

Empirical Analysis of Influencing Factors of Housing Price in Anhui Province based on Econometric Model

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Abstract

Real estate is an important industry in the operation of national economy, and its housing price has aroused wide attention from all walks of life. Studying the main factors affecting the real estate price in Anhui Province is conducive to maintaining the stable development of social economy. This paper selects the relevant economic data of Anhui Province from 2000 to 2021 and establishes a multiple linear regression model with the help of EViews software to make an empirical analysis of the main factors affecting the rise of real estate prices in Anhui Province, so as to provide feasible suggestions and countermeasures for effectively promoting the reasonable development of the real estate market in Anhui Province.

Keywords

Anhui Housing Price; Econometric Model; Influencing Factors.

1. Introduction

The fluctuation of real estate prices has an important impact on residents' willingness to buy houses. With the continuous improvement of the national economic level, people's demand for buying houses has also increased. However, in recent years, the housing price has remained high, despite the improvement of people's material life, many low-income groups still do not have the ability to buy houses. Based on this situation, this paper takes Anhui Province as an example and selects GDP, disposable income of residents, investment in fixed assets, total population at the end of the year and completed area of houses as explanatory variables to study the main factors affecting the housing price in Anhui Province.

2. Analysis of Influencing Factors of Real Estate Price in Anhui Province

2.1. Supply Factor

2.1.1. Investment in Fixed Assets

The investment in fixed assets is an important factor that affects the housing price, and the investment in fixed assets is the process that enterprises build and purchase fixed assets in a certain period of time. The increase of fixed assets investment promotes the increase of social demand for housing, and then the relationship between supply and demand in the real estate market changes, and the housing price fluctuates accordingly.

2.1.2. Built-up Area

The completed area of the house is a variable that indirectly affects the housing price, and it affects the housing price by directly affecting the supply of the house. Its principle of action is

based on the price affected by the relationship between supply and demand. The relationship between the two is as follows: when the supply of houses is insufficient, the real estate market will be in short supply, resulting in a rise in house prices. In the case of long-term factors, the level of housing prices will directly affect the supply and demand of the real estate market. With the rise of housing prices, the real estate market will be profitable, and developers will put capital into the real estate market one after another, increase their investment in real estate, and then increase the completed area of housing buildings.

2.1.3. Land Price

The factors affecting land price include its own rights and the expected returns of land elements. In the proportion of development cost of developers, the input part of land price accounts for a large proportion. The limited nature of natural resources is reflected in the scarce supply of land resources, so the land market presents a situation of "short supply", which directly leads to the continuous rise of land prices, and land as the most important element of housing construction, its price rise directly affects the price rise of housing prices.

2.2. Demand Factor

2.2.1. Demographic Factor

Under normal circumstances, population and housing demand are positively correlated. As population increases, housing demand will also increase. Under the condition that other influencing factors remain unchanged, the real estate market is affected by the relationship between supply and demand. If the number of people in a country or region decreases, the supply exceeds the demand, and the house price will also fall.

2.2.2. Household Disposable Income

For the housing as a material consumption and improvement of housing groups, the increase in residents' disposable income will greatly increase their demand for housing in the area. The reasons are as follows: First, the increase in residents' disposable income enables more residents to afford to buy houses. Second, income determines consumption, the increase of income, the increase of residents' willingness to consume, and then residents have a strong willingness to buy houses. To sum up, the demand for housing has a positive impact on income.

2.3. Other Factors

2.3.1. Gross Domestic Product

According to relevant studies, the level of regional economic development is closely related to housing prices. Generally speaking, the higher the level of economic development, the greater the demand for housing, housing prices will also rise; For economically underdeveloped areas, residents have insufficient demand for housing, and the housing price in this area is generally low.

2.3.2. Macro-control Policy

Macro-policy is an important means to regulate national economy and stabilize economic development. The relevant policies issued by the state for the real estate market are important factors affecting the housing price. If housing prices rise too much or too fast, it will exceed residents' expectations. In the face of economic downward pressure, the state issued "purchase restriction" and "new eight" policies, aiming at the phenomenon of large real estate inventory, sluggish market and lack of power in small and medium cities, in order to mobilize the market vitality, the government proposed "supply-side structural reform", but the housing price did not grow at a low rate, on the contrary, many cities showed a doubling of housing prices.

3. Construct Econometric Model

3.1. Selection of Variable

In this paper, the average selling price of commercial housing in Anhui Province is taken as the explained variable, and the gross regional product, disposable income of urban residents, investment in fixed assets, total population at the end of the year and completed area of housing are taken as the explanatory variable, and a multiple linear regression model is established to quantitatively analyze the main factors affecting the real estate price in Anhui Province.

3.2. Assumptions in the Form of Functional Models

The regression equation established is as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mu$$

In the equation, Y represents the average sales price of commercial housing in Anhui Province, X1 represents the gross regional product, X2 represents the disposable income of urban residents, X3 represents the investment in fixed assets, X4 represents the total population at the end of the year, X5 represents the completed area of housing, μ is the random error term, α , β_1 , β_2 , β_3 , β_4 and β_5 are undetermined coefficients.

3.3. Data Collection

Table 1. Related economic data of Anhui Province from 2000 to 2021

Year	Commercial housing sales Average price (m ² / Yuan) Y	Gross regional Product (\$100 million) X1	Disposable income of urban residents (Yuan) X2	Investment in fixed assets (100 million yuan) X3	Year-end population (10,000 people) X4	Completed area (10,000 square meters) X5
2000	1173	3125.33	5293.55	866.6667	6093	759.33
2001	1163	3502.78	5668.80	964.1133	6128	957.02
2002	1290	3827.66	6032.40	1133.3146	6144	1062.5
2003	1513	4307.77	6778.03	1477.7162	6163	1326.21
2004	1782.14	5129.12	7511.43	1914.2273	6228	1685
2005	2220.2	5675.85	8470.68	2520.9640	6120.09	1816.86
2006	2321.89	6500.31	9771.05	3544.6671	6110	2067.23
2007	2664.37	7941.61	11473.58	5093.6811	6118	2341.6
2008	2949	9517.68	12990.35	6799.9535	6135	2541.1
2009	3420	10864.68	14085.74	9263.1822	6131	2861.2
2010	4205	13249.78	15788.17	11849.4343	5956.7	3026.7
2011	4776.1	16284.92	18606.13	12147.7794	5972	3628.73
2012	4824.95	18341.67	21024.21	15054.9510	5978	3965.39
2013	5080	20584.04	23114.22	18251.1212	5988	5180.35
2014	5394	22519.65	24838.52	21256.2939	5997	5196.37
2015	5457	23831.18	26935.76	23965.5515	6011	5537.74
2016	5924	26307.70	29155.98	26758.1115	6033	5382.95
2017	6375	29676.22	31640.32	29185.9564	6057	4747.71
2018	7049.86	34010.91	34393.08	32629.8993	6076	4488.4
2019	7393	36845.49	37540.04	35631.8500	6092	5673.9
2020	7705	38061.51	39442.1	37449.0744	6105	5100.86
2021	7784	42959.18	43008.7	40969.2874	6113	7012.89

Data sources: The above data are from Anhui Provincial Statistical Yearbook and China Statistical Data Application Support System.

4. Model Building and Empirical Analysis

4.1. Model Estimation

With the help of Eviews operating software, a multiple linear regression model was established, and the ordinary least square (OLS) method was used for preliminary estimation of the model. The results are shown in Figure 1.

Dependent Variable: Y
 Method: Least Squares
 Date: 06/17/23 Time: 21:27
 Sample: 2000 2021
 Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23649.12	5791.222	4.083614	0.0009
X1	-0.089399	0.095181	-0.939260	0.3616
X2	0.412828	0.116429	3.545755	0.0027
X3	-0.108582	0.060817	-1.785394	0.0932
X4	-3.918610	0.932780	-4.201002	0.0007
X5	-0.152803	0.117432	-1.301203	0.2116

R-squared	0.991414	Mean dependent var	4202.932
Adjusted R-squared	0.988731	S.D. dependent var	2263.067
S.E. of regression	240.2326	Akaike info criterion	14.02809
Sum squared resid	923387.2	Schwarz criterion	14.32565
Log likelihood	-148.3090	Hannan-Quinn criter.	14.09819
F-statistic	369.5178	Durbin-Watson stat	1.139634
Prob(F-statistic)	0.000000		

Figure 1. Preliminary regression results of the model

The above model results show that, except for the explanatory variable X2, the other explanatory variables have no significant influence on the average sales price of commercial housing in Anhui Province. The correlation coefficient matrix among explanatory variables is shown in Table 2. It can be seen that the correlation coefficient among some explanatory variables is high, indicating that the model has serious multicollinearity. Therefore, this paper will adopt stepwise regression method to modify the model in order to weaken or reduce multicollinearity and improve the prediction accuracy of the model.

Table 2. Correlation coefficient matrix

	X1	X2	X3	X4	X5
X1	1.0000	0.9985	0.9975	-0.3321	0.9297
X2	0.9985	1.0000	0.9975	-0.3526	0.9422
X3	0.9975	0.9975	1.0000	-0.3358	0.9306
X4	-0.3321	-0.3526	-0.3358	1.0000	-0.4995
X5	0.9297	0.9422	0.9306	-0.4995	1.0000

4.2. Stepwise Regression Amendment

One-dimensional linear regression models of Y to X1, X2, X3, X4 and X5 were made respectively, and the results were shown in Table 3. The size of R2 is sorted as follows:

$$X2 > X1 > X3 > X5 > X4,$$

Based on the unary linear regression equation of Y and X2, variables X1, X3, X5 and X4 were introduced successively, then finally variables X2 and X4 were retained by stepwise regression method, and the following regression results were obtained.

Table 3. Results of monadic regression

variable	X1	X2	X3	X4	X5
Parameter estimates	0.174337	0.184441	0.164303	-14.46236	1.163595
R ²	0.965053	0.975320	0.960686	0.207953	0.900043

Dependent Variable: Y
 Method: Stepwise Regression
 Date: 06/17/23 Time: 22:42
 Sample: 2000 2021
 Included observations: 22
 Number of always included regressors: 1
 Number of search regressors: 5
 Selection method: Stepwise forwards
 Stopping criterion: p-value forwards/backwards = 0.05/0.05
 Stopping criterion: Number of search regressors = 5

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	24454.38	5086.597	4.807612	0.0001
X2	0.176336	0.004893	36.03804	0.0000
X4	-3.902726	0.830909	-4.696936	0.0002
R-squared	0.988580	Mean dependent var	4202.932	
Adjusted R-squared	0.987378	S.D. dependent var	2263.067	
S.E. of regression	254.2539	Akaike info criterion	14.04067	
Sum squared resid	1228256.	Schwarz criterion	14.18945	
Log likelihood	-151.4473	Hannan-Quinn criter.	14.07572	
F-statistic	822.3573	Durbin-Watson stat	0.802382	
Prob(F-statistic)	0.000000			
Selection Summary				
Added X2				
Added X4				

Figure 2. Revised results of stepwise regression method

The revised model and parameters are as follows:

$$Y = 24454.38 + 0.176336X_2 - 3.902726X_4$$

$$S = (5086.597) (0.004893) (0.830909)$$

$$T = (4.807612) (36.03804) (-4.696936)$$

$$R^2 = 0.988580 \quad \bar{R}^2 = 0.987378 \quad F = 822.3573 \quad S.E = 254.2539 \quad D.W = 0.802382$$

4.3. Model Checking

4.3.1. Economic Significance Test

The revised model regression results show that when other influencing factors remain unchanged, the average selling price Y of commercial housing in Anhui Province will change by 0.176336 units for every 1 unit change in urban disposable income X2, and the average selling price Y of commercial housing in Anhui Province will change by 3.902726 units for every 1 unit change in the total population X4 at the end of the year.

4.3.2. Statistical Inference Test

Goodness of fit test: the decision coefficient R^2 is 0.988580, indicating that the model has a good fitting effect on the sample data.

F test: The accompanying probability of F statistic is 0.000000, which is less than the significance level 0.05, indicating that the regression equation is significant, indicating that the combined impact of the two explanatory variables of resident disposable income and the total population at the end of the year on the average sales price of commercial housing in Anhui Province is statistically significant.

T-test: Given the significance level $\alpha=0.05$, the P-values of the T-test for explanatory variables X_2 and X_4 are 0.0000 and 0.0002 respectively, both of which are smaller than the significance level 0.05, indicating that the two explanatory variables have significant effects on the explained variables. Therefore, the regression parameters of the two explanatory variables, resident disposable income and total population at the end of the year, both passed the significance test.

4.4. Result Analysis

It can be judged from the results of the model that among the factors affecting the real estate price in Anhui Province, the top two are residents' disposable income and the total population at the end of the year, indicating that the rise of housing prices in Anhui Province is mainly driven by demand, and the increase of residents' disposable income and population plays a major role in the rise of housing prices.

On the one hand, the increase of residents' disposable income promotes the increase of housing demand, making housing prices rise to a certain extent in a long period of time. On the other hand, the growth of urban population leads to the increase of housing demand, thus driving the development of real estate and thus stimulating the rise of housing prices.

However, in reality, the total population has a more complex impact on the housing prices of a certain region. It is difficult to analyze it quantitatively through single data, so many factors should be considered comprehensively. At the same time, according to the preliminary regression results of the model, the increase of fixed asset investment is accompanied by the increase of real estate investment, resulting in the increase of real estate supply and oversupply, which will eventually play a certain inhibitory role in the rise of real estate prices. The impact of regional GDP and completed area on the increase of housing prices in Anhui Province is relatively small.

5. Conclusion and Suggestion

According to the model, the rise of housing price in Anhui Province is affected by residents' disposable income, population, regional GDP and completed housing area, among which residents' disposable income and population are the main influencing factors, while regional GDP and completed housing area are the secondary influencing factors.

Meanwhile, the mobilization of housing price in Anhui Province is also affected by the investment in fixed assets. The increase in the supply of real estate will restrain the rise in house prices. Therefore, the rise in housing prices in Anhui Province is mainly driven by demand factors, and the housing management department can regulate the rise in housing prices reasonably from the demand side, so as to maintain the smooth operation of the real estate market and protect the housing demand of residents.

Based on the above conclusions, the following suggestions are put forward:

(1) Guide residents to purchase houses reasonably according to demand and put an end to investment psychology.

In recent years, the economic development of Anhui Province has improved, residents' living standards have improved, disposable income has increased, and the overall ability to buy houses has been improved, which is an important reason for the rise in housing prices in Anhui Province. However, affected by the residual heat of real estate speculation, many people with a certain economic level buy multiple houses not to meet the living demand, but through the purchase of low-cost housing. Let it appreciate and then sell it for a high capital profit.

In the meantime, the house itself is used to meet the residential needs of residents, such as allowing the spread of this phenomenon of buying houses with investment psychology will lead to the widening of the regional wealth gap, the reduction of social risk tolerance, the development of the real economy and other hazards. It can be seen that the society needs to strengthen the guidance of residents to buy houses on demand, put an end to investment psychology, so that house prices can rise and fall moderately according to reasonable supply and demand, so that people who have real demand for housing can buy their favorite houses at reasonable prices.

(2) Dynamically adjust mortgage interest rates according to market changes.

After the epidemic, the economy is in a state of recovery, and the performance of the real estate industry is relatively sluggish. In order to stabilize housing prices, mortgage interest rates need to be lowered. Housing prices are comprehensively affected by the supply side, the demand side and the price expectation side. Lowering the mortgage interest rate can reduce the purchase cost of home buyers and meet their housing demand, which is conducive to the increase of the total demand of the real estate industry, reduce financing costs, alleviate the financial difficulties faced by some enterprises, and ensure their reasonable financing needs.

It also further promotes the increase in the supply of real estate, and the coordination between the demand side and the supply side promotes the stability of residents' price expectations. Stable demand, stable supply, and stable price expectations work together and coordinate with each other to bring stability to housing prices. Therefore, the dynamic adjustment of mortgage interest rates according to market changes will become an important means to stabilize housing prices.

(3) Strengthen the responsibility and role of local governments and departments in regulating housing prices.

The real estate industry is the basic and leading industry of China's national economy, and has very close connection with the economic development and the improvement of people's livelihood in our country.

On the one hand, Chinese residents are generally dependent on houses based on long-term ideological development, and with the growth of population, the living standards of residents continue to improve, and the number of people with housing demand gradually increases. The development of the real estate industry is really related to people's livelihood.

On the other hand, the real estate industry is highly flexible to economic changes. Economic development is bound to bring about the overall development of the real estate industry, but the resulting development is not all favorable. Therefore, it is of great significance to conduct macro-control on the real estate industry.

In the face of the phenomenon of rising housing prices in Anhui Province, it is necessary to strengthen the responsibility and role of local governments and departments in the regulation of housing prices, through social economic, legal and administrative means to educate, guide, supervise and regulate real estate companies, and promote the balance and overall optimization of the total supply and total demand, supply structure and demand structure of the real estate industry in China. Realize the coordinated development of the real estate industry and the economic environment.

(4) Strengthening the implementation of policy-based low-income housing policies in light of local conditions.

Policy-based affordable housing is a housing policy with social security nature provided by the government for low - and middle-income families. The government provides housing, alleviates the rigid demand for housing, and also plays a certain role in stabilizing housing prices. Although Anhui Province's economy has developed rapidly in recent years, the economic development of prefecture-level cities is not balanced.

The economic growth rate of core cities such as Hefei and Wuhu is relatively high, while the economic growth rate of cities in northern and western Anhui is far behind these core cities, Moreover, the supply and demand of the real estate market are also different due to disparate conditions such as population, policy and culture. The economically developed cities in Anhui province have a large floating population, high housing prices, and a shortage of urban land, while the economically backward areas have a small floating population and a large urban area. Therefore, the relevant departments of urban construction and housing management can reasonably formulate the amount of land according to the actual local situation, and cooperate with strengthening the implementation of the policy-based affordable housing policy.

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