



Dynamic Research on Housing Purchasing Power in China's Major Cities

Houqing Wei

*Department of logistics and information management, Jiangnan University, Wuhan, China
Email: 123088209@qq.com*

ABSTRACT

Housing prices have always been a concern for the Chinese people. Some scholars have conducted in-depth studies on China's real estate bubble and housing purchasing power in a few cities. Still, few have conducted analytical studies on the changes in housing purchasing power in China and major cities. Based on the data published by the National Bureau of Statistics of China, the author used a revised formula to calculate the housing purchasing power of China and major cities from 2006 to 2020. The data show that the average housing purchasing power of urban residents in China has increased by 45.59%. Still, there are significant differences among major cities, with growth rates ranging from -38.18% to 49.18%, and the number of cities with reasonable housing purchasing power has gradually increased. It suggests that China's real estate control policy should be city-specific, gradually raising the income levels of the lower-and middle-income groups and establishing a differentiated housing protection mechanism.

Keywords: *housing purchasing power; house price-to-income ratio; the average wage of on-the-job workers*

1. INTRODUCTION

According to data released by the National Bureau of Statistics, in 2018, the per capita housing construction area of urban residents nationwide was 39 square meters, an increase of 32.3 square meters compared with 6.7 square meters at the beginning of the reform and opening up in 1978. The housing level of the people has been dramatically improved.

Although China started real estate regulation in 1998, the housing prices in China are still rising in waves, and the voices of difficulty in buying a house and high housing prices are still heard.

Scholars generally use the housing price to income ratio to measure housing purchasing power, which is the ratio of the average housing price (or median housing price) to the average household income (or median household income) [1]. The World Bank generally considers that 3-6 is more suitable for the economic affordability of urban residents when measuring the level of housing consumption in a country or region [2]. By constructing a housing purchasing power model, Li Aihua [3] made an empirical analysis of the purchasing power of households with different incomes using relevant data of Beijing in 2004. The result showed that

the purchasing power of low- and middle-income households was insufficient and put forward corresponding suggestions. Li Aihua [4] proposed a dynamic model of housing purchasing power. Analyzing Beijing's data from 1978 to 2005, he believed that the purchasing power of active housing was greater than that of static housing. Zhang Jing and Feng Changchun [5] combined the housing price with the resident's income, the supply structure of the housing market, the credit level, and other factors. They studied the housing purchasing power of 35 big cities in China in 2009. However, few scholars have examined how much the purchasing power of residential housing in China or a particular city in China has increased or decreased.

Lv Jianglin [6] based on the established housing market bubble level model, according to the data of the third quarter of 2009, calculated that the average housing market bubble in 35 large and medium cities in China was as high as 85.6%. What's more, the bubble in Beijing, Hangzhou, Shenzhen and Shanghai is more than 200%. He Xingqiang and Yang Ruifeng [7] calculated the housing price to income ratio of China's major cities in 2011, 2013 and 2015 based on the median house value and the median total household income of major cities in China with an average value of 8.79. But it shows a downward trend year by year. A high housing price-to-income ratio will weaken consumption's real estate

wealth effect, inhibiting or even crowding out consumption. High-income families have the most muscular resilience, followed by middle-income families and low-income families with the weakest.

2. CALCULATION METHOD OF HOUSING PURCHASING POWER

The formula of housing purchasing power calculated by general scholars is:

$$T_1 = P/S \tag{1}$$

P is the average house price (or median house price), and S is the average annual household income (or median household income). T_1 indicates the average time (years) it takes for a household to purchase a home.

In China's statistical data, it is difficult to accurately obtain the average price of housing (sets) and the average income of households. Still, the average sales price of residential and commercial housing across the country and major cities and the average salary of on-the-job workers in urban units can be easily obtained from the website of the National Bureau of Statistics.

If the average wage S of on-the-job workers is divided by the average sales price of residential and commercial housing P:

$$t = S/P \tag{2}$$

It can describe how many square meters of housing the on-the-job workers can buy with their annual income. If t is used as housing purchasing power, it is intuitive, and the data source is also very accurate. The larger the t value, the stronger the housing purchasing power. The housing purchasing power in the rest of the article is calculated according to this formula.

If the average number of on-the-job workers α and the average housing area β are known, the traditional housing purchasing power can also be calculated.

$$t_2 = \frac{\beta \times P}{\alpha \times S} \tag{3}$$

Assuming $\alpha = 2$, $\beta = 100$, according to the generally reasonable housing purchasing power $t_2 \in [3,6]$, if the increase in housing area demand due to the improvement of living standards is not considered, then $t \in [8.33,16.67]$. It is also a reasonable level of housing affordability.

3. ANALYSIS OF NATIONAL HOUSING PURCHASING POWER

Based on data released by the National Bureau of Statistics, we calculated the national housing purchasing power from 2006 to 2020. See Table 1.

Table 1: National Housing Affordability

time	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Purchasing power	6.73	6.84	8.17	7.34	7.86	8.50	8.76	8.96	9.67	9.77	9.58	10.00	9.91	10.06	10.07

Data source: Compiled according to the data of the National Bureau of Statistics of China

In 2020, the national housing purchasing power was 10.07, which means that the annual salary income of on-the-job workers can buy 10.07 square meters of housing.

Suppose a family has two on-the-job workers and assumes that the average area of a house is 1,000 square meters. In that case, it will take about five years of family income to buy a 1,000 -square-meter house, just at the reasonable level of housing affordability in the general sense [3,6].

Data shows that housing purchasing power has been within [8.33, 16.67] since 2011, which is a relatively reasonable level of housing. Housing prices fell sharply in 2008 as a result of the global financial crisis, while it rose sharply in 2009. These two years led to relatively large fluctuations in the purchasing power of housing in China. Except for these two years, the purchasing power of housing in China has remained stable in other years, as shown in Figure 1. Based on 2006, China's housing purchasing power increased by 49.59% in 2020. It means that the ability of ordinary people to buy a house grows

yearly, and it becomes easier and easier to buy a house relative to income.

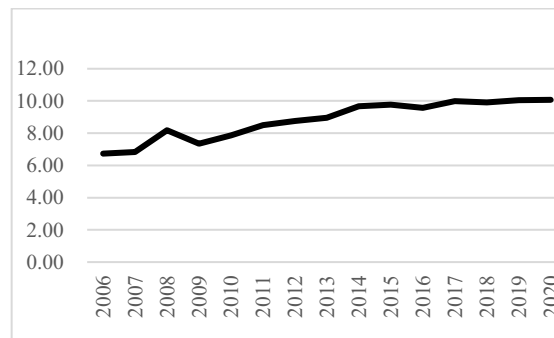


Figure 1: National Housing Affordability

If considering the improvement of people's living standards, the demand for housing area will increase by 2% per year (according to the data of Wuhan City released by the National Bureau of Statistics, it is calculated that the average area of new houses sold will increase by about 2% per year). For the housing

purchasing power data calculated according to Table 1, see Table 2. Based on 2006, China's housing purchasing power increased by 13.37% in 2020. Housing purchasing

power is not within [8.33,16.67], and the growth is relatively slow and stable. See Figure 2.

Table 2: Housing Affordability After Area Increases by 2% Per Year

time	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
purchasing power	6.73	6.71	7.86	6.92	7.26	7.70	7.78	7.80	8.25	8.18	7.86	8.04	7.81	7.77	7.63

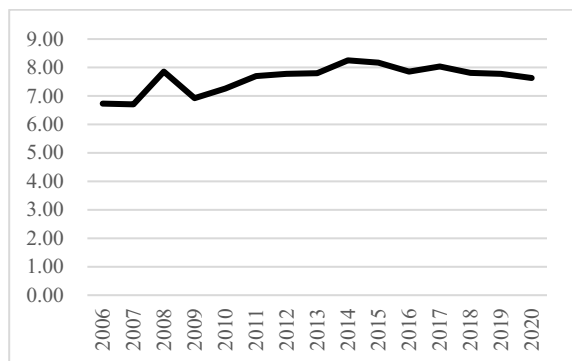


Figure 2: Housing Purchasing Power After Size Increases by 2% Per Year

However, due to the vast territory of China and the significant differences between cities, the income levels

and housing prices of different cities are very different, so the data calculated by simple average cannot fully reflect the housing purchasing power of each city. Therefore, we selected the data of significant cities published by the National Bureau of Statistics for further analysis.

4. ANALYSIS OF HOUSING PURCHASING POWER IN MAJOR CITIES IN CHINA

According to the relevant data of major cities in China released by the National Bureau of Statistics, these cities' housing purchasing power data from 2006 to 2020 are calculated. See Table 3.

Table 3: The Housing Purchasing Power of Major Cities in China

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Shenzhen	3.97	2.90	3.41	3.25	2.66	2.62	3.11	3.32	3.06	2.41	1.97	2.06	2.01	2.29	2.45
Xiamen	3.87	3.25	3.62	4.08	3.48	3.46	4.07	4.24	3.55	3.54	2.74	2.69	2.53	2.89	3.21
Beijing	5.44	4.36	4.84	4.40	3.83	4.89	5.15	5.26	5.59	5.07	4.31	3.96	4.00	4.51	4.33
Shanghai	5.85	5.97	6.97	5.14	5.03	5.68	5.78	5.65	6.13	5.08	4.65	5.26	4.93	4.61	4.75
Hangzhou	5.50	4.91	4.90	4.14	3.42	4.27	4.24	4.43	5.05	5.28	5.38	4.55	4.38	4.54	4.82
Guangzhou	5.98	4.81	5.20	5.51	5.13	5.26	5.63	5.28	5.04	5.76	5.45	5.58	5.18	5.14	4.98
Nanjing	7.60	7.17	8.29	6.33	5.29	6.50	6.53	5.98	7.05	7.20	5.04	6.65	5.64	6.67	5.48
Haikou	8.00	7.56	6.16	5.79	4.24	5.73	6.22	6.14	6.78	7.52	6.99	5.82	6.14	5.47	5.61
Ningbo	5.67	5.40	5.24	4.32	3.73	4.41	4.94	5.56	6.45	6.80	7.13	6.48	6.32	6.95	6.30
Fuzhou	5.20	4.89	5.25	4.77	4.42	4.42	4.52	5.26	5.82	5.51	6.12	7.12	5.78	6.27	6.71
Hefei	7.62	8.20	8.88	8.34	7.14	8.10	8.81	8.90	8.62	8.76	7.63	6.77	6.81	6.76	6.87
Wuhan	5.84	5.57	6.07	-	7.08	6.84	7.10	7.42	8.19	7.82	7.33	6.96	6.97	7.09	7.09
Tianjin	6.17	6.27	7.46	6.81	6.67	6.51	8.16	8.21	8.36	8.21	6.82	6.40	6.53	7.24	7.26
Dalian	5.69	5.22	6.11	6.28	6.60	6.27	7.23	7.50	7.13	7.97	8.09	8.17	7.66	7.93	7.32
Xi'an	6.66	7.78	7.90	-	8.72	7.15	7.50	8.45	8.86	10.16	10.90	9.52	8.73	8.33	7.59
Chengdu	6.45	6.34	6.45	7.03	6.62	6.66	7.23	8.43	9.67	10.50	10.09	9.23	9.00	8.31	7.90
Hohhot	10.55	10.87	12.29	10.47	10.33	10.51	13.68	10.54	9.79	10.86	10.82	11.14	8.65	8.39	8.09
Taiyuan	6.79	6.93	7.91	7.37	5.48	6.88	7.64	7.67	8.07	8.29	8.82	8.17	7.46	7.44	8.20

Shenyang	7.35	7.74	8.70	9.19	8.20	8.15	8.33	8.63	9.65	9.64	9.86	9.34	9.45	8.55	8.26
Qingdao	5.86	5.31	6.31	6.18	5.89	6.02	6.47	6.93	7.91	8.23	8.52	8.31	7.34	7.54	8.26
Kunming	7.62	7.49	6.41	8.33	9.40	9.15	8.34	9.10	9.59	8.64	9.98	9.31	7.24	7.76	8.38
Shijiazhuang	8.43	8.41	8.65	7.42	8.26	8.07	8.15	8.84	8.68	6.98	8.32	6.97	7.22	8.62	8.58
Nanchang	6.64	6.81	8.02	8.37	8.09	7.48	7.44	7.06	8.33	8.30	8.54	8.97	9.99	9.46	8.63
Jinan	6.72	7.17	7.61	7.44	6.21	6.60	7.34	7.96	8.71	9.17	9.16	8.72	7.54	8.42	8.83
Harbin	7.50	7.51	7.26	7.06	6.24	6.99	8.17	8.01	8.96	9.54	9.87	8.59	8.04	8.42	8.96
Zhengzhou	7.01	6.66	7.36	7.35	7.13	7.62	7.17	6.84	7.56	7.34	7.56	8.47	9.93	9.43	9.09
Xining	10.84	10.09	9.39	10.00	10.08	11.18	10.24	10.81	11.42	12.62	12.20	12.49	12.49	10.48	9.99
Changchun	8.29	7.76	8.06	7.59	7.01	6.95	8.85	9.12	9.74	9.81	11.37	10.79	9.94	10.09	10.18
Nanning	7.78	7.57	7.88	7.30	7.49	8.03	7.86	8.09	8.90	10.72	10.13	9.80	10.84	10.61	10.55
chongqing	9.23	8.92	10.22	9.48	8.74	8.91	9.45	9.74	11.16	12.39	13.05	11.09	9.98	10.36	11.03
Guiyang	8.66	8.62	9.21	7.89	7.35	8.43	9.54	11.29	12.10	12.87	13.08	11.28	9.35	9.46	11.12
Lanzhou	7.60	7.20	8.53	8.29	8.36	9.21	8.21	8.95	9.22	10.22	10.87	10.61	11.83	12.06	11.33
Changsha	10.13	8.76	10.06	9.87	8.87	8.12	9.09	9.76	11.33	12.13	12.63	11.69	11.97	11.97	11.59
Urumqi	11.72	11.51	11.00	11.11	9.53	9.49	9.73	9.68	10.70	11.01	12.57	12.62	11.09	10.40	12.43
Yinchuan	10.63	12.83	12.83	-	11.03	12.55	12.96	12.50	14.37	14.59	15.93	15.78	15.62	14.68	14.37

Data source: Compiled according to the data of the National Bureau of Statistics of China

It can be seen from the data in Table 3 the lowest in Xiamen in 2006 was 3.87, and the highest in Urumqi was 11.72; in 2020, the weakest in Shenzhen was only 2.45, and the highest in Yinchuan was 14.37. Differences in housing affordability levels between cities are apparent, and the gap is widening. In 2020, housing purchasing power was within [8.33, 16.67], and there are 15 cities with a relatively good housing purchasing power, accounting for 42.86%. In 2006, there were eight cities, accounting for 22.86%. Cities with appropriate levels of housing affordability in 2020 nearly doubled from 2006.

Table 4: Growth Rate of Housing Purchasing Power in Major Cities in China

serial number	City	growth rate (%)
1	Shenzhen	-38.18%
2	Haikou	-29.92%
3	Nanjing	-27.88%
4	Hohhot	-23.28%
5	Beijing	-20.31%
6	Shanghai	-18.75%
7	Xiamen	-16.95%
8	Guangzhou	-16.60%

serial number	City	growth rate (%)
9	Hangzhou	-12.36%
10	Hefei	-9.92%
11	Xining	-7.83%
12	Shijiazhuang	1.72%
13	Urumqi	6.11%
14	Kunming	10.00%
15	Ningbo	11.15%
16	Shenyang	12.38%
17	Xi'an	13.96%
18	Changsha	14.43%
19	Tianjin	17.60%
20	Harbin	19.46%
21	Chongqing	19.50%
22	Taiyuan	20.77%
23	Wuhan	21.46%
24	Chengdu	22.44%
25	Changchun	22.83%
26	Guiyang	28.34%
27	Dalian	28.58%
28	Fuzhou	29.13%
29	Zhengzhou	29.63%

serial number	City	growth rate (%)
30	Nanchang	29.89%
31	Jinan	31.31%
32	Yinchuan	35.17%
33	Nanning	35.71%
34	Qingdao	40.87%
35	Lanzhou	49.18%

From the data in Tables 3 and 4, it can be seen that the purchasing power of housing in some cities in China has declined significantly, such as Shenzhen, Haikou, Nanjing, etc. (see Figure 3). Housing purchasing power in some cities, such as Lanzhou, Qingdao, Nanning, etc. (see Figure 4). Housing purchasing power is stable in some cities, such as Shijiazhuang (see Figure 5).

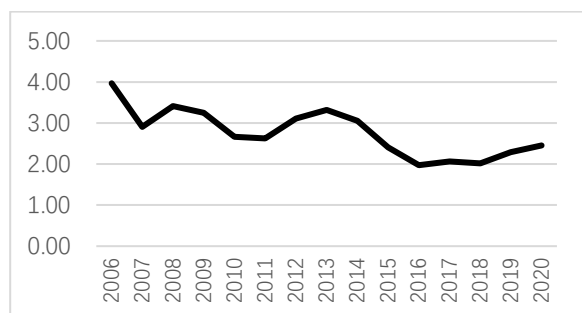


Figure 3: Shenzhen Housing Purchasing Power Curve

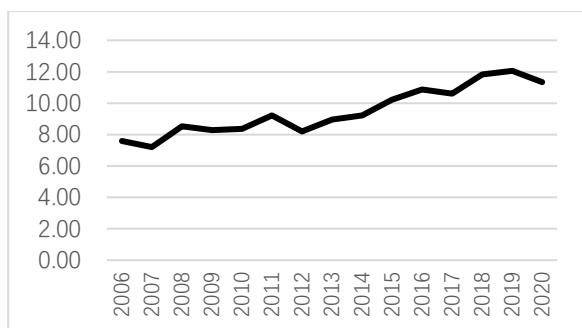


Figure 4: Lanzhou Housing Purchasing Power Curve

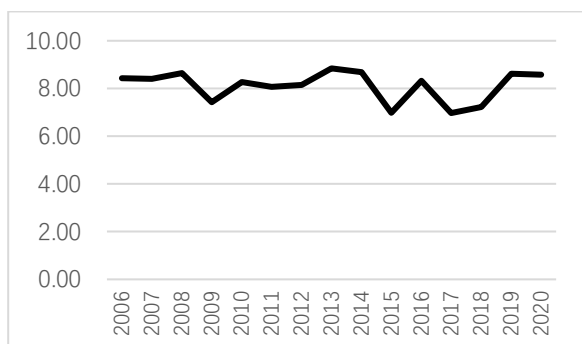


Figure 5: Shijiazhuang Housing Purchasing Power Curve

5. HOW TO SOLVE THE PROBLEM OF "EXPENSIVE HOUSING" IN CHINA

Housing is a significant issue that affects people's livelihoods and has always been given high priority by the Chinese government. A reasonable increase in housing prices has a wealth effect on residents' consumption, stimulating consumption and conducive to economic development. Excessive housing prices ultimately crowd out consumption, detrimental to economic growth and the improvement of residents' living standards.

Since the reform of China's housing system began in 1998, the real estate industry has been developing rapidly. Housing prices have continued to climb with the continuous improvement of residents' housing conditions. In some cities, housing prices are entirely out of line with the purchasing power of residents, despite several rounds of real estate regulation and control by the Chinese government. Even though the purchasing power of housing in China has been steadily increasing in recent years, there are constant calls for "expensive housing and difficulty in buying a home." To solve this problem, we should work on the following areas.

Firstly, land cost is an essential part of the housing, and local governments should determine a reasonable amount of land supply. In some cities, the collection of land is insufficient. Under the constraint of the total amount of land for construction, an increase in industrial land supply will reduce the supply of residential land and lead to a rise in the price of residential land. On the other hand, an increase in investment by enterprises will lead to a net inflow of people and an increase in demand for housing, which will lead to a rise in the price of accommodation. Therefore, local governments should determine a reasonable total land supply and a reasonable land supply structure to help stabilize housing prices.

Secondly, local governments should appropriately strengthen the construction of subsidized housing. To solve the housing difficulties of the middle and low-income groups, China has formed a housing security system with affordable housing, low-cost housing, public rental housing, and shared ownership housing as the primary forms. The construction of guaranteed housing can address the housing needs of some middle and low-income groups and increase their sense of well-being while having a limited impact on other housing prices.

Thirdly, guiding residents' expectations of rising housing prices are reasonable. Residents' expectations of rising housing prices may lead to irrational increases in housing prices. In contrast, continued unreasonable increases in housing prices may exacerbate residents' expectations of rising prices, exacerbating housing price volatility and ultimately affecting economic development.

6. CONCLUSIONS AND RECOMMENDATIONS

With China's economic development, the purchasing power of housing for urban residents in China increased by 45.59% from 2006 to 2020, with a significant improvement in housing space per capita. Although housing purchasing power in China's major cities varies greatly, the number of cities with reasonable levels of housing purchasing power has gradually increased from 8 in 2006 to 15.

Although there is a lot of noise about "high housing prices and difficulty in buying a home" in China, the data shows that the purchasing power of housing in China is gradually increasing and that China's real estate and regulation policies over the years have been in the right direction. However, there are wide disparities between cities. Real estate regulation and control policies should adhere to a city policy, city-specific policies. According to the actual situation, steady implementation of the long-term effective mechanism for the stable and healthy development of the real estate market. For the problem of the low and middle-income people having difficulty purchasing homes, localities should establish a differentiated mechanism for housing protection, apart from efforts to raise the income level of the low and middle-income groups.

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