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# Regional Comparative Study on the Influence Factors of Real Estate Price in China

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**ABSTRACT**: This study selected 31 provinces in China as research samples, including 11 provinces in the east, 12 provinces in the central region, and 8 provinces in the west. China is divided into three major economic zones for regional research on the factors influencing real estate prices. This study collected data on real estate prices and influencing factors in sample provinces from 2011 to 2021, and selected 10 variables. Ridge regression was used to construct a multiple regression model of real estate prices in the eastern, central, and western regions.Based on the constructed real estate market price influence models in the eastern, central, and western regions, it can be seen that per capita regional gross domestic product is the main factor affecting real estate prices in the eastern region, local government education expenditure is the main factor affecting real estate prices in the central region, and year-end permanent population is the main factor affecting real estate prices in the western region.

**KEYWORDS:** Estate market, Influencing factors, Ridge regression, Regional segmentation.

## I. INTRODUCTION

Real estate plays a crucial role in the economy of many countries. Due to the long industry chain and wide coverage of the real estate industry, its price fluctuations inevitably have significant impacts on individuals and the socio-economic aspects. Despite the downward pressure on the global economy caused by the COVID-19 pandemic, the Chinese real estate industry still performed well in 2022. According to data, the added value of the Chinese real estate industry reached 7,382.13 billion yuan in 2022, showing growth compared to pre-pandemic levels in 2019, with a year-on-year growth rate of 4.79%. In addition, the added value of the Chinese real estate industry contributed 6.11% to the GDP in 2022. As one of the largest industries and pillar industries of the national economy in China, the real estate industry plays an important role in the Chinese economy. However, over time, many problems and shortcomings have emerged in the Chinese real estate market, such as high housing prices, speculative investment, and real estate bubbles. To address these issues, the government has continuously introduced policies such as purchase restrictions, loan restrictions, and price control to curb housing price increases. However, the housing prices in many cities remain high and even continue to rise. Therefore, it is necessary to continue to strengthen the regulation of the real estate market to ensure its healthy and stable development.

The frequent occurrence of speculative investment in the real estate market leads to rapid price increases of commercial housing in certain regions during specific periods. In order to alleviate the negative impact, the government has formulated many policies and regulations to regulate the Chinese real estate market, and urban construction system reform and housing system reform are also continuously being promoted. However, high housing prices have a significant impact on the living standards of residents, which reduces their sense of happiness, and more seriously, high housing prices also affect the development of other industries. In the case of rapid housing price growth, many negative issues often arise, such as prominent social conflicts, unbalanced resource allocation, and uncoordinated industrial structure.

Therefore, it is of great significance to study the influencing factors of real estate prices in eastern, western, and central cities from a regional perspective. By exploring in-depth the multiple factors that affect housing prices, it can provide strong support for the government to formulate more accurate regulation policies, promote the healthy and orderly development of the real estate market, and improve the quality of life of residents. In addition, this research can also provide reference for the development of other industries, thus achieving a balanced allocation of resources and coordinated development of industrial structure.

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## II. SAMPLE SELECTION AND DATE COLLECTION

The aim of this chapter is to quantitatively calculate the degree to which the factors influencing real estate prices in China, affect real estate prices in different regions. According to the division of the three major economic regions by the National Bureau of Statistics of China, the research regions in this paper are divided into 11 eastern provinces, 8 central provinces, and 12 western provinces. In terms of sample selection, this paper selects typical samples for analyzing the factors influencing real estate prices, and collects relevant data. Based on this, a regional impact model for the factors influencing real estate prices in China is designed, and the relevant data is input into the model for calculation to obtain the elasticity coefficients of each influencing factor in different regions.

This study selected 31 Chinese provinces as research samples, including 11 provinces in the eastern region, 12 provinces in the central region, and 8 provinces in the western region.

**TABLE 1 : SAMPLE PROVINCES SELECTED IN THIS STUDY**

| Province Types | Province Names |
|---|---|
| Eastern Region | Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Guangdong, Hainan. |
| Central Region | Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan. |
| Western Region | Inner Mongolia, Guangxi Zhuang Autonomous Region, Chongqing, Sichuan, Guizhou, Yunnan, Tibet Autonomous Region, Shaanxi, Gansu, Qinghai, Ningxia Hui Autonomous Region, Xinjiang Uyghur Autonomous Region. |

This study collected data on real estate prices and influencing factors in the sample provinces from 2011 to 2021, including 10 variables: average selling price of real estate (Y, in yuan per square meter), end-of-year resident population (X1, in ten thousand people), per capita regional GDP (X2, in yuan per person), per capita disposable income of residents (X3, in yuan), land acquisition area of real estate development companies (X4, in ten thousand square meters), completion cost of real estate development (X5, in yuan per square meter), total investment completed by real estate development companies in the current year (X6, in hundred million yuan), local fiscal education expenditure (X7, in hundred million yuan), local fiscal housing security expenditure (X8, in hundred million yuan), number of health technicians per ten thousand people (X9, in people), and per capita urban road area (X10, in square meters). These data were sourced from the National Bureau of Statistics of China.

The research perspective of this study is the factors influencing real estate prices in different regions of China, therefore some data processing is necessary. Specifically, this study averaged the values of real estate prices and influencing factor variables for the provinces included in each region, to obtain the values of these variables for each region. The following tables respectively show the real estate prices and influencing factors for the eastern, central, and western regions.

**TABLE 2 : REAL ESTATE PRICES AND INFLUENCING FACTORS IN THE EASTERN REGION**

| Year | X1 | X2 | X3 | X4 | X5 |
|---|---|---|---|---|---|
| 2011 | 5092.727 | 53317.45 | 20492.55 | 1917.835 | 2847.109 |
| 2012 | 5163.364 | 57249.82 | 22997.55 | 1442.61 | 2956.764 |
| 2013 | 5221.182 | 61804.09 | 25391.09 | 1627.331 | 3065.364 |
| 2014 | 5281.545 | 65903.45 | 27812.82 | 1352.415 | 3312.639 |
| 2015 | 5321.909 | 69858.45 | 30211.91 | 893.1209 | 3559.091 |
| 2016 | 5374.000 | 75195.36 | 32774.09 | 962.8709 | 3539.364 |
| 2017 | 5417.727 | 82366.09 | 35651.18 | 1067.955 | 3668.364 |
| 2018 | 5454.273 | 89773.82 | 38670.09 | 1288.393 | 3754.513 |
| 2019 | 5486.455 | 95510.45 | 41935.64 | 1023.742 | 4144.273 |
| 2020 | 5517.273 | 97447.36 | 43654.73 | 1018.64 | 4332 |
| 2021 | 5530.364 | 110062.3 | 47438.73 | 917.3045 | 4647.909 |

| Year | X6 | X7 | X8 | X9 | X10 | Y |
|---|---|---|---|---|---|---|
| 2011 | 3235.592 | 656.568 | 84.978 | 65.455 | 14.805 | 8576.597 |
| 2012 | 3685.579 | 819.387 | 93.135 | 56.636 | 15.477 | 8682.283 |
| 2013 | 4361.048 | 873.454 | 102.545 | 73.727 | 15.672 | 9413.364 |
| 2014 | 4812.776 | 913.134 | 124.475 | 61.909 | 15.667 | 9611.273 |
| 2015 | 4839.209 | 1044.418 | 150.203 | 64.727 | 15.738 | 10605.727 |
| 2016 | 5112.131 | 1117.315 | 228.125 | 67.818 | 15.660 | 12142.364 |
| 2017 | 5482.928 | 1194.204 | 230.767 | 71.273 | 16.222 | 13353.364 |
| 2018 | 6086.773 | 1275.694 | 226.737 | 75.273 | 16.166 | 14837.978 |
| 2019 | 6558.842 | 1402.473 | 216.718 | 78.909 | 16.665 | 15768.091 |
| 2020 | 7049.329 | 1484.421 | 250.593 | 80.818 | 16.812 | 16851.636 |
| 2021 | 7326.925 | 1562.238 | 273.272 | 85.364 | 18.295 | 17792.909 |

**TABLE 3 : REAL ESTATE PRICES AND INFLUENCING FACTORS IN THE CENTRAL REGION**

| Year | X1 | X2 | X3 | X4 | X5 |
|---|---|---|---|---|---|
| 2011 | 5289.625 | 28689.250 | 12210.875 | 1609.771 | 1982.514 |
| 2012 | 5290.750 | 31923.875 | 13927.625 | 1336.418 | 2198.410 |
| 2013 | 5288.000 | 35007.750 | 15494.500 | 1375.175 | 2256.375 |
| 2014 | 5290.875 | 37702.125 | 17074.000 | 1149.700 | 2482.698 |
| 2015 | 5290.375 | 39390.250 | 18549.875 | 798.295 | 2588.500 |
| 2016 | 5295.125 | 42208.500 | 20038.375 | 795.805 | 2600.750 |
| 2017 | 5296.125 | 46738.875 | 21739.750 | 1032.719 | 2521.000 |
| 2018 | 5289.750 | 51453.125 | 23574.750 | 1022.250 | 2601.306 |
| 2019 | 5284.500 | 55444.000 | 25653.000 | 1018.673 | 2909.500 |
| 2020 | 5251.875 | 56804.375 | 26757.250 | 938.036 | 2959.875 |
| 2021 | 5243.125 | 64714.875 | 29187.750 | 803.563 | 3113.125 |

| Year | X6 | X7 | X8 | X9 | X10 | Y |
|---|---|---|---|---|---|---|
| 2011 | 1666.071 | 505.089 | 129.266 | 42.875 | 13.243 | 4058.031 |
| 2012 | 1970.353 | 692.541 | 168.095 | 47.375 | 13.764 | 4322.188 |
| 2013 | 2380.600 | 692.316 | 166.293 | 47.500 | 14.466 | 4706.375 |
| 2014 | 2582.786 | 710.389 | 176.313 | 52.000 | 14.923 | 4939.500 |
| 2015 | 2629.766 | 799.084 | 214.619 | 54.625 | 15.135 | 5135.375 |
| 2016 | 2910.750 | 856.099 | 221.559 | 56.875 | 15.789 | 5450.500 |
| 2017 | 3201.218 | 920.893 | 206.448 | 59.625 | 15.945 | 6111.750 |
| 2018 | 3412.556 | 976.366 | 210.465 | 62.250 | 17.041 | 6828.450 |
| 2019 | 3732.676 | 1043.810 | 183.878 | 65.875 | 17.565 | 7251.625 |
| 2020 | 3905.754 | 1088.469 | 214.863 | 74.000 | 18.468 | 7416.750 |
| 2021 | 4204.785 | 1095.330 | 198.574 | 77.875 | 19.234 | 7232.125 |

**TABLE 4 : REAL ESTATE PRICES AND INFLUENCING FACTORS IN THE WESTERN REGION**

| Year | X1 | X2 | X3 | X4 | X5 |
|---|---|---|---|---|---|
| 2011 | 3029.167 | 26133.417 | 10618.167 | 862.758 | 2198.864 |
| 2012 | 3047.583 | 29356.250 | 12179.167 | 758.896 | 2438.448 |
| 2013 | 3063.250 | 32721.417 | 13623.833 | 826.027 | 2563.333 |
| 2014 | 3082.750 | 35601.250 | 15040.833 | 775.739 | 2641.305 |
| 2015 | 3102.750 | 37573.500 | 16545.917 | 550.009 | 2851.250 |
| 2016 | 3127.333 | 40520.250 | 18065.583 | 422.268 | 2716.333 |
| 2017 | 3151.250 | 44997.583 | 19795.250 | 458.255 | 2713.000 |
| 2018 | 3166.250 | 49684.417 | 21598.417 | 565.937 | 2935.606 |
| 2019 | 3181.500 | 53392.750 | 23618.667 | 534.312 | 2914.667 |

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| | | | | | |
|---|---|---|---|---|---|
| 2020 | 3192.333 | 55337.417 | 25034.750 | 568.913 | 3138.583 |
| 2021 | 3190.083 | 62999.417 | 27405.333 | 422.584 | 3350.500 |

| Year | X6 | X7 | X8 | X9 | X10 | Y |
|---|---|---|---|---|---|---|
| 2011 | 1073.068 | 352.944 | 126.916 | 42.333 | 12.827 | 3916.858 |
| 2012 | 1291.634 | 465.591 | 141.623 | 47.083 | 13.242 | 4251.629 |
| 2013 | 1583.088 | 479.051 | 134.793 | 49.000 | 14.076 | 4562.750 |
| 2014 | 1786.063 | 505.043 | 154.883 | 54.833 | 15.427 | 4910.250 |
| 2015 | 1809.120 | 586.038 | 168.889 | 57.583 | 16.391 | 4897.583 |
| 2016 | 1921.763 | 623.817 | 171.410 | 60.750 | 16.208 | 5055.250 |
| 2017 | 1989.713 | 675.116 | 161.818 | 65.083 | 16.340 | 5737.167 |
| 2018 | 2167.380 | 716.225 | 176.841 | 68.750 | 17.000 | 6552.590 |
| 2019 | 2515.467 | 765.284 | 165.369 | 73.750 | 18.812 | 7030.250 |
| 2020 | 2721.193 | 804.158 | 168.674 | 77.083 | 20.586 | 7403.083 |
| 2021 | 2780.636 | 819.270 | 155.705 | 81.333 | 20.971 | 7245.583 |

## III. MODEL FOR REGIONAL ANALYSIS OF FACTORS INFLUENCING REAL ESTATE PRICES IN CHINA BASED ON CROSS-SECTIONAL DATA

This study selected 10 factors, including end-of-year resident population, per capita regional GDP, per capita disposable income of residents, land acquisition area of real estate development companies, completion cost of real estate development, total investment completed by real estate development companies in the current year, local fiscal education expenditure, local fiscal housing security expenditure, number of health technicians per ten thousand people, and per capita urban road area, to conduct a regression analysis with real estate prices using the ridge regression method. This section will establish a model for regional analysis of factors influencing real estate prices in China based on cross-sectional data.

The multiple linear regression model is a widely used statistical analysis method in various fields such as economics and society. Based on the principle of least squares, this method is used to estimate the impact of several independent variables on a dependent variable. Assuming that the dependent variable is y, the independent variables are x1, x2, x3, ..., xm, and there are n sets of observed data for the independent and dependent variables, the multiple linear regression model can be expressed as:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki} + \beta_m x_{mi} + \varepsilon_i$$

($i$=1,2,3,...,n;$k$=1,2,3,...m)

（Equation 1）

In the equation, $y_i$ and $x_{ki}$ respectively represent the values of the dependent variable $y$ and the kth independent variable $x_k$ in the ith observed sample. $\beta_k$ is the partial regression coefficient of the equation, representing the change in the dependent variable $y_i$ caused by a one-unit change in the independent variable $x_k$, while holding the other independent variables constant. $\beta_0$ represents the intercept or constant term in the equation. $\varepsilon_i$ represents the random error term or residual, which accounts for unexplained variation in the dependent variable.

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Based on the multiple linear regression model introduced above, this study constructed a model for the regional differences in factors affecting real estate prices in China, as shown in Equation 2:

$$Y_i = A_i + B_i x_{1i} + C_i x_{2i} + D_i x_{3i} + E_i x_{4i} + F_i x_{5i} + G_i x_{5i} + H_i x_{6i} + I_i x_{7i} + J_i x_{8i} + K_i x_{9i} + L_i x_{10i} + \varepsilon_i$$

（Equation 2）

In the equation, i represents each region. When i = 1, Equation 2 represents the model for the

factors influencing real estate prices in the Eastern region; when i = 2, Equation 2 represents the model for the factors influencing real estate prices in the Central region; when i = 3, Equation 2 represents the model for the factors influencing real estate prices in the Western region. Y represents the average sales price of real estate in each region, X1 represents the end-of-year resident population, X2 represents the per capita regional GDP, X3 represents the per capita disposable income of residents, X4 represents the land acquisition area of real estate development companies, X5 represents the completion cost of real estate development, X6 represents the total investment completed by real estate development companies in the current year, X7 represents the local fiscal education expenditure, X8 represents the local fiscal housing security expenditure, X9 represents the number of health technicians per ten thousand people, and X10 represents the per capita urban road area.

When dealing with multicollinearity in multiple linear regression, principal component regression, partial least squares regression, and ridge regression are commonly used methods. While principal component regression can alleviate the problem of multicollinearity, the extracted principal components may contain meaningless information, leading to decreased explanatory power. In contrast, partial least squares regression can better explain the dependent variable and produce reliable results, but is more suitable for regression models with many variables. On the other hand, when there are fewer independent variables, ridge regression is a more appropriate method. Ridge regression sacrifices some unbiasedness to eliminate multicollinearity by losing a small amount of information and precision, resulting in more scientific estimates of regression coefficients. Although applying ridge regression may lead to a larger residual standard deviation, it performs better when dealing with severe multicollinearity data. Therefore, this study chose ridge regression as the method for eliminating multicollinearity.

Ridge regression is a method used to overcome multicollinearity between variables. When there is severe multicollinearity between independent variables, the determinant of the correlation matrix of the independent variables will be close to zero, indicating high matrix singularity. To solve this problem, a positive definite matrix can be added to the correlation matrix to improve its singularity. This allows the use of ridge estimation as the estimate of the regression coefficients, which is more stable than the least squares estimate

If a positive definite matrix $kI$ is added to $X^TX$, the singularity of $X^TX+kI$ will be improved. This way, $\widehat{\beta}(k)=(X^TX+kI)^{-1}X^TY$ can be used as the estimate of regression coefficients, which is more stable than least squares estimation. The estimate is called the ridge estimate of regression coefficients, denoted as $\widetilde{\beta}(k)$. Obviously, when $k=0$, the ridge estimate degenerates into the least squares estimate, and when *k* is set too large, the bias of the ridge estimate also increases. Therefore, it is necessary to choose an appropriate value of K to balance between preserving information and minimizing the ridge estimate. This can be done by observing how the regression coefficients change as K takes different values and choosing the smallest value of K that results in stable regression coefficients. Alternatively, the ridge trace can be observed to determine the value of K at which the ridge trace curve of each variable becomes stable.

## IV. ANALYSIS OF RIDGE REGRESSION RESULTS

(1)The degree of influence of various factors on real estate prices in the eastern region.

Performing ridge regression using R version 4.0.4, we obtained the ridge trace plot (Figure 1) and diagnostic plot for examining changes in the relationship between the response and predictors (Figure 2) of the model for the factors influencing real estate prices in the eastern region

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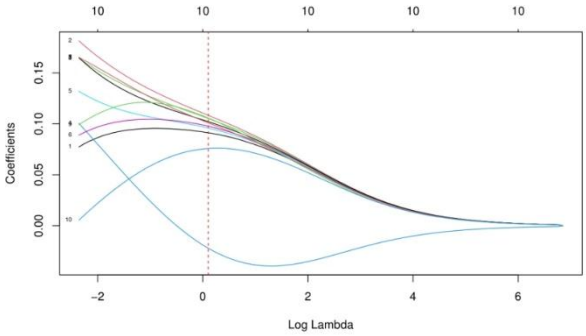


**FIGURE 1: RIDGE TRACE PLOT OF THE MODEL FOR ANALYZING FACTORS INFLUENCING REAL ESTATE PRICES IN THE EASTERN REGION**

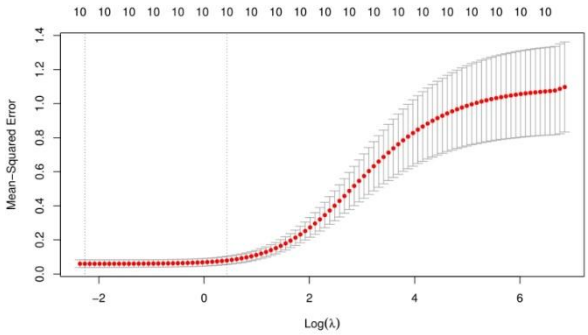


**FIGURE 2: FITTED RIDGE REGRESSION MODEL AT THE OPTIMAL LAMBDA VALUE**

Based on Figure 1 and Figure 2, it can be concluded that the optimal lambda value is 0.1037, as the curves in both plots become smoother from this value onwards. Therefore, this study selected lambda to be 0.1037, and the resulting ridge regression coefficients are presented in Table 5.

**TABLE 5: RIDGE REGRESSION RESULTS OF THE MODEL FOR ANALYZING FACTORS INFLUENCING REAL ESTATE PRICES IN THE EASTERN REGION**

| | regression coefficients | |
|---|---|---|
| | X1 | 0.0756 |
| | X2 | 0.1729 |
| | X3 | 0.1606 |
| | X4 | 0.0951 |
| | X5 | 0.1313 |
| | X6 | 0.0945 |
| | X7 | 0.1631 |
| | X8 | 0.1644 |
| | X9 | 0.1027 |
| | X10 | 0.0094 |
| | intercept | 3.58E^-16 |
| R | | 0.9763 |
| R-square | | 0.9532 |

Based on Table 5, the ridge regression model has a high goodness of fit with a R-squared value of 0.9532 and all regression coefficients have meaningful signs in line with the research objectives. Therefore, the model for analyzing factors influencing real estate prices in the eastern region can be formulated as follows (Equation 3):

$$Y_1 = 3.58E\text{^} - 16 + 0.0756X_1 + 0.1729X_2 + 0.1606X_3 + 0.0951X_4 + 0.1313X_5 + 0.0945X_6 + 0.1631X_7 + 0.1644X_8 + 0.1027X_9 + 0.0094X_{10} \quad \text{Equation 3}$$

(2) The degree of influence of various factors on real estate prices in the central region. Performing ridge regression fitting using R version 4.0.4, we obtain the ridge trace plot 3 and the plot of changes in the coefficient estimates 4 for the model analyzing factors influencing real estate prices in the central region.

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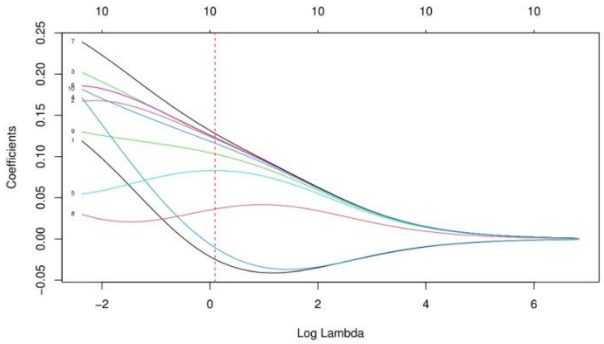


**FIGURE 3: RIDGE TRACE PLOT FOR THE MODEL ANALYZING FACTORS INFLUENCING REAL ESTATE PRICES IN THE CENTRAL REGION**

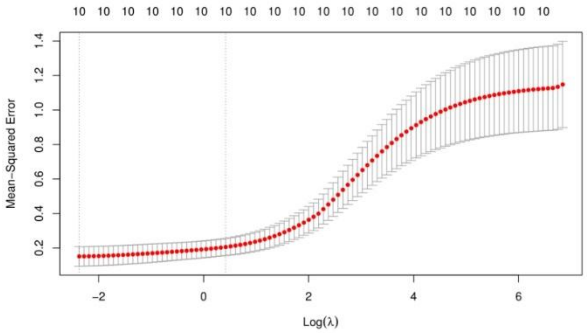


**FIGURE 4: FIT OF RIDGE REGRESSION MODEL AT THE OPTIMAL LAMBDA VALUE**

Based on Figures 3 and 4, the value of lambda that appears to be most appropriate is 0.0933, as the curves in both plots start to level off around this value. Therefore, we have selected a value of 0.0933 for lambda in this study, and the resulting ridge regression results can be found in Table 6.

**TABLE 6 RIDGE REGRESSION RESULTS FOR THE MODEL ANALYZING FACTORS INFLUENCING REAL ESTATE PRICES IN THE CENTRAL REGION**

| | regression coefficients | |
|---|---|---|
| | X1 | 0.1900 |
| | X2 | 0.1651 |
| | X3 | 0.2011 |
| | X4 | 0.1719 |
| | X5 | 0.0539 |
| | X6 | 0.1855 |
| | X7 | 0.2398 |
| | X8 | 0.0304 |
| | X9 | 0.1320 |
| | X10 | 0.1832 |
| | intercept | -2.22E^-15 |
| R | | 0.9648 |
| R-square | | 0.9307831 |

Based on Table 6, the ridge regression model has a high goodness of fit with a R-squared value of 0.9648 and all regression coefficients have meaningful signs in line with the research objectives. Therefore, the model for analyzing factors influencing real estate prices in the central region can be formulated as follows (Equation 4):

$$Y_1 = -2.22E\text{^} - 15 + 0.1900X_1 + 0.1651X_2 + 0.2011X_3 + 0.1719X_4 + 0.0539\mathrm{X}_5 + 0.1855X_6 + 0.2398X_7 + 0.0304X_8 + 0.1320X_9 + 0.1832X_{10} \quad \text{(Equation 4)}$$

(3) The degree of influence of various factors on real estate prices in the western region.

Performing ridge regression fitting using R version 4.0.4, we obtained the ridge trace plot 5 and the plot of changes in the coefficient estimates 6 for the model analyzing factors influencing real estate prices in the western region.

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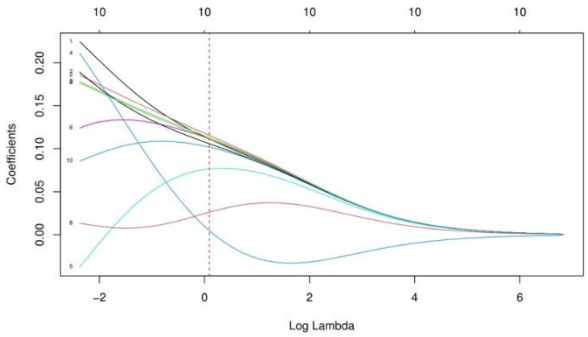


**FIGURE 5 RIDGE TRACE PLOT FOR THE MODEL ANALYZING FACTORS INFLUENCING REAL ESTATE PRICES IN THE WESTERN REGION**

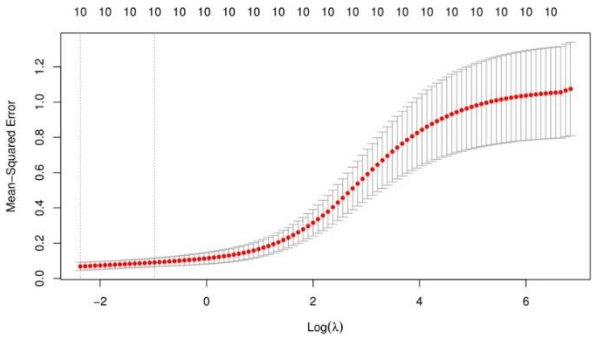


**FIGURE 6 FIT OF RIDGE REGRESSION MODEL AT THE OPTIMAL LAMBDA VALUE**

Based on Figures 5 and 6, the value of lambda that appears to be most appropriate is 0.0932, as the curves in both plots start to level off around this value. Therefore, we have selected a value of 0.0932 for lambda in this study, and the resulting ridge regression results can be found in Table 7.

**TABLE 7 RIDGE REGRESSION RESULTS FOR THE MODEL ANALYZING FACTORS INFLUENCING REAL ESTATE PRICES IN THE WESTERN REGION**

| | regression coefficients | |
|---|---|---|
| | X1 | 0.2216 |
| | X2 | 0.1839 |
| | X3 | 0.1804 |
| | X4 | 0.2101 |
| | X5 | -0.0355 |
| | X6 | 0.1272 |
| | X7 | 0.1897 |
| | X8 | 0.0133 |
| | X9 | 0.1757 |
| | X10 | 0.08304 |
| | intercept | -3.36E^-16 |
| R | | 0.9689 |
| R-square | | 0.9388 |

Based on Table 7, the ridge regression model has a high goodness of fit with a R-squared value of 0.9388 and all regression coefficients have meaningful signs in line with the research objectives. Therefore, the model for analyzing factors influencing real estate prices in the western region can be formulated as follows (Equation 5):

$$Y_1 = 3.36E^{\wedge} - 16 + 0.2216\,X_1 + 0.1839X_2 + 0.1804X_3 + 0.2101X_4 - 0.0355X_5 + 0.1272X_6 + 0.1897X_7 + 0.0133X_8 + 0.1757X_9 + 0.08304X_{10} \quad \text{Equation 5}$$

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## V. DISCUSSION

(1)The degree of influence of various factors on real estate prices in the provinces of the eastern region

Based on the regression coefficients of the independent variables in Equation 3, the elasticity coefficients of the factors influencing real estate prices in the eastern region's provinces from 2011 to 2021 can be arranged in descending order by the absolute value of their magnitudes: per capita regional GDP (0.1729), local government housing security expenditures (0.1644), local government education expenditures (0.1631), per capita disposable income of all residents (0.1606), completed housing construction cost by real estate development enterprises (0.1313), number of health technicians per 10,000 people (0.1027), area of land purchased by real estate development enterprises (0.0951), investment completed by real estate development enterprises this year (0.0945), year-end resident population (0.0756), and per capita urban road area (0.0094). These indicators have a positive impact on real estate prices in the eastern region's provinces, meaning an increase in the quantity of these indicators will lead to a rise in real estate prices. Among them, per capita regional GDP has the most significant impact on real estate prices in the eastern region's provinces, with an elasticity coefficient of 0.1729. That is, when the other factors influencing real estate prices remain constant, a 1% increase in per capita regional GDP will result in a 0.1729% increase in real estate prices in the eastern region's provinces. This indicates that per capita regional GDP is the primary factor influencing real estate prices in the provinces of the eastern region.

(2)The degree of influence of various factors on real estate prices in the provinces of the central region

Based on the regression coefficients of the independent variables in Equation 4, the elasticity coefficients of the factors influencing real estate prices in the central region's provinces from 2011 to 2021 can be arranged in descending order by the absolute value of their magnitudes: local government education expenditures (0.2398), per capita disposable income of all residents (0.2011), year-end resident population (0.1900), investment completed by real estate development enterprises this year (0.1855), per capita urban road area (0.1832), area of land purchased by real estate development enterprises (0.1719), per capita regional GDP (0.1651), number of health technicians per 10,000 people (0.1320), completed housing construction cost by real estate development enterprises (0.0539), and local government housing security expenditures (0.0304). These indicators have a positive impact on real estate prices in the central region's provinces, meaning an increase in the quantity of these indicators will lead to a rise in real estate prices. Among them, local government education expenditures have the most significant impact on real estate prices in the central region's provinces, with an elasticity coefficient of 0.2398. That is, when the other factors influencing real estate prices remain constant, a 1% increase in local government education expenditures will result in a 0.2398% increase in real estate prices in the central region's provinces. This indicates that local government education expenditures are the primary factor influencing real estate prices in the provinces of the central region.

(3) The degree of influence of various factors on real estate prices in the provinces of the western region

Based on the regression coefficients of the independent variables in Equation 5, the elasticity coefficients of the factors influencing real estate prices in the western region's provinces from 2011 to 2021 can be arranged in descending order by the absolute value of their magnitudes: year-end resident population (0.2216), area of land purchased by real estate development enterprises (0.2101), local government education expenditures (0.1897), per capita regional GDP (0.1839), per capita disposable income of all residents (0.1804), number of health technicians per 10,000 people (0.1757), investment completed by real estate development enterprises this year (0.1272), per capita urban road area (0.0830), local government housing security expenditures (0.0133), and completed housing construction cost by real estate development enterprises (-0.0355). The year-end resident population has the most significant impact on real estate prices in the western region's provinces, with an elasticity coefficient of 0.2216. That is, when the other factors influencing real estate prices remain constant, a 1% increase in the year-end resident population will result in a 0.2216% increase in real estate prices in the western region's provinces. This indicates that the year-end resident population is the primary factor influencing real estate prices in the provinces of the western region..

## VI. RESEARCH CONCLUSIONS

The real estate market is directly related to the national economy and people's livelihoods, especially in the context of the global economic downturn in the past decade and the COVID-19 pandemic in the past three years. Whether the

government can formulate reasonable and effective policies to guide and control the real estate market plays a decisive role in the recovery of the national economy. According to the classification of China's National Bureau of Statistics, China is divided into three major economic regions: the eastern, central, and western regions. The regional differences in real estate prices are undoubtedly huge, and the factors affecting regional real estate prices are different. Therefore, the government's real estate policies should be formulated according to the degree of impact of different regional factors on real estate market prices. This study selected 31 provinces from the three major economic regions as samples and selected 10 variables including year-end resident population, per capita regional GDP, per capita disposable income of all residents, the area of land purchased by real estate development enterprises, the cost of completed real estate development projects, the amount of investment completed by real estate development enterprises this year, local government education expenditures, local government housing security expenditures, the number of health technicians per 10,000 people, and per capita urban road area from the demand and supply perspectives, to construct the real estate market price impact model for the eastern, central, and western regions through ridge regression analysis.

The results of the constructed real estate market price impact model for the eastern, central, and western regions show that per capita regional GDP is the primary factor affecting real estate prices in the eastern region provinces, local government education expenditures are the primary factor affecting real estate prices in the central region provinces, and year-end resident population is the primary factor affecting real estate prices in the western region provinces.

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