2 \end{aligned} \tag{22}$$

The spatial heterogeneity of the regional employment pattern of college students means that the spatial agglomeration level of the employment of college students in a sub-region is different from that in any other sub-region. Suppose that the observed value of a spatial unit in the regional employment pattern of college students is represented by *i*, that the time period where the regional employment pattern of college students changes by *p*, that the independent variables, i.e. the influencing factors to the regional employment distribution of college students by a_{ip}, that the parameter vector by γ_{ip}, and that, under error μ_{ip}, the specific space-time function relationship with the dependent variable b_{ip} by g_{ip}, then the time series regression process of the influencing factors can be expressed as: $b_{ip}=g_{ip}(a_{ip}n\gamma_{ip},\mu_{ip})$.

Next, based on the spatial weight matrix, test the *Moran's I* index of regional variables to determine whether there is a global spatial correlation in the employment patterns of college students between different regions. Assuming that the attribute value of the spatial employment pattern in the i-th region is represented by Bi, and that the total number of regions studied by *m*, which satisfies $R^2=1/m\sum_{i=1}^{m}(B_i-B^*)^2$, $B^*=1/m\sum_{i=1}^{m}B_i$. The following is the calculation formula of Moran's I:

$$Moran's\ I=\frac{\sum_{j=1}^{m}\sum_{i=1}^{m}Q_{ij}(B_i-B^*)(B_j-B^*)}{R^2\sum_{j=1}^{m}\sum_{i=1}^{m}Q_{ij}} \tag{23}$$

Based on the calculation results of the above formula, test the normal distribution hypothesis on the spatial autocorrelation relationship of the employment patterns of college students in m sub-regions. The following is the standard expression of the test:

$$C(c)=\frac{I-O(I)}{\sqrt{var(I)}} \tag{24}$$

Then, based on the distribution of the spatial data of the influencing factors to the spatial employment pattern of college students, the expected value and variance of the *Moran'I* index under normal distribution are calculated as follows:

$$\begin{aligned} O_m(I)&=-\frac{1}{m-1}\\ FC_m(I)&=\frac{m^2Q_1+mQ_2+3Q_0{}^2}{Q_0{}^2(m^2-1)} \end{aligned} \tag{25}$$

where, $Q_0=\sum_{i=1}^{m}\sum_{i=1}^{m}Q_{ij}$, $Q_1=1/2\sum_{i=1}^{m}\sum_{i=1}^{m}(Q_{ij}+Q_{ji})^2$, $Q_2=\sum_{i=1}^{m}(q_{ij}+q^{ji})^2$, and the sums of the i-th row and j-th column of the spatial weight matrix are denoted as Q_i and Q_j, respectively.

4 Experimental results and analysis

The data samples of the influencing factors to the regional employment distribution of college students selected in this paper were obtained from 45 cities, counties and districts in the study area. Table 1 lists the 45×45 spatial weight matrix constructed based on the proximity rule. Then, based on the R software, a spatial correlation test was performed on the data of the influencing factors to the regional employment distribution of college students. Table 2 lists the *Moran*'*s I* of the employment patterns of different sub-regions and the *p*-values of the tests.

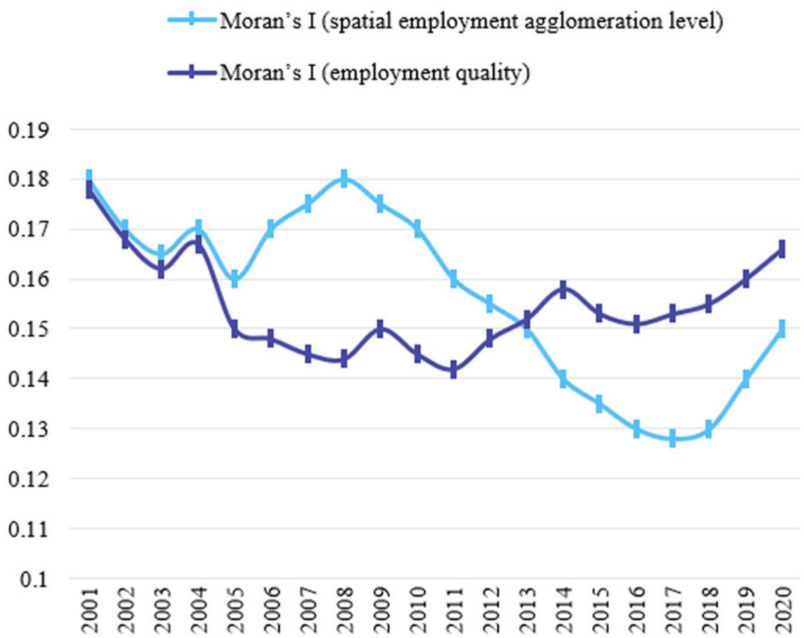

Fig. 3. Line graph of *Moran's I*

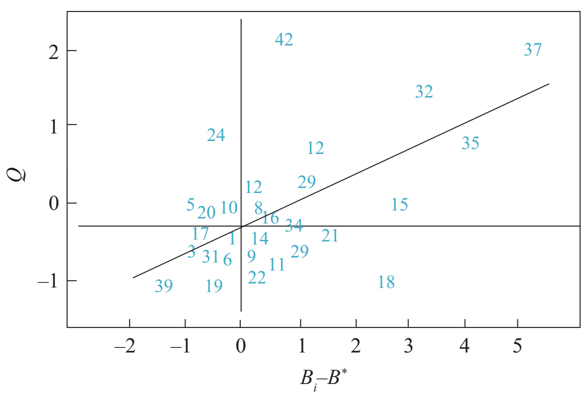

Fig. 4. *Moran's I* scatter plot

It can be seen from the table that there is a spatial autocorrelation between the level of spatial employment agglomeration and the quality of employment in each sub-region. Through comparative analysis of *Moran's I* value, the regional spatial agglomeration level of employment and the spatial cluster characteristics of employment quality of college students in each year can be found. Judging from the test results of the spatial employment agglomeration level, *Moran's I* exhibited a fluctuating state. From the perspective of employment quality, *Moran's I* showed a relatively large fluctuation trend. As the value range of the index is [0.1, 0.2], the two have a strong spatial correlation between each other, and play some role in the improvement of the employment quality of college students. Figure 3 is a line graph of the *Moran's I*, which is more visual.

It can be seen from the figure that college students' spatial employment agglomeration level and employment quality exhibited obvious spatial agglomeration characteristics among the sub-regions of the study area. At the beginning of the study period, the spatial correlation between the two was relatively strong. As time went on, the *Moran's I* value tended to be stable, and the correlation between the spatial employment agglomeration level and the employment quality also showed a stable trend. Table 3 presents the data analysis results of the spatial autoregression model.

Table 1. Spatial weight matrix of sub-regions

	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	…
A_1	1	0	0	1	0	1	0	1	0	
A_2	0	1	0	0	1	0	1	0	1	
A_3	0	0	0	1	0	0	0	0	1	
A_4	1	0	1	1	1	0	1	0	0	
A_5	0	0	0	0	0	1	0	1	0	
A_6	1	0	0	0	0	0	0	0	0	
A_7	0	0	1	0	1	0	1	1	0	
A_8	0	1	0	1	1	0	0	1	0	
A_9	1	0	1	0	0	1	0	0	1	
…										

Table 2. *Moran's I* for employment patterns in different sub-regions and the corresponding *p*-values

Year	***Moran's I*** **(Spatial Agglomeration Level of Employment)**	***p*** **Value**	***Moran's I*** **(Employment Quality)**	***p*** **Value**
2001	0.15246857	0.07251	0.16253846	0.05218
2002	0.13265472	0.02527	0.12418135	0.06251
2003	0.16253425	0.09254	0.16259447	0.04128
2004	0.14751284	0.02517	0.13625941	0.02143
2005	0.16259358	0.06251	0.12514783	0.05627
2006	0.11241574	0.06259	0.15248576	0.02153
2007	0.13625958	0.04153	0.16254853	0.07458
2008	0.18475241	0.05147	0.19253485	0.03261
2009	0.16253485	0.06235	0.12415753	0.01247
2010	0.18125142	0.04179	0.11302015	0.06251
2011	0.13625948	0.05214	0.19658472	0.04163
2012	0.16253152	0.03625	0.11425147	0.02518
2013	0.11214519	0.01257	0.10201452	0.07452
2014	0.13625487	0.03269	0.16254841	0.03157
2015	0.11326251	0.04125	0.11251485	0.06251
2016	0.17458459	0.03261	0.16253487	0.01524
2017	0.13251416	0.05214	0.11524861	0.06325
2018	0.16254875	0.06217	0.16845985	0.02152
2019	0.18485122	0.06253	0.14251847	0.08475
2020	0.16259485	0.01427	0.16253172	0.03621

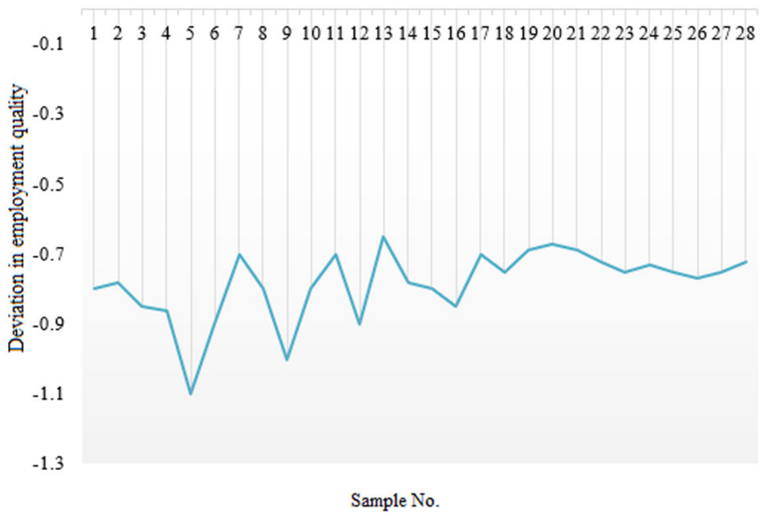

Fig. 5. Line graph of the deviations in the employment quality of college students

Table 3. Data analysis results of the spatial autoregression model

Year	Spatial Autoregression Coefficient	*p* value	Regression Coefficient Matrix for Independent Variables	*p* value
2001	0.05842	0.0268*	2.10529	<2e-15**
2002	0.06425	0.0965**	2.60215	<2e-15**
2003	0.03219	0.0362*	2.48157	<2e-15**
2004	0.04128	0.0157***	2.30262	<2e-15**
2005	0.03215	0.0629*	2.15009	<2e-15**
2006	0.07485	0.0127**	2.30262	<2e-15**
2007	0.01653	0.0371*	2.29586	<2e-15**
2008	0.08472	0.0529**	2.58141	<2e-15**
2009	0.01625	0.0241*	2.63695	<2e-15**
2010	0.07431	0.0315**	2.50217	<2e-15**
2011	0.05124	0.0527*	2.30262	<2e-15**
2012	0.06235	0.0382**	2.02158	<2e-15**
2013	0.05218	0.0215***	2.63254	<2e-15**
2014	0.08325	0.0625**	2.03261	<2e-15**
2015	0.03628	0.0152*	2.30126	<2e-15**
2016	0.01251	0.0374**	2.51284	<2e-15**
2017	0.05284	0.0162*	2.63251	<2e-15**
2018	0.03628	0.0695***	2.01029	<2e-15**
2019	0.01265	0.0251**	2.63251	<2e-15**
2020	0.06297	0.0392*	2.03125	<2e-15**

In order to further identify the spatial relationship between the employment of college students in each sub-region and its neighboring sub-regions, a *Moran's I* scatter plot was drawn for the spatial employment agglomeration level of college students, as shown in Figure 4. It can be seen that most of the sub-regions are located in the first and third quadrants, indicating that the relationship between each sub-region and its adjacent ones generally has the following two characteristics: 1) if a sub-region shows high level of spatial employment agglomeration for college students, the surrounding sub-regions also have generally high level of spatial agglomeration; 2) if a sub-region shows low level of spatial employment agglomeration for college students, the surrounding sub-regions also have generally low level of spatial agglomeration. The previous results of *Moran*'s *I* are basically consistent with those of the *Moran*'s *I* scatter plot test.

In this paper, the employment quality of college students was measured based on the deviation between the expected value and the actual value, which can be obtained through the data analysis software SPSS 20. Figure 5 shows the line graph of the deviations in the employment quality of college students. It can be seen that if the deviation between the expected value and the actual one is less than 0, the greater the value, the higher the employment quality, and the smaller the value, the lower the employment quality.

5 Conclusions

This paper analyzed the regional spatial distribution of employment of college students and carries out extended study on employment quality evaluation. Firstly, an analysis model map of the regional spatial distribution of employment of college students was given. Based on the spatial lag model, the regional spatial distribution of employment of college students was preliminarily analyzed, with the influencing factors to the regional spatial distribution of employment of college students as the independent variables, and the regional spatial agglomeration level of employment of college students as the dependent variable. A spatial econometric model for the employment quality of college students was proposed, which introduced spatial effects, and realized the quantitative analysis on the contributions of the influencing factors to the regional spatial distribution of employment of colleges students.

Through the experiment, a 45×45 spatial weight matrix constructed based on the proximity rule was shown, and the *Moran's I* of the employment patterns of different sub-regions and the *p*-values of the test were given. Also, a more visual *Moran's I* line graph was given. From the perspective of employment quality, *Moran's I* showed relatively large fluctuations. The data analysis results of the spatial autoregression model were provided, and the *Moran's I* scatter plot of the spatial employment agglomeration level of college students was drawn, showing the correlation between each sub-region and its adjacent ones. The employment quality of college students was measured by the deviation between the expected value and the actual one, and a line graph of the deviations in the employment quality of college students was presented.

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