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ANALYSIS OF SPATIAL DISTRIBUTION CHARACTERISTICS AND INFLUENCING FACTORS OF RESIDENTIAL LAND PRICE IN CHINA - BASED ON MACRO-SCALE

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Abstract*: Based on the macro-scale, taking 27 provincial capitals and 4 municipalities in China in 2010 and 2020 as the research objects, the spatial distribution and influencing factors of urban residential land price were analyzed by using the exploratory spatial data analysis method and regression analysis model. The results show that: (1) The urban residential land price showed the distribution characteristics of "high in the east and low in the west", and the residential land price as a whole shows a trend that the attenuation rate around the high-value center decreases with the increase of distance. (2) In 2020, the high-value centers of the residential land price changed from coastal areas to inland areas, and the residential land price will develop from a single high-value center in coastal areas to a double high-value center. (3) The economic development and living standard of residents in the study area play a major role in the residential land price. However, from the perspective of specific factors, the influencing factors of residential land price in 2020 are also affected by the epidemic situation, with the decrease in foreign exchange and the decrease of the influence of foreign investment on the residential land price.*

Keywords*: Macro-scale Residential land price Spatial characteristics Influencing factors*

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Introduction

The formation and development of a city have distinct regional characteristics and the imprint of the times, so the study of the city should be carried out from the perspective of development and evolution. Since the 1990s, the background of urban land space development has undergone fundamental changes, especially two important institutional changes: paid land use system and monetized housing distribution system. The implementation of these two systems has enabled China's urban land market to step into the track of the market economy. The freedom of land supply and demand has increased, and the driving role of the market economy has become obvious. The location evolution of urban land space is regulated by the market mechanism, and the overall pattern and internal characteristics of land space also change (Yu et al., 2021). Behind this process of change, the change of its internal mechanism deserves further discussion. The price of urban residential land has a strong correlation with time and space, which is characterized by continuity in time and dependence on space. With the advancement of urban functional expansion and structural adjustment, the spatial-temporal relationship of residential land price is also changing with regularity. It has significance to explore the information on this regularity and its influencing factors.

The main purpose of this study is to analyze the spatial distribution and establish an analysis system of influencing factors of the residential land price at the macro-scale, which can be used to help local authorities provide a reference for scientifically formulating land policies. Exploring spatial distribution characteristics and the main influencing factors of residential land prices in China are obtained, and the related laws of residential land prices in the macro-scale range are investigated. Exploring the spatial differentiation characteristics and influencing factors of urban land price on the macro-national scale will help to increase the macro-scale research content and provide a reference for similar analysis.

Literature Review

In the research of land price, the benchmark land price or urban monitoring land price is generally used to evaluate cities or urban agglomerations with relatively perfect land market development to conduct a study of land price (Yang et al., 2012; Yang et al., 2013; Shen et al., 2014). The scale is an important concept in geographic research. China's administrative division is also a kind of scale division (Wang et al., 2018). When conducting macro-scale analysis, it refers to taking the country as a plane, selecting a representative research object as points, and starting from the points, making a comprehensive analysis, so that the points are connected into lines, and the lines merge into a plane. By analyzing several research objects on the macro-scale, we can get the overall law.

Ball (2014) based on the undeveloped land price data in the metropolitan area, and used model analysis to find that the urban growth boundary had a positive impact on the trend of urban housing prices. Sampath Kumara et al. (2015) mainly use multiple regression and neural network technology to predict land prices in the Indian metropolitan area.

The analysis of the influencing factors of the urban residential land price at different time points is conducive to the vertical assessment of the level of urban economic development and the living standard of urban residents. Urban land prices are affected by various social and economic factors, such as the international investment environment, market supply, and demand, geographic differences, urban residents' income, and actual disposable quotas, geographical location advantages, the surrounding ecological environment, and the city's Infrastructure, buildings, surrounding educational resources, etc. (Zhou et al., 2019; Zhou.,

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2020). Guo et al. (2021) selected the internal factors of land circulation such as the total amount and structure of land circulation and the external factors of regional economic to study the influence degree of these factors on the land price. Chen et al. (2020) study the influencing factors of residential land price in Nanchang of China, referring to the index system of urban land grading factors in Nanchang, the influencing factors are mainly divided into four categories: commercial factors, traffic factors, infrastructure factors, and environmental factors. The above-mentioned literature studies the land price from many angles, but the research on the macro-scale land price is less. Studying things from the macro-scale can help us understand and study the overall law of things.

Research methodology

Research Method

The Analysis Method of Spatial Analysis of Land Price

In this paper, the spatial analysis of land price is mainly completed by using Exploratory Spatial Data Analysis (ESDA) and spatial interpolation method in geostatistical analysis, in order to preliminarily summarize the spatial characteristics of land price data. ESDA method is centered on the spatial correlation measurement method, to describe and analyze the situation of spatial distribution.

The inverse distance weighting (IDW) method is an interpolation method with the distance between the interpolation point and the sample point as the weight. The closer the sample point is to the interpolation point, the greater the weight is. IDW obtains the interpolation unit value by averaging the values of each sample point in the adjacent area. In the application of strong spatial autocorrelation, inverse distance weight is a more suitable interpolation method, which can improve the scientific accuracy of interpolation results. The formula is:

$$Z(x_0) = \sum_{i=1}^{n} \lambda_i \, Z(x_i) \quad \cdots\cdots\cdots\cdots \quad (1)$$

For the formula, $Z(x_0)$ is the estimated value at x_0. λ_i is the weight coefficient. n is the number of land price samples. $Z(x_0)$ is the measured value at x_0.

The Analysis Method of Influencing Factors of Land Price

The ordinary least squares (OLS) method is the most basic form of regression analysis, which is a mathematical equation to determine and verify the influence of one or several independent variables (cause variables) on one dependent variable (result variables) (Jin.,2008).

Ridge regression is a biased estimation method, it is also an improvement of the ordinary least squares method, or a method specifically to solve the problem of multicollinearity. Ridge regression adds a set of normal numbers (i.e., ridge parameters) to the diagonal of the matrix X'X to make the inversion operation relatively stable. The ridge regression method can solve the problem that the matrix of the ordinary least squares method cannot be inverted when solving the coefficient vector (Ge.,1997). The formula is:

$$B(k)=(X'X+kI)^{-1}X'Y \quad \cdots\cdots\cdots\cdots \quad (2)$$

Among them, X is the standardized matrix; B(k) is the ridge regression estimation of the regression coefficient vector; k is a given normal number. The absolute value of Bi(k) in B(k)

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gradually decreases, and their deviation from Bi will also increase; if k→∞, then B(k)→0, The trajectory formed by the change of B(k)with λ is called the ridge trace diagram.

Unlike the ordinary least squares method, the residual sum of squares obtained by ridge regression analysis tends to be stable as a whole, and the result is more in line with reality (Wan.,2016).

Study Area and Data

Study Area

China is located at 3°51'N~53°33'N, 73°33'E~135°05'E. The country has jurisdiction over 27 provinces, 4 municipalities, and 2 special administrative regions. Cities in China mainly divided into municipalities, provincial-level cities, prefecture-level cities, and county-level cities. Cities of different levels have different administrative powers (Zhu et al., 2015). Based on administrative divisions, the macro-scale adopts administrative regions, which represent 27 provinces and 4 municipalities. On the one hand, provincial capitals and municipalities are regionally representative, on the other hand, provincial capitals and municipalities the administrative divisions of municipalities directly under the central government are at the same level and the data is highly comparable, which facilitates the comparison and connection between data. For this reason, the land price of 2010 and 2020 research mainly uses data from 27 provincial capital cities and 4 municipalities except for Hong Kong, Macau, and Taiwan of China. Figure 1 is the study area.

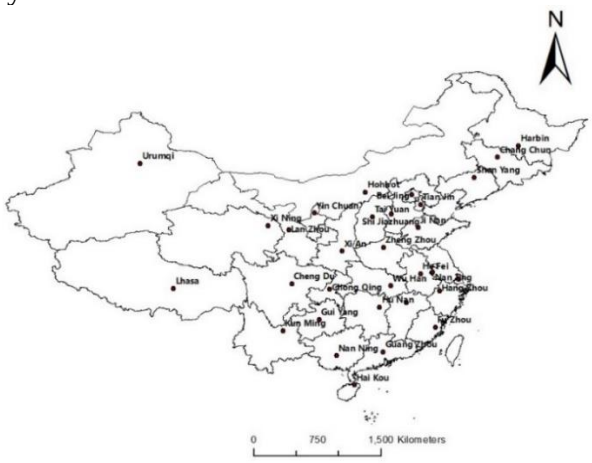

Figure 1 Study Area

Source: China Map Publishing House

Data Source

There are two types of data used. One is the land price monitoring data of provincial capital cities and municipalities directly under the central government needed to study the national scale. Choose provincial capital cities when conducting macro-scale research, to avoid the large difference between city scale and economic level caused by random selection, and do not need to be revised; Another is the statistical yearbook data of the research cities used to study the influencing factors of residential land prices.

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Analysis of Spatial Distribution Characteristics

Analysis of Spatial Characteristics of Residential Land Price

Spatial Autocorrelation Analysis of Residential Land Price

The spatial autocorrelation analysis function in ArcGIS software is used to analyze the residential land price data in 2010 and 2020, and the analysis results are shown in Figure 2. In the global autocorrelation analysis, Moran's I values are 0.1753 and 0.2737, respectively, indicating that the data are in a positive correlation state. P values are 0.008 and 0.0002, respectively, which indicates that the spatial correlation of the data is significant.

Before the spatial analysis of residential land price, because the premise of spatial interpolation is the normal distribution of data, it can be seen from the above research that the research data after data processing and transformation accords with the normal distribution, and the spatial distribution characteristics of residential land price can be analyzed.

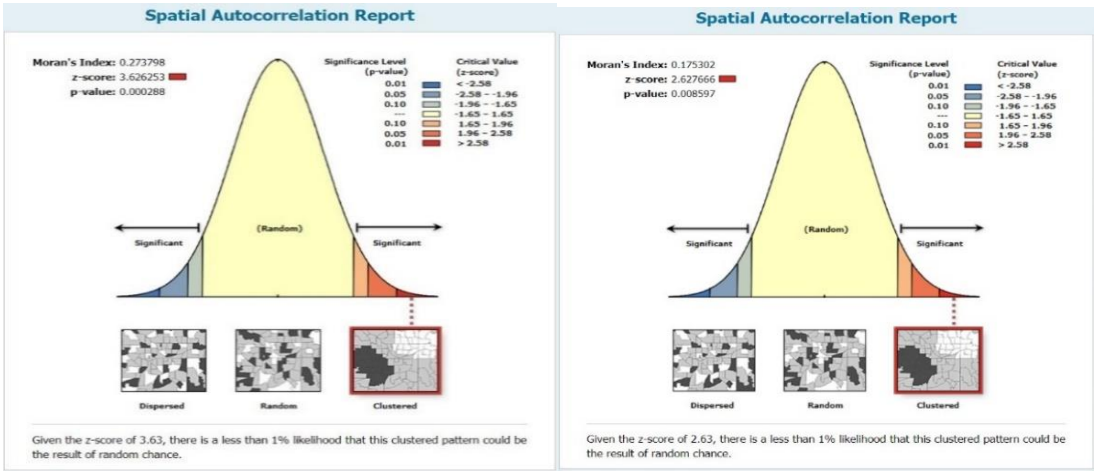

Figure 2 Spatial Autocorrelation Analysis Report of Land Price Data In 2010 and 2020

Comparative Analysis of Spatial Characteristics of Residential Land Price

Through the analysis of the spatial interpolation method, it is found that the spatial distribution of residential land prices in 2010 and 2020 has similarities and differences. The spatial distribution of residential land prices in 2010 and 2020 is shown in Figure 3 and Figure 4. After a comparative analysis of the two years, it has the following characteristics.

(1) The spatial distribution shows the phenomenon of circle attenuation around the central area with the high residential land price.

Residential land prices in 2010 and 2020 have two same spatial distribution characteristics. First, the overall distribution shows a circle pattern. Second, the attenuation level of residential land price is anisotropic. It can be seen that the attenuation trend of land price is different in different directions, and the gradient of the attenuation trend is steeper in the area with high land price on the southeast coast. The range of land value is different in different regions. In the western region, the trend of regional growth and decline is gentle, and the range of land value changes little.

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(2) The spatial distribution shows regional differences between the east and the west.
From the figure 3 and figure 4, it can be seen that, unlike in 2010, when only the southeast coastal area with Shanghai as the center was the single center with high residential land price, the high land price centers in 2020 had obvious double center characteristics, and the high land price areas were mainly distributed in Shanghai-centered "Shanghai-Nanjing-Hangzhou" area and Beijing-centered capital and nearby areas. Generally speaking, the high land price areas in 2010 and 2020 are mainly concentrated in the eastern region. Although some parts of the northeast region belong to low land price areas, the overall land price level in the eastern region is higher than that in the western region.

(3) The residential land price center with high value tends to move northward.
In 2010, the coastal areas were the regions with the highest residential land price, but in 2020, Beijing, as an administrative center, surpassed Shanghai as the center with the highest residential land price. From the overall trend, the high-value center of land price moves north from the southeast coastal area, and the range of high-value residential land price area increases compared with 2010.

(4) In 2020, the residential land price level will be improved as a whole, especially in the eastern region.
Through comparison, it can be found that in 2020, the overall land price level at the national level will be improved, with the lowest land price increasing by 51 yuan /m^2 and the highest land price increasing by 14,500 yuan /m^2. From the change of residential land value domain, the overall land price in the eastern part of the region, including the low land price areas in the northeast, has increased, but the residential land price in some parts of the southwest shows a downward trend.

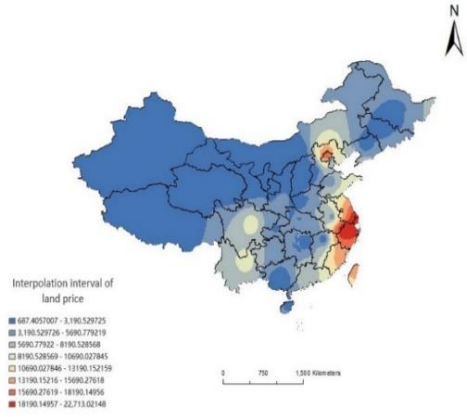

Figure 3 Interpolation Graph of Spatial Distribution In 2010

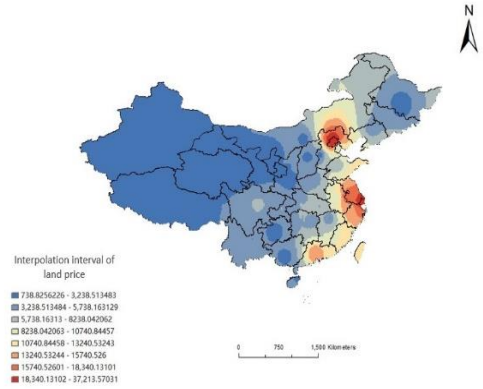

Figure 4 Interpolation Graph of Spatial Distribution In 2020

Analysis of Influencing Factors

Establishment of Index System of Influence Factors

The analysis of influencing factors of urban land price is a complicated process, involving many factors. By using the analytic hierarchy process method, 30 articles related to the construction of influencing factors system of urban land price index in 2018-2020 in the network platform of HowNet, the general library of knowledge resources in China, were selected for statistics, and the most frequently cited index was selected.

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As shown in Table 1, on the whole, the indicators of influencing factors in the index system are divided into economic development indicators, residents' living standards indicators, population indicators, and urban construction indicators. The indicators of economic development are divided into the gross domestic product (GDP), local financial revenue, Per capita GDP, total retail sales of consumer goods, actually utilized amount of foreign capital in that year, gross agricultural output value, total Investment in fixed assets in the whole country, the proportion of tertiary industry in GDP. The Resident living standards indicators are divided into urban per capita disposable income and the average wage of employees. Population indicators are divided into urbanization rate, population density, and the resident population at the end of the year. The urban construction index is divided into urban road area, the number of full-time teachers in middle schools, the green coverage area of developed area, the number of hospital beds, and the administrative area of land.

Table 1 Index System of Influencing Factors

Index layer	Factor layer
Economic development indicators	Gross Domestic Product (Hundred million yuan) (X_1)
	Local financial revenue (Ten thousand yuan) (X_2)
	Per capita GDP (Yuan)(X_3)
	Total Retail Sales of Consumer Goods (Hundred million yuan) (X_4)
Residents living standards indicators	Actually utilized amount of foreign capital in that year (Ten thousand dollars) (X_5)
	Gross agricultural output value (Ten thousand yuan) (X_6)
Population indicators	Total Investment in Fixed Assets in the Whole Country (Hundred million yuan) (X_7)
	Proportion of tertiary industry in GDP (%) (X_8)
	Urban per capita disposable income (Yuan)(X_9)
	The average wage of employees (Yuan)(X_{10})
	Urbanization rate (%) (X_{11})
	Population density (Person/km^2) (X_{12})
Urban construction indicators	Resident population at the end of the year (Ten thousand people) (X_{13})
	Urban road area (Ten thousand/m^2) (X_{14})
	The number of full-time teachers in middle schools (Person)(X_{15})
	The green coverage area of developed areas (hm^2) (hectare) (X_{16})
	Number of hospital beds (Piece)(X_{17})
	Administrative area of land (km^2) (X_{18})

Analysis of Influencing Factors of Residential Land Price

Analysis of Influencing Factors on Residential Land Price In 2010

After OLS analysis on the data of influencing factors in 2010, the results are shown in table 2, and the fitting degree analysis results of the regression model are obtained. Among them, the determinable coefficient of the model R square is 0.909, and the adjusted R Square is 0.753. The fitting result of the model is good.

Table 2 Regression Model Fitting Degree Analysis Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.954	.909	.753	.497061	1.672

a. Predictors (Constant), X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}.
b. Dependent Variable: Land Price

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Table 3 shows that the value of F is 19.500, and the value of P is less than 0.05, which indicates that the established regression model has statistical significance, and the regression coefficient of at least one independent variable is not 0.

Table 3 Regression Model Hypothesis Test Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.282	18	1.436	5.812	.002
	Residual	2.718	12	.247		
	Total	30.000	30			

a. Predictors (Constant), X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}.
b. Dependent Variable: Land Price

Table 4 Collinearity Description Table

Model		Collinearity statistics	
		Tolerance	VIF
1	(Constant)		
	Zscore(X_1)	.004	263.328
	Zscore(X_2)	.046	21.722
	Zscore(X_3)	.066	15.154
	Zscore(X_4)	.007	134.259
	Zscore(X_5)	.076	13.120
	Zscore(X_6)	.189	5.285
	Zscore(X_7)	.163	6.144
	Zscore(X_8)	.042	23.629
	Zscore(X_9)	.081	12.308
	Zscore(X_{10})	.243	4.121
	Zscore(X_{11})	.395	2.532
	Zscore(X_{12})	.046	21.615
	Zscore(X_{13})	.010	99.307
	Zscore (X_{14})	.067	14.835
	Zscore(X_{15})	.031	32.497
	Zscore(X_{16})	.163	6.148
	Zscore(X_{17})	.029	34.935
	Zscore(X_{18})	.071	14.157

However, as shown in Table 4, the Variance Inflation Factor (VIF) value of most data is greater than 10, and there is strong collinearity. Ridge regression analysis can deal with the collinearity of data. The ridge regression analysis is carried out by SPSS Software. In the ridge regression analysis, K is from 0 to 1, the step size is set at 0.05, and 21 K values are obtained.

According to the principle of variable selection, the independent variables that affect the stability of the model with a large fluctuation of regression coefficient are removed. The final variables removed are the total investment in fixed assets in the whole country (X_7), the proportion of tertiary industry in GDP (X_8), the number of full-time teachers in middle schools (X_{15}), the green coverage area of developed areas (X_{16}), administrative area of land (X_{18}).

As shown in the results of ridge regression analysis (Figure 5), when $K \geq 0.3$, the regression coefficient tends to be stable, and when K=0.3 is taken, the independent variable with a larger

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coefficient will have a greater influence. Among the adjusted influencing factors, X_1 is GDP, X_2 is local financial revenue, X_3 is per capita GDP, X_4 is the total retail sales of social consumer goods, X_5 is the actually utilized amount of foreign capital in that year, X_6 is the total agricultural output value, X_7 is the per capita disposable income of urban residents, X_8 is the average wage of on-the-job workers, X_9 is the urbanization rate, X_{10} is the population density, X_{11} is the resident population at the end of the year, X_{12} is the urban road area, and X_{13} is the number of hospital beds.

The coefficient of regression analysis represents the contribution of each independent variable to the dependent variable. The greater the absolute value of the coefficient, the greater the contribution of the variable in the model. This coefficient also indicates the type of relationship between independent variables and dependent variables. The coefficient is positive, indicating a positive correlation, and the coefficient is negative, indicating a negative correlation. According to the ridge regression coefficient, the order is: per capita disposable income of urban residents, actual amount of foreign capital utilized in that year, resident population at the end of the year, local fiscal revenue, urban road area, per capita GDP, population density, Gross Domestic Product, total retail sales of social consumer goods, number of hospital beds, average wages of on-the-job employees, total agricultural output value, and urbanization rate. Except for the total agricultural output value, other influencing factors have a positive impact on the residential land price.

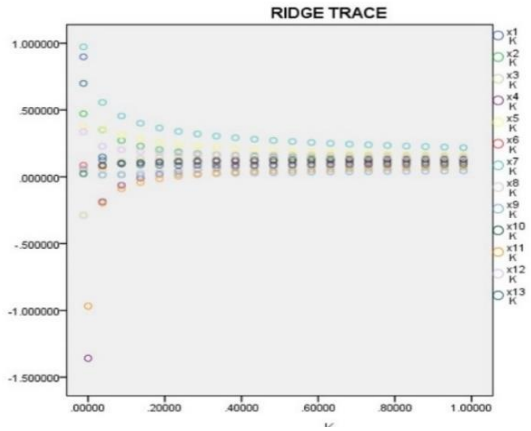

Figure 5 Ridge Trace Map

After analysis, it can be found that when the value of K≥0.3, the regression coefficient tends to be stable, and the smaller the value of K is, the closer it is to 0, and the less information will be lost, so the more accurate the analysis result will be obtained. Take K=0.3, and bring this value into the analysis model to get the contents of table 5, in which the adjusted R square is 0.952, the F value is 51.5278, and the P value is 0.000 of variance analysis, which pass the significance test.

Table 5 The Result of Model Analysis When K=0.3

Model	R	R Square	Adjusted R Square	F value	Sig.
1	.985	.971	.952	51.527880	.000

In 2010, the ridge regression coefficient of per capita disposable income of urban residents is 0.271, which is the most influential factor of the residential land price. People's living standard in areas with high income is also higher. The overall high-income level of the area will attract the labor force from other areas, and the corresponding demand for residential land will also

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increase, which has a positive effect on the residential land price. The ridge regression coefficient of the actually utilized amount of foreign capital in that year in the indicators of economic development is 0.174. In 2010, Shanghai and its surrounding areas had the highest level of residential land price in China. It has given full play to the driving effect of foreign trade on the economy under its geographical location near the sea and active foreign trade economic policy. It has not only greatly promoted the local economy, but also increased the employment opportunities of related industries, and attracted talents from other regions to participate in economic development and construction, which led to the increase in residential land demand and the rise of residential land price.

The ridge regression coefficients of local fiscal revenue and GDP per capita are 0.113 and 0.098, respectively, which also have a high impact on the residential land price. Local revenue can intuitively explain the income situation of a region at a certain time. It shows that under a certain population, the higher the GDP of Local Financial Revenues and Per Capita is, the higher the economic development level of the region is, and the higher the residential land price will be, which is directly proportional to the residential land price. The ridge regression coefficient of total retail Sales of consumer goods is 0.046, which has a small regression coefficient and a small impact on the residential land price. The ridge regression coefficient of total agricultural output value is negatively correlated with residential land price in the indicators of economic development, but the influence degree is not high. Generally speaking, areas with high total agricultural output value have a high degree of agricultural mechanization, large planting area, little demand for residential land, and little influence on the residential land price.

The ridge regression coefficients of the residential population at the end of the year, population density, and urbanization rate in the population index are 0.115, 0.056, and 0.005, respectively. These three factors reflect the degree of influence of the urban population on residential land prices over a period of time. Among the three factors, the residential population at the end of the year has the greatest influence, followed by population density, and the urbanization rate has the least influence on the residential land price. The more the population, the larger the population density will be. The increase in population density indicates that the larger the population per unit area is, the higher the urbanization rate will be. As the rural population concentrates on the cities, the demand for urban residential land will increase, and the residential land price will increase accordingly, which has a positive impact on the residential land price.

The ridge regression coefficient of the resident population at the end of the year in the urban construction index is 0.109, which indicates that people pay more attention to the completeness of the infrastructure in the city where they live. Traffic conditions are very important to daily life and commuting, and residential land prices in areas with good traffic conditions are also relatively high, which has a positive impact on residential land prices. The ridge regression coefficient of the number of hospital beds is 0.019, which indicates that the residential land price will increase correspondingly in places with relatively complete medical facilities, which has a small positive effect on the residential land price.

In the indicators of economic development, the ridge regression coefficient of the average wage of employees is 0.016, which indicates that places with high wages will cause the phenomenon of rural surplus labor force shifting to cities, which will also increase housing demand, thus promoting the growth of the residential land price.

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Combined with the spatial distribution in 2010, it can be seen that the residents' income in areas and the proportion of the tertiary industry is larger, and the residential land price is higher. The residential land price is greatly influenced by residents' living standards, economic development, and population status. There is a large population in these areas, the demand for residential land is greater, and the overall economic level is higher, which makes the residential land price higher, while the economic development and living standard of residents in other areas are relatively lower, and the residential land price is lower.

Analysis of Influencing Factors on Residential Land Price in 2020

After the OLS analysis of influencing factors data in 2020, regression model fitting results are obtained (Table 6 and Table 7). R Square is 0.967, adjust R Square is 0.917, f value is 19.500, P<0.05, and the model fitting result is good.

Table 6 Regression Model Fitting Degree Analysis Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.983	.967	.917	.28747753	1.548

a. Predictors (Constant), X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}.
b. Dependent Variable: Land Price

Table 7 Regression Model Hypothesis Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.008	18	1.612	19.500	.000
	Residual	.992	12	.083		
	Total	30.000	30			

a. Predictors (Constant), X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}.
b. Dependent Variable: Land Price

Table8 Collinearity Description Table

Model		Collinearity statistics	
		Tolerance	VIF
1	(Constant)		
	Zscore(X_1)	.003	330.822
	Zscore(X_2)	.023	43.877
	Zscore(X_3)	.020	48.865
	Zscore(X_4)	.010	102.718
	Zscore(X_5)	.117	8.542
	Zscore(X_6)	.099	10.150
	Zscore(X_7)	.150	6.683
	Zscore(X_8)	.126	7.918
	Zscore(X_9)	.066	15.169
	Zscore(X_{10})	.062	16.215
	Zscore(X_{11})	.276	3.624
	Zscore(X_{12})	.056	17.914
	Zscore(X_{13})	.002	443.428
	Zscore (X_{14})	.050	19.884
	Zscore(X_{15})	.031	32.237
	Zscore(X_{16})	.047	21.199
	Zscore(X_{17}	.034	29.577
	Zscore(X_{18})	.156	6.414

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However, as can be seen from table 8, after further analysis, the Variance Inflation Factor (VIF) of most influencing factors is greater than 10, and there is strong collinearity, which is suitable for ridge regression analysis. According to the algorithm of ridge regression, the regression coefficient is estimated. Through the calculation of the formula, the value of K in ridge regression analysis is from 0 to 1, the step size is set at 0.05, and 21 K values are obtained.

The independent variables that affect the stability of the model with a large fluctuation of the regression coefficient are removed. In the adjusted influencing factors, X_1 is gross domestic product, X_2 is local financial revenue,X_3 is per capita GDP,X_4 is total retail sales of consumer goods, X_5 is gross agricultural output value,X_6 is proportion of tertiary industry in GDP,X_7 is urban per capita disposable income,X_8为actually utilized amount of foreign capital in that year, X_9 is urbanization rate, X_{10} is population density, X_{11} is the green coverage area of developed area,X_{12} is number of hospital beds, X_{13} is administrative area of land.

As shown in Figure 6, when K≥0.4, the regression coefficient tends to be stable, taking K=0.4, and the independent variable with a larger regression coefficient has greater influence. According to the ridge regression coefficient, the influence degree is ranked from strong to weak, and the order is local financial revenue, per capita GDP, urban per capita disposable income, the average wage of employees, administrative area of land, gross domestic product, total retail sales of consumer goods, Proportion of tertiary industry in GDP, gross agricultural output value, the green coverage area of developed area, population density, urbanization rate.

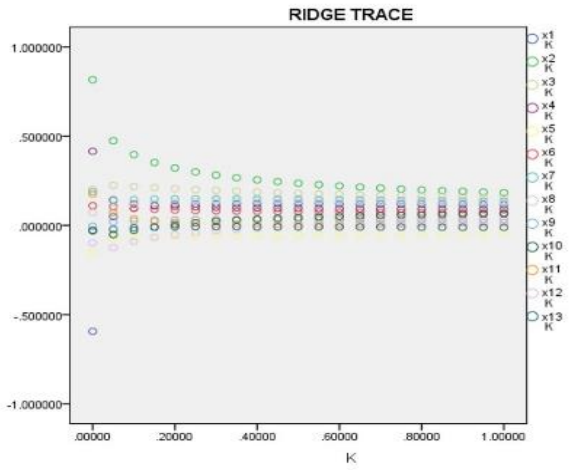

Figure 6 Ridge Trace Map

According to the above analysis, when K≥0.4, the regression coefficient tends to be stable, so take K=0.4, and bring this value into the analysis model to get the contents of table 9. At this time, the adjusted R square is 0.859, the F value is 15.1528, and the P value is 0.000, which passes the significance test. From the results, it can be seen that, except for the gross agricultural output value in the index of economic development level and the administrative area of land in the index of urban construction, all others have a positive impact on the residential land price.

Table 9 The Result of Model Analysis When K=0.4

Model	R	R Square	Adjusted R Square	F value	Sig.
1	.959	.920	.859	15.15288933	.000

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Among the indicators of economic development, the ridge regression coefficient of local financial revenue reaches 0.251, which is proportional to the residential land price and has the greatest influence. Local financial revenue can intuitively reflect the economic situation of a region. The higher the local revenue, the better the economic development and the higher the residential land price. The GDP regression coefficient is 0.118, which is similar to local financial revenue. The higher the GDP, the more value a region creates, and the better the economic development and the positive impact on the residential land price. The ridge regression coefficient of the tertiary industry in GDP is 0.076, because of the promotion of the tertiary industry in GDP, which correspondingly increases the demand for residential land, which has a positive role in promoting the residential land price. The ridge regression coefficient of total retail sales of consumer goods is 0.092, which is an important index to judge the domestic demand and consumption capacity of a country or region and the degree of economic prosperity, and it can reflect the consumption demand. With the growth of consumer demand, the demand for residential land will drive the rise of residential land price.

The ridge regression coefficient of gross agricultural output value has a negative correlation with residential land price, which is expressed as that when the total agricultural output value of a region is higher, the residential land price will decrease accordingly.

The ridge regression coefficients of Per capita GDP in the economic development index and administrative area of land in the urban construction index are 0.193 and -0.141 respectively. Although the two factors have different positive and negative effects, they both have a great influence on the residential land price. Combining these two factors, we can make the following explanation: Per capita GDP of a city not only reflects the economic level, but also shows that based on a certain land area and economic level, the larger the population density, the more prominent the contradiction between people and land, the larger the land demand, and the higher the corresponding residential land price, which has a negative effect.

The ridge regression coefficients of urban per capita disposable income and the average wage of employees are 0.151 and 0.14, respectively. Income is the premise of consumption. The higher the income, the higher the consumption, and the higher the living standard of people in areas with high income, which has a positive effect on the residential land price and a greater impact on the residential land price.

The ridge regression coefficients of urbanization rate and population density in the index are 0.034 and 0.036, respectively. The larger the population per unit area, the higher the demand for residential land, which has a little positive impact on the residential land price.

The ridge regression coefficients of the green coverage area of the developed area and the number of hospital beds are 0.038 and 0.052, respectively. It shows that with the development of the economy, people pay more attention to the greening situation and medical facilities in the cities where they live, and the higher requirements for the living environment will have a small positive impact on the residential land price.

Through the above analysis, it can be found that the evaluation results meet reality. Combined with the spatial distribution in 2020, it can be seen that the residential land price is most affected by the economic development and living standard of residents, but less affected by the population index and urban construction index. The three main factors that affect the residential land price are local financial revenue, per capita GDP, and urban per capita disposable income.

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In areas with high residential land prices, such as Beijing, Tianjin, Shanghai, Hangzhou, Guangzhou, Fuzhou, and Hefei, the per capita disposable income of urban residents and the average wages of on-the-job workers are higher, the living standards of residents are higher, the tertiary industry is developing rapidly, the urban economy is higher, the completeness of urban public facilities and infrastructure is higher, and the demand for residential land is greater. Various factors work together to make the residential land prices in these areas higher, while other areas are affected by economic development and the living standards of residents.

Comparative Analysis of Influencing Factors In 2010 And 2020

(1) Economic development and living standard of residents

The main influencing factors of residential land price in 2010 and 2020 are residents' income level and urban economic development level. But compared with 2010, the main influencing factors of residential land price in 2020 changed from urban per capita disposable income and actually utilized amount of foreign capital in that year to local financial revenue and per capita GDP. It shows that the influence of foreign capital on residential land price is reduced, which may be affected by Covid-19, and the economic activities with foreign countries are reduced. In addition, local financial revenue has become the most influential factor. In order to maintain economic stability, the government's influence on residential land price has been strengthened, and the level of economic development has exceeded the income of urban residents, which has become the main factor affecting residential land prices. Therefore, the residential land price can represent the price potential of the land market, and to some extent, it also reflects the regional economic situation.

Compared with 2010, in 2020, the influence of demographic factors on residential land price has decreased, while the influence of urban construction on residential land price has increased. In 2020, urban construction will be further strengthened, and residential land prices in places with good urban construction will also be high. People's demands for the living environment are increasing, including the scale of schools, hospitals, and road construction in residential areas. The maturity of infrastructure facilities is positively correlated with residential land price. However, there is a negative correlation between the land area in administrative areas and residential land price. The larger the parcel area is, the lower the land value is, and there is little difference between different areas, that is to say, the influence of land area on residential land price is relatively stable.

Conclusion and Discussion

(1) Compared with the general regression analysis model, the ridge regression model has superior tolerance to the collinearity of data (Zhu et al., 2015). It is reasonable to analyze the influencing factors of residential land price by ridge regression, and the results meet the actual situation, which is a good method to analyze the influencing factors of residential land price.

(2) There are two things in common between 2010 and 2020. First, the spatial distribution of residential land price shows the phenomenon of circle attenuation around the high-value center area, while the trend of outward decline of residential land price decreases with the increase of distance from the high-value center. Second, the residential land price as a whole presents the distribution characteristics of "high in the east and low in the west". Compared with 2010, in 2020, the high-value center of the residential land price will move northward. At the same time, compared with the overall improvement of the residential land price level, the land price in the eastern region has increased more.

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(3) In 2010, the main influencing factors of residential land price are urban per capita disposable income, actually utilized amount of foreign capital in that year, and the resident population at the end of the year. In 2020, the main influencing factors of residential land price are local financial revenue, per capita GDP, and urban per capita disposable income. Urban residential land price is influenced by many factors, but with the further growth of economic development and people's demand, it is greatly influenced by economic development and people's living standard. From the macro-scale analysis, the factors that have the greatest influence on residential land price change from the actual amount of foreign capital utilized in disposable income of urban households and the year-end resident population to the regional fiscal revenue, per capita GDP, and disposable per capita income of urban residents. It is still the economic development and living standard of residents in a region that plays a major role in the residential land price. The better these two factors are, the higher the residential land price will be. However, compared with 2010, due to the epidemic situation, foreign economic activities have decreased, which makes the impact of foreign capital on the residential land price lower. It can be seen that residential land price and its influencing factors have also been influenced and changed by it.

(4) When analyzing the spatial distribution characteristics and influencing factors of macro-scale residential land price, although the spatial and two-year analysis is carried out, there is still a lack of continuous multi-year time analysis and comparative analysis between different scales. In future research, the time series of different scales in continuous years can be continued to make the research more complete.

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References

Chen, Z.P., Guo, X., Zhao, L.H., Guo, X.G. (2020). Research on the evaluation of residential land price based on the BP neural network model —— taking Nanchang city as an example [J]. Jiangxi Science, 38 (04): 504-509+536.

GE, H. L., Fang, L. M. (1997). Unbiased ridge regression iterative algorithm [J]. Mathematical practice and understanding, 04:320-326.

Guo, A.Q., Han, S.Q., Li, Z., Sun, Y. (2021). Analysis of land price changes and influencing factors around the capital and Xiong'an new area [J]. Science and Technology and Industry, 21(08):281-287.

Jin, Y. G. (2008). From regression analysis to structural equation model: linear causal relationship modeling methodology [J]. Shandong Economy, (2).

M. Ball, M. Cigden, E Taylor. Urban growth boundaries and their import on land prices [J]. Environment and Planning A, 2014, 46(12):3010-3026.

Sampathkumara, V. M. Helen Santhib, J. Vanjinathanc. (2015). Forecasting the Land Price Using Statistical and Neural Network Software [J]. Procedia Computer Science, 57:112-121.

Shen, H. J., Feng, C.C., Hou, Y. S. (2014). The study of spatial characteristics of urban land price and its influencing factors. Urban Development Studies, 21(3): Inset 4-8.

Wan, L. Y. (2016). Ridge regression analysis and its application [J]. Journal of Xuchang university, 35(02):19-23.

Yang, K.Q., Shi, C. Y., Wang, Y.H. (2013). Spatial structure research on residential land price in Chinese typical urban agglomerations. Economic Geography, 33(6): 135-141.

Volume: 8 Issues: 52 [March, 2023] pp. 131 - 146
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.085212

Yang, K.Q., Wang, Y.H., Zhang, S. L., et al. (2012) The urban land price and its regional differences in China based on a density gradient. Geographical Research, 31(9): 1652-1660.

Yu, J.H., Zhang, W. Z., Dong, G.P. (2013). Spatial heterogeneity in the attributes prices of residential land in Beijing. Geographical Research, 32(6): 1113-1120.

Yu, M.X., Grain, R. J., Li, R. Z. (2021). The Party's people-centered land policy: a hundred years of evolution and development [J]. Management World, 37 (04): 24-35.

Zhou, X.P., Qin, Z. Y., Zhao, S., Chai, Duo. (2019). Spatial pattern, evolution characteristics and influencing factors of China's residential land price-price ratio —— Based on spatial econometric analysis of 35 large and medium-sized cities [J]. China land science, 2019,33(01):40-48.

Zhou, Y., Tang, N., Wang, W. (2020). Study on the influence of multidimensional proximity on the spatial correlation of urban land price [J]. Regional Research and Development, 39(03):65-69+82.

Zhu, J. H., Chen, T., Wang, K.Y., et al. (2015). Spatial pattern evolution and driving force analysis of administrative division in China since the reform and opening-up. Geographical Research, 34(2): 247-258.