



Regional Differences of Housing Price Influencing Factors

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Abstract. The rapid development of China's real estate market since the reform and opening up has greatly promoted China's economic growth. Zhejiang Province and Anhui Province are adjacent to each other, but there are huge differences in economic development. Studying the regional differences of influencing factors of housing prices in these two provinces can provide reference for the development of other cities. Through the establishment of multiple regression model, it is found that there are differences between Zhejiang Province and Anhui Province under the two factors of the total number of people at the end of the year and the disposable income of urban residents.

Keywords: Housing price, regional economy, Migration of people

1 Introduction

The development of China's economy has aroused widespread concern around the world, among which real estate investment is the main factor promoting China's economic growth. Since 1998, when the Chinese government stopped implementing the administrative housing distribution system and began to implement a new housing policy, the new real estate supply system has been divided according to the income level of housing demanders, and housing has been commercialized [1]. Land is the key to housing. Since 2004, China's national land resources department has implemented a new system of state-owned land use rights - the IAL system, which encourages more enterprises to enter the real estate market [2]. The real estate industry, as the pillar industry of the national economy, the real estate market has gradually flourished, especially in economically developed cities, where the amount of development investment is increasing [3][4][5]. By 2021, China's investment in real estate development will rise to about 15 trillion-yuan, accounting for about 27% of the total investment in fixed assets, second only to the manufacturing industry [5]. The implementation of the new housing policy and the IAL system has led to a gradual rise in real estate prices [6].

The global impact of the financial crisis is extensive and far-reaching. Although many investors and consumers in developed and developing countries benefit from it,

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many people are still affected. Like the financial crisis, the housing crisis also affects many cities and families with housing needs in the world [7]. Especially after the foam in the US real estate market, the price collapse in the real estate market led to the recession of the US and even the global economy[8]. The global financial storm caused by the subprime mortgage crisis in the United States has caused huge fluctuations in China's real estate market. The rapid realization of urbanization in China and the global financial crisis have caused the imbalance between supply and demand of real estate trial production, indirectly caused the rapid growth of real estate prices, and formed a false prosperity of the real estate market [9].

Therefore, based on the above phenomena, this paper selects relevant data from seven representative cities in Zhejiang Province to conduct a comparative analysis of housing prices, and further explores the following issues: How has housing prices changed in each city in the past 10 years? Is there any data to prove that the change of housing prices is related to the per capita disposable income of urban residents in the city? Is it related to the total population of the city? Is it related to GDP?

After analysing the problem of housing price transformation in Zhejiang Province, we analysed the housing price in Anhui Province, a neighbouring province of Zhejiang Province, and also selected seven representative cities. In addition to analysing the relationship between housing price in Anhui Province and per capita disposable income, GDP, and total population of urban residents, we further explored the reasons for the differences between housing prices in Zhejiang Province and Anhui Province.

2 Literature Review

Liang et al. empirically tested the long-term relationship by implementing a high-dimensional ARDL framework for China's quarterly data from the first quarter of 1999 to the second quarter of 2006 and evaluated the causal relationship between real estate prices and bank loans, considering GDP and interest rates[10]. They proved that income, bank loans, interest rates and house prices are Granger causality. Zhang et al. conducted an empirical study on the relationship between housing prices and macro-economy from the perspective of China's first, second and third tier cities based on VAR (Vector Autoregression) model[11]. They believe that interest rates have a significant negative impact on house prices. The impact of inflation on house prices is positive at the initial stage, and then becomes negative. The negative effect of first-line cities is more significant. Similarly, house prices have a positive impact on inflation. Gui et al. used multiple linear regression and ridge regression to empirically analyse the impact of five explanatory variables, namely, unit land price, real estate development investment, per capita GDP, population, and interest rate, on real estate prices. The results show that per capita GDP has a significant positive impact on real estate, while housing provident fund interest rate has a small impact on real estate prices[12]. Liu et al. took the price of real estate commercial housing in Beijing and Shanghai as the research object, and selected six factors, including gross regional product, per capita disposable income of urban residents, total population of

the region, area of completed houses, area of land to be developed, and land purchase cost[13]. They used Stata panel data and POOL mixed model to analyse the data. The research shows that gross regional product the per capita disposable income of urban residents, the total population of the region, and the land purchase cost are the most critical factors affecting the real estate price changes in Shanghai and Beijing. Xu believes that the housing price in Beijing will increase by 2.82 units, 0.7 units and 2702.07 units per square meter for every 1 yuan increase in disposable income, regional GDP, and hospital beds, but the increase in forest greening rate and completed housing area will reduce the housing price [14]. Du considered the population, land and economic factors of Qingdao by establishing a multiple regression model to analyse the data of the resident population, the urbanization rate of the resident population, the investment amount in real estate (residential) development, the completed area of houses, the actual sales area of commercial houses, the value of completed houses, the gross domestic product, the per capita annual disposable income of urban residents, the consumer price index, and the benchmark loan rate, Finally, it is confirmed that the completed housing area, GDP and benchmark loan rate are the influencing factors [15]. Xu obtained that the real estate price will rise 0.9%, 0.092% and 0.033% respectively when the per capita GDP, land transaction price and population growth rate increase by 1% by establishing multiple regression and using Stata analysis [16]. Wang et al. used the multiple regression model from the aspects of demand, supply and policy to analyse the explanatory variables of the total population (registered residence) at the end of the year, gross regional product, per capita gross regional product, balance of residents' RMB savings deposits, average wages of employees, per capita disposable income of urban residents and other aspects, and believed that the total population at the end of the year had the greatest impact on housing prices [17].

To sum up, the influencing factors of housing prices can be basically determined as per capita disposable income of urban residents and total population (registered residence) at the end of the year. Therefore, this paper studies the influencing factors of real estate prices by sorting out the relevant data of the Statistical Yearbook of 14 prefecture level cities from 2011 to 2020. On this basis, the study expands according to the impact of regional heterogeneity on real estate prices.

3 Data

In this paper, seven cities in Zhejiang Province and seven cities in Anhui Province of China are mainly investigated. These 14 cities are selected according to the national city level. Since there are no data tier five cities in Zhejiang Province and no tier one cities in Anhui Province, the selected results are as follows: representative cities in Zhejiang Province: Hangzhou (New first tier city , provincial capital), Ningbo (New first tier city, deputy provincial capital), Wenzhou (second-tier city) Jiaxing (second tier city), Huzhou (third-tier city), Lishui (fourth tier city), Quzhou (fourth tier city), and representative cities in Anhui Province: Hefei (second tier city, provincial capital), Bengbu (third-tier city), Wuhu (third-tier city), Fuyang (fourth-tier city),

Chizhou (fourth-tier city), Bozhou (fifth-tier city), Huaibei (fifth-tier city). The data of cities selected by Zhejiang Province and Anhui Province from 2011 to 2020 are from the data released by the National Bureau of Statistics. The ranking list of Chinese cities comes from the First Finance New First-tier City Research Institute. The list is based on the five first level dimensions of business resource concentration, urban hub, urban people's activity, lifestyle diversity and future plasticity, through the business store data of 170 mainstream consumer brands, user behaviour data of 17 leading Internet companies in various fields and urban big data of data institutions, The evaluation results of 337 cities in China at prefecture level and above.

4 Methodology

In this paper, multiple linear regression analysis is used. Multiple linear regression analysis is the best combination of multiple independent variables to predict or estimate the dependent variables, which is more effective and more practical than using only one independent variable to predict or estimate.

Through literature review, a multiple regression model was constructed. After construction, it was found that there was a multiple collinearity problem in the high correlation between housing prices and GDP. The model was optimized by retaining the two explanatory variables of per capita disposable income (DPI) of urban residents and total population (registered residence) at the end of the year. The model was constructed as follows:

Set the average sales price of real estate as the explained variable γ , the per capita disposable income of urban residents and the total population at the end of the year (registered residence) are the explanatory variables x_1 、 x_2 , The coefficients of each variable are β_0 、 β_1 、 β_2 ,

$$\gamma = \beta_0 + \beta_1x_1 + \beta_2x_2 + \mu \quad (1)$$

5 Empirical Results and Analysis

5.1 Comparison Between Zhejiang Province and Anhui Province

Through the analysis of the correlation between the house price in Zhejiang Province and Anhui Province and the per capita disposable income of urban residents, the total population (registered residence) at the end of the year,

Table 1. Correlation coefficient comparison results .

City	correlation coefficient	
	GP	DPI
Zhengjiang	0.7407	0.6522
Anhui	0.4677	0.8059

The per capita disposable income of urban residents, the total population at the end of the year (registered residence) and real estate prices are all positively correlated. In these two factors, the correlation coefficient of the total population of Zhejiang Province at the end of the year is significantly higher than that of Anhui Province, indicating that the population has a greater impact on housing prices in Zhejiang Province than Anhui Province. It can be seen from the official data of China's population census that the permanent population of Zhejiang Province in the seventh census (2020) was 64.5676 million, an increase of 10.1407 million compared with 544.4269 million in the sixth census (2010), while the permanent population of Anhui Province in the seventh census was 6102.72 million, an increase of 1.5267 million compared with 59.5005 million in the sixth census. In addition, in the seventh census, it was found that the permanent population of all 11 prefecture level cities in Zhejiang Province increased net, that of 6 prefecture level cities in Anhui Province increased, and that of 10 prefecture level cities decreased. When the inflow of population in a city is greater than the outflow, the population will increase, the demand for housing will increase, the demand for housing will increase, and the house price will rise. The population growth of Zhejiang Province is faster than that of Anhui Province, so the impact of the total population of Zhejiang Province on housing prices at the end of the year will be greater than that of Anhui Province. Another factor is the per capita disposable income (DPI) of urban residents. Both Zhejiang and Anhui are highly correlated, but the correlation coefficient of DPI in Zhejiang is lower than that in Anhui. The disposable income of urban residents is the sum of the final consumption expenditure and savings that urban residents can use, that is, the income that residents can use freely. The DPI of Zhejiang Province has ranked the third in China for a long time. Its wealth is well known throughout the country. Its economic development is much higher than that of Anhui Province. The investment and consumption of urban residents in Zhejiang Province in real estate is earlier than that of Anhui Province. In 2019, Anhui Province joined the Yangtze River Delta Economic Circle, forming an economic circle with Zhejiang Province, Shanghai City and Jiangsu Province. Driven by three highly developed provinces, Zhejiang Province, Shanghai City and Jiangsu Province, Anhui Province's economic development continued to operate at a high level, with a rapid increase in DPI, and the enthusiasm of urban residents rose with the investment in the real estate market.

5.2 Comparison of Cities at Different Levels in Zhejiang

Table 2. Correlation coefficient comparison results.

Grade	correlation coefficient	
	GP	DPI
New first-tier cities	0.8615	0.6879
second-tier cities	0.7686	0.2619
third-tier cities	0.8469	0.8946
Fourth-tier cities	0.6442	0.8570

In Zhejiang Province, there are four tier cities: new first tier cities, second-tier cities, third-tier cities, and fourth-tier cities. It can be seen from the above table that the correlation coefficients of GP and DPI at different levels in Zhejiang Province are highly correlated, but the DPI of second-tier cities is only 0.2619, which belongs to weak correlation. The second-tier cities are Wenzhou and Jiaxing. The economic development of these two cities ranks third and fourth in the province all the year round. The economic development mode is mainly foreign trade. The investment of urban residents in real estate is not limited to the local market. As the most developed new tier cities in Zhejiang Province, the correlation coefficient between GP and DPI should be lower than that of other tier cities, but the data shows that the correlation coefficient between GP and DPI of new tier cities is far higher than that of other tier cities. Hangzhou and Ningbo, the new first tier cities, have been in the forefront of the country in terms of economic development for a long time, and are geographically adjacent to Shanghai. Compared with Shanghai's high-pressure and high-cost living conditions, Hangzhou and Ningbo are more liveable, resulting in more population inflow and increased housing demand; From 2010 to 2020, the economy of Hangzhou and Ningbo developed rapidly, comparable to that of developed countries. DPI grew rapidly, people's ability to buy houses increased significantly, and the demand for houses increased accordingly. From the perspective of economics, the increase of consumers' income level will make the demand curve move upward. When the supply curve remains unchanged, the intersection of the demand curve and the supply curve, that is, the equilibrium price of the housing market, will rise. To sum up, the correlation coefficient between GP and DPI in new first-tier cities is highly correlated mainly because of changes in market demand.

5.3 Comparison of Different Cities in Anhui

Table 3. Correlation coefficient comparison results.

Grade	correlation coefficient	
	GP	DPI
second-tier cities	0.7402	0.9706
third-tier city	0.5819	0.8309
Fourth-tier cities	0.4301	0.7786
Fifth-tier cities	-0.0624	0.9183

In Anhui Province, there are four tier cities: second-tier cities, third-tier city, fourth-tier cities, and fifth-tier cities. From the above table, we can see that the correlation coefficients of different line level DPIS in Anhui Province are highly correlated, the GP correlation coefficients of second tier cities are highly correlated, third tier cities are moderately correlated, and the GP coefficients of fourth-tier and fifth-tier cities are weakly correlated. The second-tier cities in Anhui Province only have the provincial capital, Hefei. The correlation coefficient between GP and DPI of Hefei is highly correlated because Hefei, the provincial capital, has relatively

developed economy, population inflow and increased demand in Anhui Province; The inflow of population has brought a large number of labour and talents, which has promoted the economic development of Hefei City and increased the DPI. People's ability to buy houses has been greatly improved, and the demand for housing has increased, which in turn has led to the rise of housing prices. In addition to the second-tier cities in Anhui Province, other cities have experienced a large population loss. From 2010 to 2020, the total population outflow exceeded 15 million. The population loss was serious, the local housing demand was greatly reduced, and the real estate market was depressed.

5.4 Comparison of Cities at the Same Level in Zhejiang Province

Table 4. Correlation coefficient comparison results.

City	correlation coefficient	
	GP	DPI
Hangzhou	0.9747	0.9138
Ningbo	0.9571	0.8585
Wenzhou	-0.2096	-0.3018
Jiaying	0.9611	0.9029
Lishui	0.7824	0.7864
Quzhou	0.9211	0.9564
Huzhou	0.8469	0.8946

From the above table, we can see that the correlation coefficients of GP and DPI of the new first tier cities (Hangzhou, Ningbo) and fourth tier cities (Lishui, Huzhou) are similar and highly correlated. In the second-tier cities, the house price in Wenzhou is negatively correlated with GP and DPI, but in Jiaying, which is also a second-tier city, the house price is positively correlated with GP and DPI and is highly correlated. The economic development model of Wenzhou is different from that of other cities, forming a unique economic model— "Wenzhou economy" model. Wenzhou people are doing business all over the world, with a large population flow, and they live outside all the year round. At the same time, Wenzhou people are called 'Oriental Jews'. Their income is very disposable, and they are very good at investment. Especially in the real estate market, when the real estate market is not as prosperous as it is now, they have started to invest and consume in the real estate market outside Wenzhou. Wenzhou residents in Hangzhou and Ningbo, the new first-tier cities, are the main force in housing investment. Therefore, the DPI in Wenzhou has no or even negative impact on housing prices, but it has a great relationship with the changes in housing prices in the new first tier cities. Jiaying, a second-tier city, is adjacent to Shanghai. Due to the excessive housing pressure in Shanghai, more people choose to work in Shanghai and live in Jiaying, forming a "two city survival" model. In this mode of life, Jiaying has a large number of people with considerable income flowing

in, housing demand, and purchasing power have increased, and house prices have risen.

5.5 Comparison of Cities at the Same Level in Anhui Province

Table 5. Correlation coefficient comparison results.

City	correlation coefficient	
	GP	DPI
Bengbu	0.8737	0.9033
Wuhu	0.4080	0.8647
Fuyang	-0.5563	0.9401
Chizhou	-0.9376	0.9236
Haozhou	0.5599	0.8948
Huaijie	0.8738	0.9429
Hefei	0.7402	0.9706

The correlation coefficient of DPI of all cities in Anhui Province is highly positive. From the above table, it can be found that the GP correlation coefficient of Bengbu City in the third-tier cities is 0.8737, highly correlated, while that of Wuhu City is 0.4080, weakly correlated. Although Bengbu City and Wuhu City are both third-tier cities, the total population of Bengbu City is larger than that of Wuhu City. In addition, Wuhu City is adjacent to Hangzhou, the capital of Zhejiang Province, which is a strong economic province. In order to seek better development, a large number of people migrate to Hangzhou. The population loss is serious, so the population has little impact on housing prices. Similarly, both of them are fifth-tier cities, but the correlation coefficient of GP varies greatly, and Huaibei is higher than that of Bozhou. The total number of households in Bozhou at the end of the year was twice that of Huaibei City, but it was the area with the most serious population loss in Anhui Province. In 2010, the growth rate of the total number of households at the end of 2020 was only 5.2%, while that of Huaibei City was 8.4%. Therefore, the impact of the population in Bozhou on housing prices is smaller than that of Huaibei City.

6 Conclusion and Proposal

According to the correlation analysis of housing prices, total population at the end of the year and disposable income of urban residents in Zhejiang Province and Anhui Province from 2010 to 2020, the disposable income, total population at the end of the year and housing prices of urban residents in Zhejiang Province and Anhui Province are positively correlated. The disposable income of urban residents and the total population at the end of the year are important indicators to measure the economic development level of Zhejiang Province and Anhui Province. This result shows that the difference of economic development level affects the difference of house prices in

these two provinces to a certain extent. In addition, through the comparative analysis of the housing prices, disposable income of urban residents, and the total population at the end of the year in cities of the same level and cities of different levels in Zhejiang and Anhui, it is found that different economic development models in different cities in the province have affected local housing prices to some extent, such as the "Wenzhou economy" model in Wenzhou, Zhejiang Province, which makes the residents of this city go abroad for a long time. In addition, through the correlation analysis of housing prices, urban residents' disposable income and total population at the end of the year in Anhui Province, it is found that if the local economic development is basically consistent, urban population mobility will have an impact on local housing prices.

For Zhejiang, as a strong economic province, its residents live well, mainly to curb speculation. Because real estate has the characteristics of both consumer goods and investment goods, people tend to invest funds in real estate. However, if there is too much real estate speculation, it will lead to waste of resources, a serious real estate foam, disrupt the market order, and lead to the continuous rise of house prices. Therefore, for areas with high house prices, the government should strengthen the control of "speculation" to reduce the occurrence of such behaviour.

For Anhui Province, real estate investment is the main pillar of national economic growth. We should standardize and implement reasonable population policies, reduce population loss, increase local housing demand, and promote urban economic development. The government should speed up the development of infrastructure construction in all cities, speed up the construction of traffic roads, make more lines lead to neighbouring Zhejiang Province, Jiangsu Province, and Shanghai, and promote communication between Anhui Province and various economically powerful provinces.

In this paper, by comparing the disposable income, total population at the end of the year and the housing price correlation coefficient of urban residents in second tier cities, third tier cities, and fourth tier cities in Zhejiang Province and Anhui Province, it is found that the same second tier cities, third tier cities, or fourth tier cities have different degrees of influence in different provinces, and what other factors will affect housing prices besides the disposable income of urban residents and the total population at the end of the year are the influencing factors of housing prices, This is worthy of further exploration in future research.

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