

Study On Influencing Factors of Real Estate Price Fluctuation from The Perspective of Behavioral Economics

Ruyu Huang

School of Economics and Management, Nanjing University of Science and Technology, Nanjing, China

Abstract. Due to the dual attributes of investment attribute and consumption attribute of real estate, its price volatility is more complex than that of ordinary investment goods and consumer goods. It has always been the object of close attention of real estate market researchers, policy makers, investors and people who have the need to buy a house. Starting from the theory of behavioral economics, this paper analyzes the impact of investors' behavior difference on housing price fluctuation in the real estate market. This paper selects the monthly data of Nanjing, Suzhou, Changzhou and Wuxi from 2011 to 2020 and uses the heterogeneity expectation model for empirical analysis. The results show that, different from super first-tier cities such as Beijing, Shanghai, Guangzhou and Shenzhen, fundamental investors have the power to restore the housing price to the benchmark housing price, while trend investors will not push the housing price further offset. The fluctuation of housing prices are more dependent on fundamental investors.

Keywords: House price fluctuation, Behavioral economics, Heterogeneity expectation.

1. Introduction

Many scholars have studied the influencing factors of housing price fluctuations. The earliest research results show that the price of real estate is mainly affected by the basic factors such as demand and cost, just like ordinary commodities. The research on its price fluctuations also starts from traditional economic theories, such as macro factors, economic growth rate, policy factors and other basic factors to explain the housing price fluctuations. But the fact is that the market often deviates from the traditional economic theory of strange phenomena, for example, in the case of economic depression, the effective demand of the market is insufficient, the real estate price still continues to rise, in many cases, the fundamental factors can not give a good explanation of housing price fluctuations. Later, behavioral economics emerged. Its theoretical basis, which relaxes the assumption of rational man and is closer to reality, has been favored by many scholars.

The method of behavioral economics can make up for the defects of traditional economic theories. Most of its theoretical basis is applied to the financial market as the opposite of the efficient market hypothesis. By improving it and applying it to the study of the price fluctuation of the real estate market, we can better understand the market closely related to our lives. It is of certain practical significance to study the influencing <https://fanyi.youdao.com/download> factors of real estate price fluctuation by using behavioral research method. This paper tries to find out the influencing factors of real estate price fluctuation from the perspective of behavioral economics and heterogeneous investment behavior theory.

2. Literature References

In the explanatory research on the irrationality of the real estate market, Salzman and Zwinkels[1] summarized the cognitive limitations and behavioral biases that buyers may have when making house purchase decisions through a large number of facts, including 11 types such as excessive optimism, confirmation bias and herding behavior. The research results show that the hypothesis that the participants in the market are rational "economic men" believed in by neoclassicism is obviously not valid in the real estate market, and the behavior of homebuyers usually deviates from the rational behavior. Mayer and Sinai [2] concluded that buyers' expectation of house price was obtained by referring to the recent historical data of house price. By analyzing the data from 1984 to 2016, they

concluded that the house price appreciation rate with a lag of 5 years had a great impact on the prosperity of the real estate market in major American cities. Baddley [3] pointed out the significant herding behavior in the British housing market from 1981 to 2000 through empirical test.

Domestic researchers Gao Changmiao and Chen Mingzheng[4] believe that the easing of credit policy does not necessarily lead to the rise of housing prices, although it does have an effect on the rise of housing prices. They use the noise transaction model of financial market to empirically-prove that the transaction behavior of noisy traders is the main culprit for the rise of housing prices. Chen Guojin and Liu Jine believe that [5] heterogeneous belief is the leading cause of the formation of China's real estate price bubble. Zhou Jingku[6]'s research is carried out from the three aspects of anticipation psychology, speculation behavior and herd behavior, and believes that the positive feedback trading mechanism formed by the interaction between these three factors plays an important role in the process of real estate price fluctuation. Ke Yipei and Huang Jing [7] further study found that herding behavior in the real estate market and rising housing prices will form a mutually reinforcing feedback effect, which will promote the formation and expansion of real estate bubbles.

3. Theoretical analysis

3.1. The origin of housing price fluctuation is studied from traditional economic assumption to behavioral economics

The heterogeneous agent model essentially abandoned the assumptions of the traditional economic theory about the rational expectations of the participants and the notification of individuals. In addition, many literatures have applied the noise transaction theory to the real estate market to represent irrational investors. In this paper, with reference to the heterogeneous agent model, real estate investors are divided into two categories: one is the "rational" investor who makes real estate investment according to the fundamentals, and the other is the trend investor who makes investment according to the noise information such as historical price. The assumption of fundamental investors is that investors judge the real estate price from the economic fundamentals and compare it with the current real estate price, so as to make the next investment decision, while trend investors only make the next investment decision based on the difference between the historical price and the current real estate price. Obviously, fundamental investors have more characteristics of rational man's assumption than trend investors.

4. Research Design

4.1. Research Hypothesis

Referring to the practices of Zhang Hao and Li Zhongfei [8], Assuming that real estate assets (R) and risk-free assets (B) are the only two asset choices in the whole financial market, the risk-free rate of return (r) is obvious; For each unit of real estate asset held, you can earn a variable cash flow (rent) $\{y_i\}$ in the future. Assume that the investor's expected return on rent is a fixed value $\bar{y}$.

Suppose that there are N investors in the market, then the total demand of investors in the real estate market during period t is:

$$D_t = \sum_{i=1}^N D_{i,t}^* = \frac{\sum_{i=1}^N E_{i,t}(p_{t+1}) + \bar{y} - (1+r)p_t}{a_i \sigma_{i,t}^2} \quad (1)$$

Where, p_t is the current housing price, a_i is the investor's risk aversion coefficient, $\sigma_{i,t}^2$ is the conditional variance of the investor's wealth in the next period, and $E_{i,t}(p_{t+1})$ is the investor's expectation of the next housing price in the current period.

The investors in the real estate market of the four cities are divided into two categories, one is fundamental investors(f), that is, rational investors, and the other is trend investors(c), that is, irrational noise trading investors.

Fundamental investors' expectation for the next housing price should be (p_t^* is fundamental price):

$$E_{f,t}(p_{t+1}) = p_t + \alpha(p_t^* - p_t) \quad (2)$$

Similarly, trend investors' expectation for the next housing price should be:

$$E_{c,t}(p_{t+1}) = p_t + \beta(p_t - p_{t-1}) \quad (3)$$

It can be concluded that the demand function of the two types of investors for real estate assets in the t period is as follows:

$$D_{f,t} = \frac{\bar{y} + \alpha p_t^* - (\alpha + r)p_t}{a\sigma^2} \quad (4)$$

$$D_{c,t} = \frac{\bar{y} - \beta p_{t-1} - (\beta - r)p_t}{a\sigma^2} \quad (5)$$

4.2. Establishment of the research model

Let $\bar{y}=0$, $r=0$, and suppose $a\sigma^2 = 1$, we can get

$$D_{f,t} = -\alpha(p_t - p_t^*) \quad (6)$$

$$D_{c,t} = \beta(p_t - p_{t-1}) \quad (7)$$

Suppose that the short-term judgment of the developer is based on the real estate price of the previous period, then the supply function can be simplified as:

$$I_t = k(p_t - p_{t-1}) + b \quad (8)$$

Then, since the market price is usually in the process of dynamic adjustment in the short term, the net demand of the market determines the market price. If the adjustment coefficient of the market price about the gap between supply and demand is μ and μ is assumed to be 1, then.

$$p_{t+1} = p_t + \mu(D_{f,t} + D_{c,t} - I_t) \quad (9)$$

Let $Y_t = p_t - p_{t-1}$, $X_t = p_t - p_t^*$, the above formula can be expressed as

$$Y_{t+1} = -b - \alpha X_t + (\beta - k)Y_t \quad (10)$$

Thus, the model in this paper can be expressed as:

$$Y_{t+1} = a_0 + a_1 X_t + a_2 Y_t + \varepsilon_t \quad (11)$$

4.3. Data explanation

In the selection of actual data, $X_t = (\ln p_t - \ln p_t^*)$ will be used to represent the deviation degree of housing price from the benchmark price, $Y_t = (\ln p_t - \ln p_{t-1})$ will be used to represent the growth rate of housing price. The panel data of Nanjing, Suzhou, Wuxi and Changzhou cities in Jiangsu Province are used as research samples. The data range is from March 2011 to December 2020 to analyze the behavior of investors in the real estate market. The basic housing price data in this paper are all transaction prices of ordinary residential buildings, and the data source is CRIC database.

In this paper, the ratio of house price to income is chosen to measure the benchmark house price, which is often used to measure the degree of real estate bubble and is also intuitively used by countries to judge whether the house price is too high. The formula for calculating the housing price to income ratio is as follows:

$$k^* = \frac{P}{R} = \frac{S \times n \times p}{n \times AR} \quad (12)$$

The deformation formula of the benchmark house price is as follows:

$$p^* = \frac{k^* \times n \times R}{S \times n} \quad (13)$$

Where k^* represents the ratio of house price to income, P represents the total price of each household, R represents the total annual income of each household, S represents the per capita housing area, and n represents the average population of each household. Internationally, it is generally believed that the ratio of house price to income between 6 and 7.5 is a reasonable range, and this paper holds that it is also reasonable to calculate the benchmark house price with a reasonable ratio of house price to income.

5. Empirical analysis

5.1. Descriptive statistical results of variables

Table 1 below shows the results and analysis of the descriptive test of the data.

Table 1. Descriptive statistics of variables

Indicator	Y	X
Mean	0.01	0.46
Max.	0.24	1.09
Min.	-0.19	-0.18
Std.	0.06	0.29
Observed values	468	468

Through the descriptive statistics of variables, it can be seen that in the monthly data within the selected range, by observing the value of Y , it can be seen that the average monthly growth rate of housing prices is 1%, while the average monthly deviation degree of housing prices from the basic face value is 46%.

5.2. Regression Analysis

OLS regression analysis was performed on the data by using Eviews 7.2 for the above variables. (Since this data belongs to a large T and small N structure, it is not suitable for using dynamic panel data regression.) The regression model is $Y_{t+1} = a_0 + a_1X_t + a_2Y_t + \varepsilon_t$

The regression results are shown in Table 2

Table 2. OLS results

Coefficient	Regression	Std.	P-Value
a_0	0.02	0.00	0.00
a_1	-0.02	0.01	0.07
a_2	-0.28	0.04	0.00

The regression values of these two variables are significant at the significance level of 1% and a_1 significant at the significance level of 10%.

Continues to establish a fixed-effect model on the above data for regression, and the regression results are shown in Table 3. (The data in brackets in the table is the T-value of the statistic)

Table 3. Fixed effects model results

Coefficient	Regression	P-Value	Regression	P-Value
a_0	0.03 (4.08)	0.00	0.05 (4.34)	0.00
a_1	-0.04 (-2.89)	0.00	-0.10 (-3.62)	0.00
a_2	-0.27 (-6.01)	0.00	-0.31 (-6.04)	0.00
City	yes		yes	
Time	no		yes	

$a_1 < 0$ which indicates that the variable X in the current period always has a negative impact on the size of the variable Y in the next period, that is to say, the deviation between the housing price and the benchmark housing price calculated by the ratio of housing price to income has a negative impact on the growth of the housing price in the next period. It shows that when the demand of fundamental investors in the next period is negatively correlated with the deviation degree of the actual house price from the benchmark house price in the current period, that is to say, if the deviation degree of the current house price from the benchmark house price is beyond the acceptance of fundamental investors, fundamental investors will sell their real estate assets. $a_1 = -\alpha$, a_1 indicates the overall effect of the investment strategy of fundamental investors on the fluctuation of housing prices. OLS regression results show that every 1% increase in the real housing price relative to the benchmark housing price will cause the negative change of housing prices by 0.016%.

$a_2 < 0$ means that in the four cities of Nanjing, Suzhou, Wuxi and Changzhou, the fluctuations of housing prices do not necessarily have continuity in the model with a lag of one period, that is to say, the current housing price growth reflected in the investment strategy of trend investors will not lead to a faster housing price growth in the next period.

$a_2 = \beta - k < 0$, It means that in the face of the same housing price growth, the demand elasticity of trend investors in the real estate market of these four cities is smaller than the supply elasticity of real estate developers, which will make the housing price growth not so rapid. This is because if the current housing price is higher than the previous housing price, the trend investors will not think that the housing price will continue to rise too fast, which is very different from the super first-tier cities such as Beijing, Shanghai, Guangzhou and Shenzhen, resulting in a slow rise in the housing price of these four cities, and the irrational expectations of investors are relatively slow.

6. Summary

To sum up, the results of empirical regression are partly consistent with the theoretical analysis mentioned above, that is, the behavior of fundamental investors can make the housing price offset and pull it back to the benchmark housing price, while trend investors have not been found to have a driving effect on the housing price in the sample data of the four cities, and the rise of housing price is more dependent on other factors. This indicates that the power of regression to the basic price is greater than that of trend change, so that the housing price will not deviate from the benchmark housing price significantly. In addition, the determination of the benchmark housing price will be affected by many macro factors, and it may also have trend changes, so the overall housing price will show an upward trend.

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