Research on the Prediction of the Housing Pricing in China

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Abstract:

As an important cornerstone of industrial development, real estate has been widely concerned by people. A house can not only provide a place of peace for people, but also provide a certain source of income for many people. A stable house price will give people confidence in their economy. After 2007, there have been obvious changes in house prices, which further increase the difficulty of forecasting and reduce the accuracy of forecasting. As a typical forecasting model, linear regression is favored by scholars all over the world for its accuracy and adaptability. This paper will use this model to forecast the house price in the next year. The conclusion is as follows: In the coming year, the overall trend will show a more obvious upward trend. Therefore, it is recommended to invest in real estate in the short term. At the same time, this paper believes that ensuring the stability of domestic housing prices can improve people's quality of life and enhance the status of the country in the hearts of the people.

Keywords: Prediction; China average house's price; linear regression model.

1. Introduction

In China, buying a house is the goal of most young people and what most middle-aged people are willing to devote their time and energy to. Wen mentioned that in 2012, the Chinese invested $1.23 billion in total in U.S. real estate, second only to Canadians, which shows the enthusiasm of Chinese people for buying a house [1]. The main reasons for buying houses are as follows. The first one is investment appreciation. Real estate is often viewed as a long-term investment, and the property has the potential to increase in value over time, providing potential financial benefits to the homebuyer. Many out-of-towners will accumulate a lot of wealth and buy a house in some big cities because the big cities develop fast and the housing price rises faster. Qing stated that in big cities like Beijing, for example, nearly half of the high-end commercial houses are bought by outsiders. Buying a house is gradually becoming a new investment orientation for Chinese people [2]. The second is immigration or long-term residence. In some countries, buying a home may help to obtain long-term residency or immigration status. Li mentioned that Chinese buyers of real estate in Spain have been officially granted an investment visa thanks to the Spanish Entrepreneurship Law, which came into effect last year [3]. The last one is better living environment. Some people may look for an environment that is more suitable for their life, such as a country with a pleasant climate, abundant educational resources, or superior medical conditions. More and more families are beginning to consider settling overseas [4].

With the rising demand for houses, house prices are getting higher and higher, thus causing new problems. According to the relevant statistics, in China, housing prices have risen rapidly as marriage rates have fallen [5]. At the same time, Yin's research pointed out that rising housing prices inhibit firms' innovation investment, which hinders the progress of the industrial value chain [6]. In addition, the study showed that rising house prices exacerbate urban-rural income inequality across the country, thereby negatively impacting the achievement of common prosperity [7].

However, the higher and higher house prices make more and more young people can not afford to buy a house. Due to the shock of COVID-19 and the rise of new-age ideas, an increasing number of people are now abandoning the old generation's idea of buying a house and instead investing their money in hobbies or interests. As a result, the demand for houses began to taper off. Not only the young but also the elderly lose their passion for buying houses. Some scholars believe that the aging population structure will have a depressing effect on housing prices [8]. According to the data, the sales price of new residential buildings in many first-tier cities fell 0.5 percent, the same decline as the previous month. Among them, Beijing, Guangzhou, and Shenzhen fell 0.5 percent, 0.8 percent and 0.9 percent respectively [9]. Businesses linked to real estate, such as hotels, were also affected. There was a new

trend in hotels around the country, which is to increase the number but reduce the price [10]. But not all prices have fallen, and even in the recession, some homes have risen in value and remain an investment of choice for businessmen. Therefore, this paper can predict the future housing price of China through the linear regression model to see if it is suitable for investment.

2. Methods

2.1 Data Source

The data is taken from the National Bureau of Statistics, which is the yearly average of the price of houses calculated in RMB, from 2014 to 2022. In addition, data on the GDP per capita of China was also searched by China Chief Economists Forum.

2.2 Variable Description

Housing prices directly affect people's quality of life. High housing prices may lead to difficulties in buying a house, increase the financial burden on families, and affect living standards. Rising rental costs will also reduce disposable income, making life more stressful. At the same time, house price fluctuations can also affect an individual's financial stability and investment decisions. Low house prices may affect asset appreciation and economic vitality, but they can help improve housing accessibility and reduce household burden.
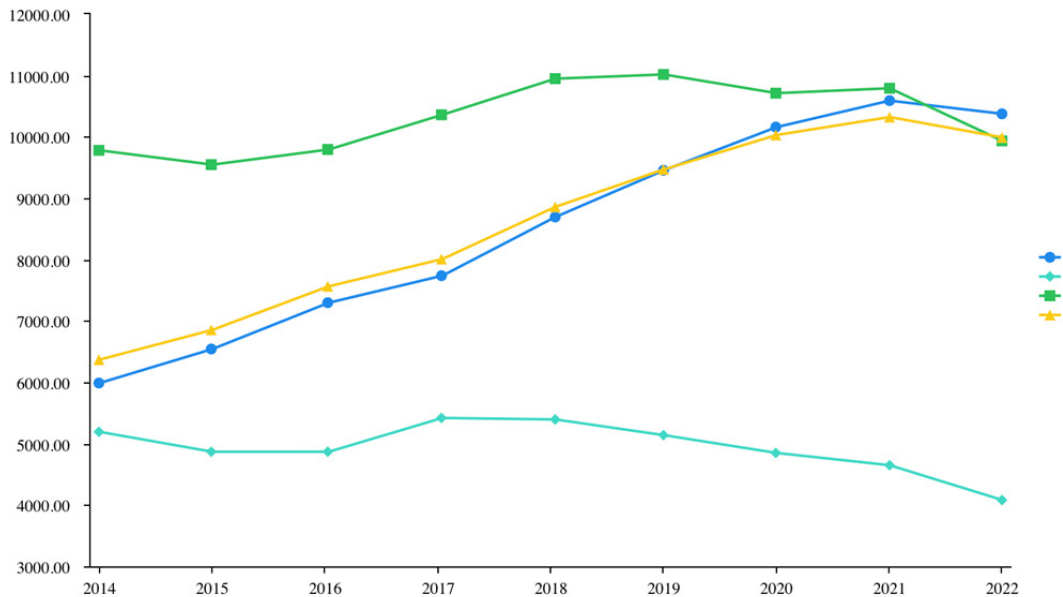

Fig. 1 Price of houses in China

Figure 1 shows the average selling price of each of the four different home types. It can be seen that for commercial housing and residential housing (yellow and blue lines), prices have been rising until 2021, and there is only a slight decline between 2021 and 2022. For commercial and other commercial housing (turquoise line), the price is not so stable compared with the other two. Other commercial housing (green line) had a slight decline and recovery before 2016, and a steady decline after 2021. Commercial occupancy, on the other hand, generally continued to rise in 2015 and then began to decline gradually around 2017. From this, this article shows that the price of the house is also related to the function of the house.

2.3 Model Selection

The linear regression model is chosen in this paper. Linear regression is a statistical method used to study the linear relationship between a dependent variable (the target variable) and one or more independent variables (the predictor variable). The basic linear regression model can be expressed by the following equation:

$$y = \beta_0 + \beta_1 x_1 \tag{1}$$

In this formula, y represents the dependent variable (the variable you want to predict). x_1 represents the independent variable (the variable used to predict the dependent variable). And β_0 represents the intercept, indicating the expected value of the dependent variable when the independent variable (x) is zero. Lastly, β_1 represents the regression coefficient, indicating the change in the dependent variable (y) with each increase in the independent variable (x). The goal of linear regression is to minimize the error between the predicted value and the actual observed value by finding the best (β_0) and (β_1) values.

3. Results and Discussion

3.1 Data Collection

Since some researchers found that rent collection can bring regular income, which is the favorite project of many investors, this article focuses on the residential housing price forecast. It can be seen from the image that the full purchase of a house requires a lot of money, which is closely related to today's economic situation. Therefore, the dependent and independent variables focus on future housing prices and estimated per capita GDP (Table 1).

Table 1. Average sale price of houses and GDP per head during 2014 and 2022

Year	GDP per capita	Average sale price of houses
2014	46912	5988
2015	49922	6542
2016	53783	7297
2017	59592	7736
2018	65534	8694
2019	70078	9454
2020	71828	10158
2021	81370	10589
2022	85310	10375

According to the existing data, firstly organizing the data into a visual scatter plot, which is convenient for the readers to roughly observe whether GDP and housing prices are really related, and ensure that the use of a linear regression model is feasible.
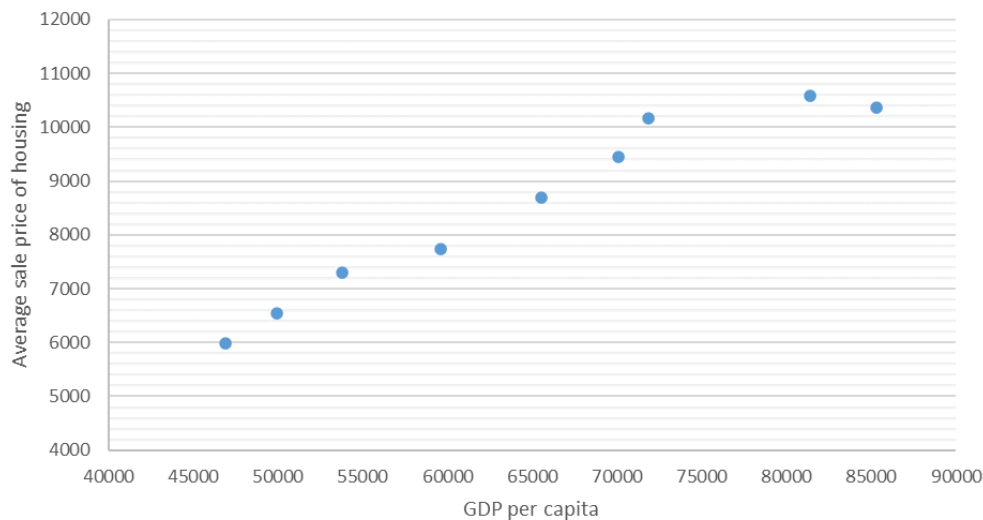

Fig. 2 The relationship between GDP and price of houses in China

It can be concluded from Figure 2 that the points in the figure are basically on the same level and have a positive correlation. Basically, when GDP per capita goes up, house prices go up with it. And when GDP per capita falls, so do house prices.

3.2 Model Construction

The historical data will be used to initially build the model to find the best regression coefficient so that the model predicts the house price as close as possible to the actual house price. The least squares method (OLS) is used to minimize the error between the predicted value and the actual value.

The least squares method (OLS): It is a mathematical method for data fitting and estimating model parameters, with the goal of finding a regression line that minimizes the sum of squares of errors. Here computers are used to

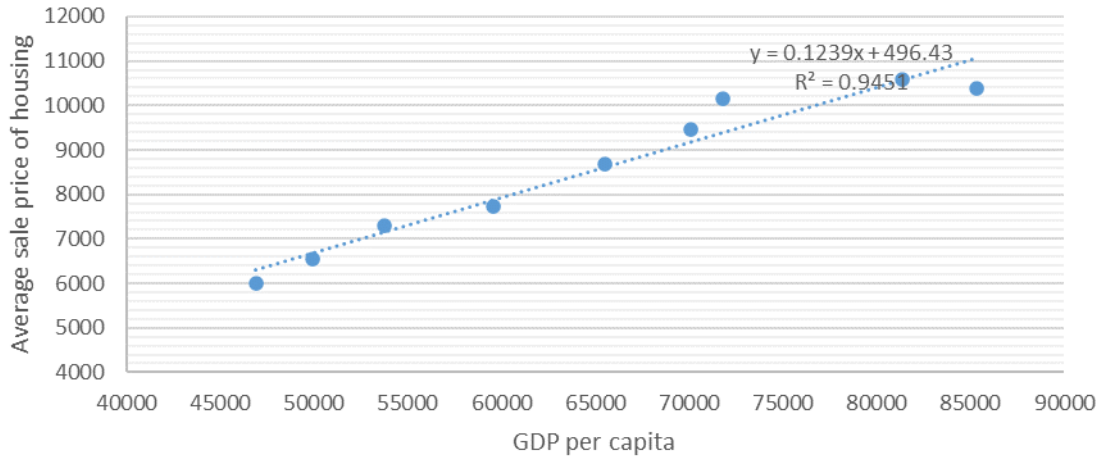calculate and plot the regression line to improve accuracy.

Fig. 3 Regression line modeled by computer according to data above

The regression line shown in Figure 3 is $y = 0.1239x + 496.43$, which was shown by the article that $\beta_0 = 496.43$ and $\beta_1 = 0.1239$. Therefore, the relationship between the price of houses and GDP per capita is that $price = 0.1239 \times GDP + 496.43$.

3.3 Model Evaluation

There are some other data related to linear regression so that the model can be analyzed by this article more clearly. First, GDP is taken as the independent variable, and the average sales price of residential commercial housing (yuan/square meter) is taken as the dependent variable for linear regression analysis. The coefficient of determination (R² value) is used to measure how well the model fits, also known as adjusted regression square sum ratio. It measures the proportion of variance in the dependent variable that can be predicted by changes in the independent variable. The higher this index is, the better the linear regression model fits the data. the R^2 value of the model is 0.945, which means that GDP can explain about 94.5% of the change in the average sales price of residential commercial housing.

Moreover, when F-test is performed on the model, it is found that the model passes the F-test (F=120.486, p=0.000< 0.05), that is, GDP will definitely have an impact on the average sales price of residential commercial housing

To sum up, the model formula is as follows: The average sales price is $price = 0.1239 \times GDP + 496.43$. This model is considered to be able to predict very accurately according to the description above.

3.4 Prediction for 2024 Sale Price

According to the China Chief Economists Forum, which predicts GDP growth of about 4.6 percent next year, this means that the GDP per capita in 2024 is expected to be about 93468. Adding this forecast number to the model just now will come out the real estate forecast for next year.

$$y = 0.124 \times 93468 + 496.43 = 12086.5 \qquad (2)$$

So, the final article's forecast for the average sales price of residential commercial housing (yuan/square meter) is 12086.5, which is higher compared to the previous year.

3.5 Other External Effects

House prices are influenced by a number of other external factors. First of all, policy regulation regulates the real estate market through measures such as purchase restrictions and loan restrictions. When housing prices rise too fast, the government will tighten policies to curb demand and ease price increases. Easing, on the other hand, would stimulate the market and push up housing prices. Construction cost is an important factor affecting housing prices. Secondly, rising material prices and increasing labor costs have led to rising construction costs for developers, thus driving up housing prices. Finally, the rise in land prices will also push up development costs and affect the level of housing prices. Urbanization has intensified the demand for housing in big cities. An influx of people and improved infrastructure have made urban properties more attractive, and the imbalance between supply and demand has pushed up prices.

4. Conclusion

Through the study of this paper, it can be concluded that

in the next year, with the increase in GDP per capita, the average house price will rise. However, further forecasts will become inaccurate due to the uncertainty of other external factors. At the same time, in recent years, the world has been affected by the epidemic, the national economy has been impacted, and it is in the recovery period, which will make future housing prices more difficult to predict.

Through the prediction and research in this paper, some suggestions can be put forward. From a personal point of view, it is a reasonable choice to make a related investment in a house in the short term. Due to the rising trend of house prices, buying a house in a big city and renting it out can bring a certain amount of income. From the point of view of the state, the government should increase its intervention in the housing price to prevent the high price of the common people who can not afford to buy a house. It also prevents many investors from buying too many homes, leading to shortages and inflated prices. This can not only maintain the stable development trend of the domestic economy but also improve the people's happiness index so that people have a stable home.

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