



Analysis of Regional Differences in the Impact of Resident Income on Housing Prices

Wenhui Wang

College of Resources and Environment, Shandong Agricultural University, Shandong, 271001, China

*Corresponding author. Email: w13127198976@outlook.com

Abstract. Taking relevant data from nine cities in Shandong Province and Zhejiang Province in 2005~2020, a regression model was established to analyze the regional differences in the impact of resident income on housing prices. The results show that the impact presents both inter-provincial and intra-provincial differences. From an inter-provincial point of view, the driving effect of resident income on housing prices is significantly greater in provinces with higher per capita income than in provinces with lower per capita income. Although there is a certain influence of resident income on housing prices, the relevance between them is still unclear.

Keywords: housing price, resident income, regional differences

1 Introduction

The housing reform policy in China has undergone great changes after its implementation in 1988, showing the characteristics of "de-classification", "de-welfare" and "de-average". Recently, the focus of management control has shifted to housing prices and the real estate market regulations, as well as adjustments to housing finance credit policies. The real estate industry has been affected and the housing prices have been rising. Thus the real estate transaction market has developed rapidly. In 2021, the sales of commercial housing is 18.193 trillion CNY, an increase of 4.8% and 13.9% over 2020 and 2019, respectively. Showing an average increase of 6.7% over the two years. Affected by this, the real estate industry has played an important role in the development of China's market economy. In the first half of 2021, real estate accounted for 7.5% of GDP. However, with the continuous increase in housing prices in recent years, the trend and adjustment of the property market has become the focus of continuous concern from all walks of life.

In the past 20 years, housing prices have gone through three stages. The first stage is from 2004 to 2009: house prices have risen sharply since 2004. Except for the slight decline in house prices in 2008 and 2009 due to the impact of the world financial crisis, the overall housing prices in China have been rising steadily. The second stage is from 2010 to 2019: Beginning in 2010, housing prices bid farewell to

the period of rapid growth, and the growth rate remained between 5% and 9%, but it was still at a relatively high position. According to the data released by the E-House Research Institute in 2016, the housing price-to-income ratio of more than half of the cities deviates from the reasonable range. The housing price-to-income ratio in developed regions is much higher than the reasonable range, and the housing price-to-income ratio in these regions is generally on the rise. Shenzhen has the highest growth rate of 49.4%. The third stage is from 2020 to the present: Affected by the epidemic, China's economic growth will slow down in 2020, and the increase in the average transaction price of commercial housing will continue to narrow. In 2021, the national property market will cool down, and the price increase will be further narrowed, but it is still at a high level.

As a pillar industry directly related to the national economy and people's livelihood, the real estate industry is related to the production and investment of the upstream, midstream, and downstream industries of the national economy. In particular, housing issues are related to the national economy and people's livelihood and are the most basic survival needs and guarantees of the Chinese people. Therefore, the rationality of housing prices is directly related to urban residents' housing consumption and the realization of their right to live. The high real estate prices in many large and medium-sized cities and the trend of continuous development have significantly affected the healthy development of the real estate industry and the happiness of people's lives. The housing prices in some places have completely exceeded the affordability of Chinese residents. The study found that the degree of urban housing price increase has a significant negative impact on residents' happiness; the faster the housing price rises, the lower the people's subjective well-being. At present, the rising housing price has seriously affected the consumption of urban dwellings, and also formed the main reason for the government's policy of suppressing the expansion of domestic demand. The root cause of rising housing prices has also become a hot issue discussed by domestic scholars in recent years. However, the characteristics of housing prices in coastal and inland provinces, large and medium-sized cities, and third- and fourth-tier cities are different, and the influencing factor of regionality has an important impact on housing prices. Therefore, it has important theoretical and practical significance to study the regional differences in housing prices.

2 Literature review

2.1 Factors that affect housing prices

Case and Shiller (1990) believed that house prices are correlated with per capita income, and the higher the per capita income, the higher the house prices. They used the quarterly data of four American cities from 1970 to 1986 to analyze this problem [1]. Peng and Wheaton (1997) studied the impact of land supply and consumer expectations on housing prices based on the housing prices and land supply data in Hong Kong from 1964 to 1990 and concluded that the rise in housing prices in Hong Kong was due to the combined effect of these two factors [2]. Chinese scholar Luo Jianguo (2007) believes that housing prices have regional characteristics, but the national

average housing price is also inconsistent with individual cities or regions [4]. Zhao Lili and Jiao Jiwen (2007) used the data of Jinan City from 2001 to 2005 and the grey relational analysis method to analyze the relative importance of the factors affecting housing prices and believed that the registered population was second only to the price factors of building materials and land price factors in Jinan. An important factor for housing prices in the city, the registered population reflects the scale trend of housing demand. With the increase in population and demand, housing prices will rise, and vice versa, housing prices will decline [5]. Chen Jianghao (2014) believes that among the factors affecting housing prices, per capita disposable income, urbanization level, and housing prices are positively correlated, industrialization level and housing prices are negatively correlated, and interest rates are also one of the important factors affecting housing prices [6]. Zhou Wenwen, Liu Chao, and Li Jiao (2017) believe that the same rights for lease and sale and loan interest rates have a long-term and stable impact on housing prices [7]. Zhong Xianzhe and Ding Xiaoyun (2018) proposed that the main factors affecting housing prices include government land supply plans and land finance, housing rigid demand brought about by urbanization, and financial speculative factors. The direct influence of residents' income, population composition, urbanization, and immigration factors [8]. To sum up, the factors affecting housing prices include residents' income, regionality, social development level, urbanization level, industrialization level, etc. Most authors agree that residents' income and regionality are the most important factors affecting housing prices.

2.2 The impact of residents' income on housing prices

Wang Xianzhu and Zhao Fengjun (2013) analyzed the transmission mechanism that the widening income gap affects housing prices through the saving rate on the macro and the crowding-out effect on the micro and empirically shows that the widening income gap is highly positively correlated with high housing prices [9]. Wu Shouping (2019) analyzes the impact of population flow and residents' income on urban housing prices based on building a buyer's utility function and a real estate market equilibrium model and finally concludes that the rise in housing prices is jointly driven by the local population and residents' income [10]. Zhou Xiaohan (2019) theoretically analyzed the transmission mechanisms of the total social savings rate channel and the housing demand behavior channel, which affect housing prices, and empirically studied the impact of factors such as housing price increase expectations and housing purchase restrictions on the transmission mechanism, and found that The widening income gap between residents is one of the factors driving the rise in housing prices, and it is found that the expectation of housing price rises significantly pushes up housing prices. Strong [11]. Chen Yanru (2021) took 337 prefecture-level administrative units in China as the research object and used the Theil index, rank-scale, and spatial Markov chain methods to analyze the urban housing price, income, and housing price-to-income ratio in Chinese cities from 2009 to 2018. The spatial and temporal differentiation pattern, overall stability, and spatial dependence characteristics are analyzed, and it is found that the stability and spatial dependence of urban housing prices and income types are strong [12]. From the above research, it can be found that

residents' income has a profound impact on housing prices, and residents' income or family income largely determines their house purchase behavior, which in turn has an impact on housing prices.

2.3 The impact of regional differences on housing prices

Liang Yunfang and Gaotiemei (2007) selected data from 28 provincial-level administrative regions and used two models to analyze the regional differences in the impact of factors such as per capita GDP, population, and interest rates on changes in housing prices [13]. Yin Xiangfei (2008) conducted an empirical analysis of China's urban residents' income growth, house prices, and other data from 1992 to 2006, and concluded that the widening income gap between residents led to the rapid rise in house prices, and the income of the top 10% of high-income households increased. is the main reason for the rise in house prices [14]. Zhao Fengjun and Gao Bo (2011) used data from 35 cities to construct a simple consumer equilibrium model, which proved the spatial correlation of housing prices in my country [15]. Roland Füss and Joachim Zietz (2016) studied the factors that led to regional differences in the growth rate of house prices in the US metropolitan statistical areas from 1992 to 2014 and finally concluded that the local population growth rate and land development rate jointly determined the impact of changes in the federal funds rate on house prices. the effect, resulting in the final result of regional differences in housing prices [3]. Yu Xiaofen (2022), based on the 2006-2020 housing price index data of 70 large and medium-sized cities in China released by the National Bureau of Statistics, used GIS spatial analysis and spatial Durbin model to study the space of housing price index in 70 large and medium-sized cities in China. The pattern and its influencing factors, the results of the spatial Durbin model show that the per capita GDP, the proportion of the tertiary industry, and the currency issuance are the main factors affecting the spatial differentiation of the housing price index in major cities [16]. In the role of regions on housing prices, the joint role of prices was first proposed by British experts. In the past 10 years, China has begun to study the issue of urbanization and housing prices, focusing on large and medium-sized cities in our region, or according different The field will classify and discuss urbanization. To sum up, most authors believe that residents' income and regionality will affect the level of housing prices in a city, but few authors put these two factors together for analysis, so this paper creatively puts these two factors together analysis.

3 Model building and data analysis

3.1 Sample selection

Nine cities in Shandong Province and Zhejiang Province are selected as research samples. Among them, Shandong Province includes: Jinan City, Qingdao City, Dongying City, Tai'an City, Linyi City, Yantai City, and other 6 cities, Zhejiang Province includes: Ningbo City, Hangzhou City, Shaoxing, and other 3 cities.

Table 1. Correlation coefficient between annual average income and housing price of residents in each city (Table credit: original)

province	City	Select the number of cities
Shandong Province	Jinan City, Qingdao City, Dongying City, Tai'an City, Linyi City, Yantai City	6
Zhejiang Province	Ningbo, Hangzhou, Shaoxing	3

3.2 Variable selection and model building

In the early stage of model construction, according to the research results of scholars in the literature review, the per capita disposable income, total population, GDP, and the total number of households are selected as independent variables, and the unit price of commercial housing sales is selected as the dependent variable. After preliminary calculation, it was found that due to the high correlation between several independent variables and multicollinearity, the model was optimized, and only the independent variable of residents' income was retained.

3.3 Model Analysis

Using the relevant data of the Shandong Provincial Bureau of Statistics, the Zhejiang Provincial Bureau of Statistics, and the statistical bureaus of various cities as the data source, a regression analysis study was carried out on the relevant data of 9 cities from 2005 to 2020, and the correlation coefficient between the average annual income of residents in each city and the house price was obtained as follows: Table 2 shows:

Table 2. The correlation coefficient between the average annual income of residents and housing prices in each city (Table credit: origina)

City	Income and house price correlation coefficient
Jinan City	0.266285237
Qingdao	0.260608252
City of Yantai	0.171649075
Linyi City	0.213404902
Dongying City	0.11480796
Tai'an	0.207874979
Ningbo	0.242241247
Shaoxing	0.226869411
Hangzhou	0.556913626

After classifying the correlation coefficient (see Table 3), it can be found that the impact of residents' income on housing prices presents both inter-provincial and intra-provincial differences.

Table 3. The correlation coefficient between the average annual income of residents and housing prices in each city (Table credit: origina)

City	Correlation coefficient interval
Yantai City, Dongying City	0.1-0.2
Jinan City, Qingdao City, Linyi City, Tai'an City, Ningbo City, Shaoxing City	0.2-0.5
Hangzhou	0.5 or more

The correlation coefficient between income and housing price is between 0.1 and 0.2: Dongying and Yantai. The reason for the low correlation between income and housing prices in Dongying City is that Dongying City is an energy-based city, and its per capita disposable income is second only to Qingdao City in Shandong Province. Because Shengli Oilfield, a state-owned enterprise, has more preferential policies for welfare housing, residents have less demand for commercial housing, so the correlation between income and housing prices is the lowest among the nine cities. The correlation between residents' income and housing prices in Yantai is not obvious. The reason is that Yantai is located in the coastal area of Shandong Province and is one of the earliest areas in Shandong Province where the economy developed. Local residents bought houses early and there is no new housing demand. The wealthy people already own their own houses. From an investment point of view, housing prices have been relatively high in recent years and the growth rate has been too fast, so it is not the best choice for investment.

The correlation coefficient between income and house price between 0.2 and 0.5 is the largest, including Jinan, Qingdao, Linyi, Tai'an, Ningbo, and Shaoxing. At present, the correlation coefficient of housing price and income in cities such as Jinan and Qingdao is significantly higher. The residents' income in these cities is relatively high in the province. Under this premise, the correlation coefficient of housing price and income is also relatively high, which can lead to the conclusion that housing prices in provincial capitals and coastal areas have risen a little faster. From the analysis of Shandong's situation, the driving force for the rapid rise of housing prices in coastal areas mainly comes from objective factors, including the demand for foreign housing purchases and the expectation of a bullish market price outlook. Another reason is: The urbanization rate continued to increase from 2005 to 2020, and the increase in the urbanization rate meant an increase in the number of people transferring from rural areas to cities. The increase in urban population was a direct factor affecting housing prices; Demand has increased, and the price of real estate has been raised; the improvement needs of the original urban residents have also been released because of urbanization, and the price of real estate has been raised. New urbanization has promoted the development of cities in Shandong Province. The development of the city relies on a lot of financial expenditure, and the finance depends on the income

from the land transfer, which increases the cost of land development, and the developers pass it on to the buyers, making the housing price rise.

Hangzhou is the only city with a correlation coefficient between income and housing price greater than 0.5. Compared with other cities in Zhejiang Province selected in the sample, Hangzhou has higher housing prices but the per capita disposable income is basically the same as other cities. Hangzhou has the highest correlation coefficient between income and housing prices, mainly due to two reasons: First, the income level of different strata groups and the affordable housing prices under this income level are not considered in the process of calculating housing price income, but only the average income and average housing prices of residents are considered. , does not fully explain the high housing price-to-income ratio and the unreasonable changes in housing prices: Second, in the process of buying a house, individuals will accept financial support from parents and relatives to increase their ability to pay for house purchases, but considering personal disposable income leads to the housing price-to-income ratio. High, and then come to the wrong judgment that the house price is unreasonable. From the perspective of urban greening, urban green space is an important factor, and residents prefer to live in residential areas close to large green spaces and with a large number of green spaces. Residents have a high demand for shared green space and self-contained green space, and the types of accessibility and area requirements are different. Green area and quality of green space are also factors that affect housing prices.

Comparing Shandong Province and Zhejiang Province, the average correlation coefficient of three cities in Zhejiang Province is about 0.34, the average correlation coefficient of six cities in Shandong Province is about 0.21, and the average correlation coefficient of Zhejiang Province is higher than that of Shandong Province, which shows that the average correlation coefficient of Zhejiang Province per capita The correlation between disposable income and house prices is even higher. The three cities in Zhejiang Province can be divided into two categories. The correlation coefficient between Ningbo and Shaoxing is between 0.2 and 0.3. The correlation coefficient of Hangzhou is significantly higher than that of Ningbo and Shaoxing, which is between 0.5 and 0.6. . The six cities in Shandong Province can also be divided into two categories. The correlation coefficients of Jinan City, Qingdao City, Linyi City, and Tai'an City are between 0.2 and 0.3, and the correlation coefficients of Yantai City and Dongying City are between 0.1 and 0.2. . Housing prices in three cities in Zhejiang Province rose rapidly between 2016 and 2018, which was related to the central bank's reduction in reserve requirements, interest rates, taxes, and down payments. The loosening of bank lending policies and the increase in mortgage loans increased the strength of buyers to purchase houses. Therefore, the market demand has increased, and housing price has risen rapidly. The growth rate from 2018 to 2019 was relatively slow. During this period, the government launched the shantytown reform plan, increased the guarantee of public rental housing, and cracked down on the phenomenon of "real estate speculation", which made the real estate market develop steadily. It can be seen that the macro-control of the country and the policies promulgated by the government will affect the changes in housing prices to a certain extent. There is a positive correlation between income and housing prices.

4 Conclusion

This paper selects the data of nine cities in Shandong Province and Zhejiang Province from 2005 to 2020 for analysis and studies the regional differences in the impact of residents' disposable income on housing prices. The results show that the growth of per capita disposable income is one of the important driving factors for housing prices. However, because of the different socioeconomic conditions and differences of thinking in each province and city, the impact of per capita disposable income on housing prices is not absolute, and there are regional Sexual differences: From an inter-provincial perspective, the driving effect of residents' income on housing prices is significantly greater in provinces with higher per capita income than in provinces with lower per capita income; from a provincial perspective, housing prices in adjacent cities in the same province have a higher degree of similarity. However, due to the different functional positioning of each city in the same province, although the income of residents has a certain impact on housing prices, the degree of influence is not universal. The author believes that there are regional differences in the impact of residents' income on housing prices. Local governments should formulate corresponding policies and measures to control this problem according to regional characteristics. For example, overpriced areas can adopt measures to limit housing prices; Regions with low per capita income should adopt the method of distributing subsidies. In order to better solve this problem.

References

1. Case KE, Shiller RJ. Forecasting Prices and Excess Returns in the Housing Market[J]. John Wiley & Sons, Ltd (10.1111), 1990(3).
2. Wheaton B. Consumption, lifestyle and gendered identities in post-modern sports: the case of windsurfing. [J]. University of Brighton, 1997.
3. Roland Füss, Koller JA . The role of spatial and temporal structure for residential rent predictions[J]. International Journal of Forecasting, 2016.
4. Luo Jianguo. my country's real estate price analysis and countermeasure research [D]. Chang'an University.
5. Zhao Lili, Jiao Jiwen. Grey correlation analysis of factors affecting housing prices [J]. Statistics and Decision, 2007(23):2.
6. Chen Jianghao. Influencing factors of housing prices and R language implementation [D]. University of Science and Technology of China, 2014.
7. Zhou Wenwen, Liu Chao, Li Jiao. Research on the impact of real estate policy regulation on housing prices: Analysis based on ARDL model [J]. Price Theory and Practice, 2017(11):4.
8. Zhong Xianzhe, Ding Xiaoyun. Analysis of Influencing Factors of Urban Housing Prices in China [J]. Modern Commerce and Industry, 2018, 39(18):2.
9. Wang Xianzhu, Zhao Fengjun. Income disparity, crowding out effect, and high housing prices [J]. Economic Theory and Economic Management, 2013(1):9.
10. Wu Shouping. Population mobility, residents' income, and urban housing prices: A test based on the data of 35 large and medium-sized cities in China [J]. Regional Research and Development, 2019, 38(1):4.

11. Zhou Xiaohan. Research on the Influence of Income Gap of Urban Residents on Housing Prices in China [D]. East China Normal University, 2019.
12. Chen Yanru, Gu Yue, Song Weixuan. The spatial and temporal pattern of housing price, income, and housing price-to-income ratio in Chinese cities [J]. *Geographical Research*, 2021, 40(9):17.
13. Liang Yunfang, Gao Tiemei. An Empirical Analysis of Regional Differences in China's Real Estate Price Fluctuation [J]. *Economic Research*, 2007, 42(8):10.
14. Yin Xiangfei, Chen Liuqin. A causal test of the relationship between urban residents' income gap, wealth gap, income growth, and housing prices: 1992—2006 [J]. *Journal of Hebei University of Economics and Business*, 2008, 29(6):16-21.
15. Zhao Fengjun, Gao Bo, Luo Zuchun. The Double Track System of Affordability, Financial Support and Housing Supply [J]. *Jianghai Journal*, 2011(3):7.
16. Zhan Dongsheng, Yu Xiaofen, Yu Miaozi, et al. Spatial Differences and Classification Control Strategies of Urban Housing Affordability in China [J]. *Geographical Sciences*, 2022, 42(2):13.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

