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Study on the Pricing Model of Affordable Housing in Guangzhou, China

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Abstract

Indemnificatory housing is related to our life in China, how to make price reasonable is necessary for its social welfare function. This paper introduces the pricing process of affordable housing and focuses on the demonstration of price-limited housing which is both indemnificatory and commercial. Combined with the cost method and the market method, the pricing model was constructed based on the system: market valuation price--the ratio of house price ---selling price. Taking Guangzhou-- a city in south China-- as the object, the key --price ratio- was calculated according to the data. Reasonable of that model was examined with an example of a house in Guangzhou, China, named FengJingHuaTing. With the expansion of the government welfare project, the study of the pricing model of the purchase type of indemnificatory housing is of great value to the citizens and market.

Keywords: Affordable housing; Pricing Model; Price Ratio.

1. Introduction

1.1 Background of Affordable housing in China

Housing is one of the most basic necessities of life. Under the conflict between growing demand for material and culture and the rising price of housing, any citizen has the right and need to reach a "housing" level. Therefore, the Chinese government is paying more and more attention to the construction of affordable housing. Building affordable housing system and reasonable pricing are the keys to the effective implementation of affordable housing policy. The affordable housing in which the government invest or raise money to construct, sold or rented with limited standards and prices to eligible families and single residents with housing difficulties, consists of low rent housing, public rental housing, affordable housing, limited housing, limited commodity housing and so on (Wang, D.X., Peng, H. C, 2013).

In 1998, the housing system was reformed in China. The welfare housing system was replaced by a new market-oriented system, and housing commercialization, monetization, and socialization were gradually implemented. The market reform promoted the rapid development of the real estate industry, but the market cannot effectively solve the housing problem of the middle and low-income stratum, unless with the aid of the national policy. In order to solve this housing problem, the housing security system was gradually established in China: high and

middle-income people are satisfied by the market; provide affordable and limited housing to the middle and low-income people; the lowest income people have access to the low rent housing and the public rental housing (Huang, G.Y, 2009). The construction of affordable housing and reasonable pricing play an indispensable role in the healthy development of China's real estate market.

However, in the exploratory stage of housing system reform in China, the pricing model isn't mature. For example, economically affordable housing lost its price advantage in 2008 due to a small difference from ordinary commercial housing prices in Guangzhou, China, as well as limited housing.

Affordable housing is an important government project. Only with a reasonable price and policy, can it play its role well. Only by establishing a stable and reasonable housing security system can the housing problem of middle and low-income families be solved. At the same time, it also plays an important role in adjusting the structure of the real estate market, restraining unreasonably rising price, driving the development of the related industries.

1.2 The pricing mechanism of affordable housing in developed areas

The government of Singapore has made great efforts to develop public housing. At present, 87.6% of the residents live in the group house, of which 93% of the residents have the property rights of their houses, and the coverage of their affordable housing is very high. The pricing principle is that 90% of households can afford three-bedroom public housing, and 70% can afford four-bedroom public housing. The pricing method has gone through these stages: construction cost pricing, construction cost and land cost pricing, construction cost and land market price pricing, construction cost and resale price pricing, and the median price of the house price. In practice, not only the market price is considered, but also the income level of different income strata is under consideration. Different types of discounts are given to different types, such as the discount rate of the three-bedroom house is about 44%, four-bedroom house is 33%, and the five-bedroom house is about 27% (Gong, S.H,1997). At present, the pricing of public housing in Singapore is the market pricing method based on the income level, together with housing fund system. The goal of "home ownership" is difficult to achieve at this stage in China (Teo E A L, Lin G, 2011)

There are two types of affordable housing in Hongkong. One is for rent, and another is for sale. Their application is restricted by income level and asset status. Because of the relatively perfect income statistics system in Hongkong, its price formulation is mainly reference income. The construction cost of housing is between 1/3 and 2/3 of the market price, the proportion of mortgage and income is less than 40. There is also effective access and exit mechanism in Hongkong. Applicants can only rent or buy an affordable house one time. Public rental rights cannot be automatically transmitted from generation to generation. People who want to transfer their houses within two years after purchasing the house must be transferred to the government. Three years later, the object of the transfer should be eligible. Five years later it is free to sell if the price difference is refunded. Due to the fact that the income level of China's residents is stratified and the income statistics system is weak, it is difficult to implement the cost-oriented pricing model. However, we can draw on the strict access and exit mechanism of Hongkong to ensure that the price of the affordable housing is maintained at a reasonable level (Ho M H C, 2004).

Security type housing in Macao is divided into social housing and economic housing. The former is mainly used for rental. It is built or invested by the government and rented to a low-income resident with low price, which is charitable. The latter is mainly for sale, invested directly by the government, for the low - and middle - income groups that are not able to buy commercial housing and are not qualified to apply for social housing. The lower and upper limit of income and the upper limit of net assets are listed below.

Table 1 Restrictions on Economic Housing Applications in Macao

Number of family members	Monthly income lower limit (RMB)	Monthly income upper limit9RMB)	Upper limit of net assets (RMB)
one	7820	22240	672168
Tow and more	12210	44479	1344336

Data sources : Macao Special Administrative Region, law 10/2011, economic Housing Act

In terms of pricing, the price of the economic housing is not linked to the market price but is calculated by the capacity of the eligible households. On the basis of the comprehensive consideration of the location, age, the direction of the unit, the area and so on, the residents' income is the main factor in Macao.

It can be seen that in Hongkong, Macao, and Singapore, government all attach great importance to the income level of the insured. In the process of pricing, it takes full account of the different proportion of houses with different income levels (Adrienne La Grange, 1998). It is worth learning in the Chinese mainland. However, it needs improvement of relevant supporting income and property credit system, which is relatively weak at present, and it does not meet the fact of a large population in China. In developed areas, many residents don't have property but are long tenants, which helps to reduce the burden of housing (Zhou, K.L., 2014). In China, the right to protect housing should be highlighted, not the property rights of the housing.

2. Literature review

The housing system reform in China began just twenty years ago. it constantly needs to learn from all kinds of experience and draw lessons from other countries and regions to improve itself. According to the property difference, the system of affordable housing is divided into two types: for purchase and lease. With the increasing popularity of the real estate market in China, the land and house are very expensive in some cities. because of the particularity of affordable housing, the pricing method is more complex and cautious than the ordinary commodity housing, which is worthy of our attention and active exploration. The purchase of affordable housing in China is indispensable (Yifu Lin, 2008; Xiao Bi Qing, 2011), the government's policy of affordable housing will not cause a downturn in the real estate market, instead of helping the middle and low-income people to own their own housing (Yifu Lin, 2008).

Wu Jianfeng (2012) emphasizes that the rising price of the guaranteed commodity house is changing with the increasement of residents' income. Bai Baoping (2014) had a research on price structure of guarantee commodity house, taking the affordable housing as the representative, comparing it with the ordinary commercial housing. At the same time, he compared the Chinese affordable housing with the public housing in the United States and finds the problems existing in China, and some suggestions and countermeasures were put forward to alleviate the contradictions and problems in the pricing link at the present stage.

For the pricing model, Li Gefei(2007) used the method of weight mean for the price of the limited-price housing in Zhengzhou, Henan for the first time. According to two calculation method: "80% of commodity housing that is the same type at the same area, in the same period" and "the development technology, the management cost plus the profit of 8% to 10%", the two prices were calculated respectively. Then the weight average method was used, and the price of the limited-price house was obtained. Zhang Hongyan (2009) measured the benchmark house price from the angle of income and similar housing rental price. The government should adopt the indirect price control method, introduce the developer competition mechanism to decide the highest price, and increases its price elasticity.

Lai Junyu and Peng Haicheng (2014), based on the research on the pricing mechanism of the guaranteed commodity houses in Chongqing and Xi'an, put forward the price scheme based on the index of the proportion of capital and assets, the rate of return on investment and the net interest rate, so as to get reasonable profit. It can be seen that affordable housing is still marketable, and profitability is one of the considerations.

Li Yingying (2011) studied and analyzed the pricing mechanism by using the method of load measurement, cost calculation and market price measurement, and discussed the price problem of the guarantee type commercial housing under different pricing methods. It is suggested that the government should use three methods in combination and determine a cost-effective project. She combined cost, market, and income comprehensively, reduced unreasonable factors, which is in line with China's reality. Gu Zhengxin, Nie Qibo and Wu Xianghua (2010) mainly discussed the pricing mechanism of the affordable housing from the perspective of common property rights. They pointed out that the pricing should start with the two angles: price composition of the building and the disposable income of the middle and low-income people, we must take full consideration to the real purchasing ability, so as it can play its real role.

Therefore, it is one of the reasonable ways to combine a variety of pricing methods. Scholars often use one or combination of multiple models according to the characteristics of the study area to choose pricing model. Cheng Guoqiang (2010) and Zhang Hongyan (2009) are mainly analyzed from the angle of income, while Li Gefei (2007) discussed a model of market and cost pricing, and Gu Zhengxin (2010) combined the two modes of cost and income. Li Yingying suggested that cost, income, and market should be all put into consideration. The building cost is relatively static and easy to obtain, but the market factor is very different. This paper is based on the cost method, taking the price of the regional market as the reference and adjustment factor, that is, combining the cost method with the market method.

3. The theoretical basis and research design of the affordable housing pricing

3.1. The principle of affordable housing pricing

According to the pricing practice at home and abroad, there are three main pricing models for affordable housing: income pricing, cost pricing, and market pricing, related to eligible applicants' income method, the construction cost plus profit method and the market price percentage method. The three pricing models have its own advantages and emphasis (Chen, A.M, 2006. Wang, D. X., Peng, H. C, Ye, X.Q., 2014).

(1) Income pricing method

The main factor of this model is to guarantee the ability to pay for the income and assets of the object. At present, the scholars mainly discuss these aspects: the proportion of housing expenditure to household income, when all the rest is used for housing expenditure. after the basic non-housing budget is deducted. The proportion of the data is generally based on experience, and also takes into account the specific applicant's capacity to benefit low-income people more fairly. Generally speaking, the methods of income evaluation-index include housing price-income ratio, housing consumption-income ratio, and residual income method. However, it is difficult to collect the real and effective property information of the applicant because of the imperfect revenue and property requesting system at the present stage in China, so it is not ideal to some extent. Moreover, income pricing cannot reflect the value difference of affordable housing in different locations, which is not conducive to the supply balance of the market(Fang, L.J., 2010).

(2) Market pricing method

This method is a market comparison way based on the theory of Marshall equilibrium value theory. In general, it is necessary to find a price of the reference object and make an adjustment, which is widely used in the evaluation of many different types of assets (Wang, X.Z., 2008). Here, it is presented as "the market price percentage method," which is based on the rent or price of the commercial housing market at the same time point, the same location, the same quality, and then make "discounts." The train of thought is the price of the target = $\{\sum \text{price of reference} \times \text{Price adjustment coefficient}\} / n$. However, the proportion of discounts needs to be accurate, not too high or too low, and we should avoid unifying "discounts" in the way of "one size fits all" in order to ensure the welfare equity (Xiao, B.Q., 2012. Zhang, Y.,2010).

(3) Cost pricing method

This model takes the construction costs and operating costs of affordable housing into account. Like the ordinary commercial housing, the price of the affordable housing is generally composed of six parts: the land acquisition cost, the development cost, the management cost, the capital cost, the tax, the profit. The affordable housing is a public product with welfare, its land cost and related tax and fee are reduced by the government, and the construction cost is also stipulated by the government not to exceed 3000 yuan per square meter (Huang, N.S., 2011), including construction, installation, supporting investment, greening transformation, capital interest, and other costs. Therefore, the cost-oriented pricing model is mainly concerned with two factors: its construction cost and operation cost (He, Y.B. 2010. Liu, Z.Y. 2013).

3.2 Pricing model design

In this paper, the cost market pricing method is combined with the market method. Under the premise of unifying average profit rate, the price ratio of the purchase type housing price and the same level of ordinary commercial housing is determined by mathematical deduction. The price of the affordable housing is corrected by the ratio. The ratio of prices is the core (Ma, Q. 2006).

According to the principle of cost accounting, the house price is composed of land price cost, construction cost, profit and reasonable tax. Although the absolute value of the elements of the affordable housing and ordinary commercial housing is different, in proportion, the construction cost, the profit rate, and the tax are relatively stable, only the cost of land is unstable. In other words, the ratio of the affordable housing to the ordinary commodity housing is mainly influenced by the land price ratio, the construction cost ratio, the profit ratio, and the rate ratio, while for all the affordable housing, the others are stable except the land price ratio.

Therefore, the cost--market pricing model has the hypothesis: the cost difference between the affordable housing and commercial housing is mainly land price. The reasons for this hypothesis are that the policy preferences are mainly reflected in the land price; secondly, for the same developer, On the premise of stable construction technology and management level, there is no significant difference between the construction cost of the two. In terms of financial cost, the financing rates of both are basically the same, but the interest cost is different because of the distinct land cost. We believe that it is theoretically feasible to deduce the price ratio through land price. In addition, since the variables need to be quantified, the model has some effective time points and needs to be adjusted in time with the changes in the social tax policy, the financial policy and the cost of construction (Qiang, Z., Xia.S.L., 2009).

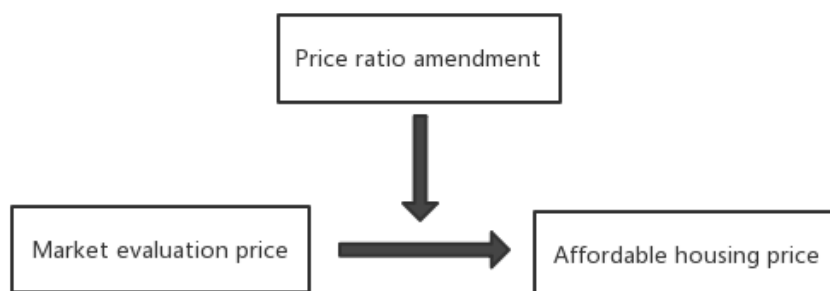


Figure 1: the calculation model of the cost market method

The following steps are needed when using cost - market method

- (1) Calculate the profit ratio with safety interest rate plus risk-adjusted value method
- (2) Based on the cost method, derive the relationship between the price ratio and other factors, and assign it.
- (3) Bring the number into the formula calculation and get the price.

According to the valuation theory, the prices of both are roughly calculated with land price, construction cost, profit rate and tax rate, and then ratio of the two are calculated. Analyze which variables will affect its value (Sun, W.Z., 2007).

Taking a house whose development period is 3 years as example, according to the theory of prices composition, the relationship between affordable housing price p_{gf} , land price p_{gd} and the commercial housing price p_{sf} , land price p_{sd} , the construction cost C , the interest rate R , the tax rate T and the profit margin R is as follows.

$$p_{gf} = p_{gd}(1 + 3r + 3R_g) + c_g(1 + 3r) + T_g p_{gf}$$

$$p_{sf} = p_{sd}(1 + 3r + 3R_s) + c_s(1 + 3r) + T_s p_{sf}$$

Simply deformed :

$$\frac{p_{gf}}{p_{sf}} = \frac{1-T_s}{1-T_g} \times \frac{p_{gd}(1+3r+3R_g)+c_g(1+3r)}{p_{sd}(1+3r+3R_s)+c_s(1+3r)} \quad (3.1)$$

$$= \frac{1-T_s}{1-T_g} \times \frac{p_{gd}}{p_{sd}} \times \frac{(1+3r+3R_g) + \frac{c_g(1+3r)}{p_{gd}}}{(1+3r+3R_s) + \frac{c_s(1+3r)}{p_{sd}}}$$

$$= \frac{1-T_s}{1-T_g} \times \frac{p_{gd}}{p_{sd}} \times \frac{(1+3r+3R_g)}{(1+3r+3R_s)} \times \frac{1 + \frac{c_g(1+3r)}{p_{gd}(1+3r+3R_g)}}{1 + \frac{c_s(1+3r)}{p_{sd}(1+3r+3R_s)}} \quad (3.2)$$

According to (3.2), the house price ratio $\frac{p_{gf}}{p_{sf}}$ is affected by land price ratio $\frac{p_{gd}}{p_{sd}}$, profit and interest ratio $\frac{(1+3r+3R_g)}{(1+3r+3R_s)}$ and the proportion of construction cost to the total cost. For the different house, except corresponding market housing price and land cost, other factors are relatively stable. So, the ratio of house prices is mainly influenced by the market price and the land price coefficient, and different housing has different price ratio (Zhang, Y., 2011).

4. Analysis and Verification

4.1 Research object

There are two types of affordable housing: for rent or sale. This article mainly discusses the pricing model of the sale type housing. Economical housing and limited price housing are two typical and main types of affordable housing.

(1) Economical housing in Guangzhou has three forms: some are developed by municipal housing security office, some are transformed from the stock public house, and others are constructed by the enterprise. In these three forms, the first kind belongs to the construction of the direct organization of the municipal government. According to the regulations, there is no profit and is sold at the cost price. The second kind is the stock public housing. According to the "notice on the problem of selling the stock of the public housing," the stock public housing is that has clear property, managed by relevant enterprise and institution in the administrative area of Guangzhou, China. Stock public housing is sold at a market valuation price with. Therefore, the two forms of affordable housing do not have a land transfer, nor do their price need to be discussed. The third is that the developers get the land through the allocation and sell at a profit rate of no more than 3%. Here there is no land leasing, so we don't know the cost of land price. this type of affordable housing doesn't involve land pricing, and the cost structure is relatively simple. Therefore, we only introduce the cost and pricing structure of economical housing and do not build and analyze the model for it.

(2) Price limited commodity house, based on the limited set type and limited price, is commercial and welfare whose developer is determined by bidding. It is aimed at those who are unable to buy the ordinary commercial housing and do not meet the conditions of the economic housing. The purchasers have limited property rights. Price limited commercial housing has the market attribute and research value. Therefore, the

price limited commercial housing is the model establishment and the empirical research object.

4.2 Data sources and value

Data are from Guangzhou land resources and Housing Authority, YangGuangJiaYUan website, Guangzhou Yearbook, China construction cost information network and so on.

The core of the cost- market pricing method is price ratio table. According to formula 3.1, we can calculate the price ratio of each specific value, including the following definitions of the tax rate, profit rate, construction cost and so on.

(1) Land cost.

The land cost includes the land price paid for the land acquisition and the interest. The economical housing is usually allocated land, and the land use right can be obtained by paying little or no land grant F or limited price housing, the land is obtained through a transfer with lower price compared with ordinary commercial housing.

(2) Construction cost. It includes the cost of design, the cost of construction, installation, equipment, infrastructure construction and public facilities, management and interest, etc. There are detailed provisions for each item in "technical guidelines for the construction of affordable housing projects in Guangzhou, China." We take the small high-rise housing whose development period is three years as an example. According to the construction cost information network of China, the average construction cost of the small high-rise buildings in Guangzhou is 1881 RMB /m² in 2015. In order to guarantee the lower sale price, the guarantee type housing will use the building materials with sufficient supply and relatively low price on the premise of ensuring structural safety and functional use. The design of the structure is mainly practical, the function is clear, and the unit is relatively simple (Huang Rudong, 2001). Therefore, the construction cost is slightly lower, and here is 1500RMB /m².

(3) Tax. According to the relevant tax regulation, tax includes the business tax, the urban construction, and maintenance tax, the additional education fee and the stamp tax, the tax rate is 5.65% (Ye Xianquan, 2014). However, it involves a lot of specific tax items and tax rates in the specific operation process, real estate development, sale, transaction process. the economic housing, low rent housing and public rental housing will be exempted from all administrative fees and government funds, according to the "notice on the practical implementation of the administrative charges and the policy of exemption of government funds in Guangzhou.". For limited price housing, preferential items are relatively few, and there is no clear tax and preferential regulations. The tax rate cannot be calculated accurately in the two reasons. We suppose T_g and T_s are the same value. But the proportion of tax and fee is still a very important factor for other types of affordable housing (Wang, Y.G., 2008)

(4) Profit. "The management of economical housing in Guangzhou" stipulates that the price should be based on the principle of maintaining a small profit. The profit rate of the economic housing project implemented by the real estate development enterprise is not higher than 3%. The economical housing directly organized by the government must be sold at cost without profit. The profit rate of the limited price room is also different in different areas (Ma, X.Y., Yuan, Q.F., Zhao, J.). The rate of return is determined according to the safety interest rate plus risk adjustment value method. The safety interest rate is 4.75% for the three-year commercial loan interest rate of the central bank, and the risk value of the housing lease is 3%. We suppose the profit rate is 7.75%. The actual profit rate of ordinary commercial housing is very different in different urban projects. In 2012, Shaanxi Province issued a policy to measure the cost of housing projects in different regions, announce the range of regional housing sales price, and control the profit of real estate around 10%. Commercial housing beyond the price range will not be recorded in the price department, nor can it get the pre-sale certificate. But in fact, the profit rate is diverse. For example, the gross interest rate of Vanke 2015 is 19.46%. (Data source: Vanke 2015 Annual Report) Therefore, in the theoretical calculation, we take 10%.

- (5) Interest. The annual interest rate for three years is 4.75%.

4.3 Price ratio table

The above values are assigned to (3.1), and the following results are obtained:

$$\frac{p_{gf}}{p_{sf}} = \frac{(1+3 \times 4.75\% + 3 \times 7.75\%)p_{gd} + 1500 \times (1+4.75\% \times 3)}{(1+3 \times 4.75\% + 3 \times 10\%)p_{sd} + 1881(1+4.75\% \times 3)}$$

$$= \frac{1.375p_{gd} + 1713.75}{1.4425p_{sd} + 2149}$$

Because the price limit room of Guangzhou is common in 2008-2011 years, the price of the limited price housing and the commodity house is given as an example, and the price ratio of the two can be calculated combined with the benchmark price map of the residential land in 2009. Thus, the estimated price of the Limited price room is obtained.

Table 2 Price ratio table

地价 (元)	1000	2000	3000	4000	5000	6000	7000	8000	9000
700	0.74	0.52	0.40	0.32	0.27	0.23	0.21	0.18	0.17
1000	0.87	0.60	0.46	0.38	0.32	0.27	0.24	0.21	0.19
1300	/	0.69	0.53	0.43	0.36	0.31	0.27	0.24	0.22
1600	/	0.78	0.60	0.48	0.41	0.35	0.31	0.28	0.25
1900	/	0.86	0.66	0.54	0.45	0.39	0.34	0.31	0.28
2100	/	/	0.71	0.57	0.48	0.42	0.37	0.33	0.30
2400	/	/	0.77	0.63	0.53	0.46	0.40	0.36	0.32
2700	/	/	0.84	0.68	0.57	0.49	0.44	0.39	0.35
3000	/	/	0.91	0.74	0.62	0.53	0.47	0.42	0.38

Price ratio table is shown as above. But the table is limited, data isn't. The price ratio can be said to have numerous values, in order to make it more intuitive and clear, we took some typical land price ratio and market price, calculated the price of the limited price room and listed the forms as follows:

Table 3 Limited price housing price simulation table

Market housing price	5000	7500	10000	12500	15000	17500	20000	22500	25000	27500	30000
Price ratio											
0.1	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
0.2	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
0.3	1500	2250	3000	3750	4500	5250	6000	6750	7500	8250	9000
0.4	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
0.5	2500	3750	5000	6250	7500	8750	10000	11250	12500	13750	15000
0.6	3000	4500	6000	7500	9000	10500	12000	13500	15000	16500	18000
0.7	3500	5250	7000	8750	10500	12250	14000	15750	17500	19250	21000
0.8	4000	6000	8000	10000	12000	14000	16000	18000	20000	22000	24000
0.9	4500	6750	9000	11250	13500	15750	18000	20250	22500	24750	27000

The price ratio table has two applications. First, a direct inquiry through the corresponding market price and the ratio. Then the price of the house price can be estimated (Yao, L.Z., 2003). But, through the table, we can't list every ratio, we can calculate the result of each assignment by the formula (3.1).

4.3 Analysis and discussion

The pricing model is deduced from the fact in Guangzhou. So, we selected a case to verify it.

LongGuang FengJingHuaTing is a limited price room in Guangzhou, China in 2009. It covers an area of more than 30 thousand square meters. It is located on the side of GuangShan highway. The developer is Guangzhou LOGAN Real Estate Co., Ltd., its basic information (all 2009 data) is as follows:

Item	Data
Total building area (square meter)	284063
land-transferring fees (100 million)	3.9214
Average land price (yuan / square meter)	1380
Maximum sales price (yuan / square meter)	4000
The standard price of the region (yuan / square meters)	1980
House prices in the region (yuan / square meters)	5524

We selected the new commercial housing project which was sold at the same time in the vicinity of Fengjing Hua Ting area. Their average price is as follows(RMB): LinYuShanZhuang (6917), HongKangDongZhu (4932), ShangPinhuaTing (4725), different projects have different cities. Field price, the average price of poly XiangXueShan reached ten thousand. Here, we take the average selling price of the above three ordinary commercial houses of the same grade and take the market housing price as 5524 yuan /m². From this, we can calculate the price ratio of FengJingHuanTing:

$$\frac{P_{gf} - 1.375 \times 1380 + 1713.75}{P_{sf} - 1.4425 \times 1980 + 2149} = 0.722$$

The selling price of the FengJingHuaTing is estimated: 0.722 x 5524=3985.6 yuan / m².

Compared with the actual price, the government stipulates that the highest price of FengJingHuaTing should not exceed 4000yuan. And its actual sale price is about 3900-4000yuan which is basically in line with our calculation results.

On the basis of the cost method, combined with the market pricing method and the actual data in various regions, the price ratio of a certain region can be deduced, and the reasonable price of the purchase type housing is calculated.

4. Conclusion

From the point of view of pricing, this paper introduced three basic pricing methods: the cost method, market method and income method, and the market--cost pricing model is theoretically deduced and empirically analyzed.

- (1) According to the actual situation and the combination of specific data, the pricing model of the limited price room in Guangzhou is concretely translated into $\frac{P_{gf} - 1.375p_{gd} + 1500}{P_{sf} - 1.4425p_{sd} + 1881}$, which can be used to calculate the ratio of the price of the house. In Guangzhou, it is verified by FengJingHuaTing project, and the estimated price is 3961.83 yuan/m², and the actual price is around 4000 yuan per unit. The result is basically consistent.
- (2) After studying the pricing model of Hongkong, Macao, and Singapore, it is found that the advantage is that the income of the insured is fully taken into account, and the price system with distinct and clear

guidance is built. We should draw on the developed countries and regions to establish a clear and transparent system of income statistics, clear the standard of building cost accounting, set up a single set of housing price correction standards, and play the role of price in the allocation of resources.

Because the factor of the price of real estate is very complex and the degree of heterogeneity in different regions is very large, the theoretical method must be changed with the actual situation. Many data in the cost pricing model have certain volatility and dissimilarity. This paper only makes exploration and deduction and has certain hypothesis precondition. Because of the difference of construction structure and development period, the data fluctuation of data in different periods is great. So, the formula needs to be adjusted according to the actual situation. This article's scope of research needs to be expanded.

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