

## Apartment Affordability among the Middle-Income Group in Urban China



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**ABSTRACT:** In the past few years, as the Chinese economy has surged and income levels have risen, there has been a notable uptick in the proportion of middle-income groups. According to the National Bureau of Statistics and other research reports, the proportion of China's middle-income group in the national population is increasing year by year, indicating that China is experiencing an expansion of the middle class. According to a report released by Renmin University of China, China's middle-income group will account for about 40 percent of the total population, or about 560 million people, by 2022. In this study, I will analyse the affordability of apartments for middle-income people in China from macro and micro perspectives. In most Chinese cities, the affordability of apartments for middle-income people has remained relatively stable. However, there are still some cities with serious affordability problems, such as Beijing, Xiamen, Shanghai and so on. The challenge of apartment affordability causes increased commute durations because of the divide between residences and employment areas, and it compels residents to utilize less space in their homes. Therefore, it is very valuable to explore the affordability of apartments for middle-income people.

**KEYWORDS:** Apartment affordability, middle income, Expenditure-to-Income Ratio, Residual Income Approach

### INTRODUCTION

Technically speaking, after the establishment of the People's Republic of China in 1949, which spans over four decades. The notion of apartment affordability was not a recognized issue in urban areas of the country. Despite this, the quality of their living conditions was substandard. To illustrate, according to the 1990 population census, urban households in China had an average of merely 7.1 square meters of living space per person in 1990. In 1990, the main developments of China's housing reform include: the launch of the commercial housing system, the reform of the housing distribution system, the reform of housing property rights and so on.

Apartments dominate China's housing market. For example, according to a 2014 article in China Daily, it is estimated that about 90 percent of urban families in China live in apartment buildings. Similarly, according to a 2017 article in The Economist, it is estimated that about 80 to 90 percent of urban households in China live in apartment buildings.

The high cost of apartment near employment areas can be a deterrent to buying homes in those locations, which in turn can lead to social issues like increased traffic congestion and longer times spent commuting. More specifically, the "housing expenditure to income ratio" is utilized as a metric for evaluating housing affordability. It represents the proportion of income allocated to repayments for homeowners and rent for renters.

At the same time, I mentioned that there are some "superstar cities" in China, such as Beijing, Shanghai. The issue of apartment affordability in these superstar cities results in longer time spent on roads. Because of the increasing distance between where people live and where they work. The present data indicating that the issue of housing affordability has extended to neighbouring cities, particularly following the implementation of home buying restrictions in these prominent cities starting in 2010. In these cities, the rise in housing prices naturally leads to the affordability of housing for urban residents.

No matter what city in China, there are large and small apartment affordability. The governments have also provided many policies to address the issue of apartment affordability.

### Literature Review

The notion of apartment affordability traces back to the 19th century, when examinations of apartment budgets introduced the principle of "one week's salary covering a month's rent" (Hulchanski, 1995). This guideline, commonly referred to as the housing expenditure-to-income ratio (HEIR), stanch housing expenses surpass a certain proportion of income, it becomes challenging to meet non-housing necessities. Typically, housing affordability, as measured by the HEIR method, as defined by Nepal et al. (2010), entails households allocating ensuring that housing costs do not exceed 30 percent of their income to housing expenses.

Furthermore, another widely employed metric for assessing housing unaffordability is the ratio of housing price to income (HPIR) (Cai & Lu, 2015; Li et al., 2020). However, while definitions based on housing prices may capture local average housing cost

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pressures, they may not accurately reflect the actual housing cost burden experienced by households.

Gillingham is a scholar who studies urban planning and housing issues. He believes the housing affordability crisis is caused by a mismatch between housing supply and demand. He suggested the city relax restrictions on development density and implement policies that encourage developers to build more affordable housing.

Paul Krugman is a Nobel Prize-winning economist. He argues that intensive development and reduced land-use restrictions can improve housing affordability. Intensive development can increase the number of houses without increasing the land use area and improve housing affordability. The reduction of land restrictions can increase the land use area, especially the increase of apartment area, which will increase the number of houses and improve the affordability of apartments.

Methodology

### Expenditure-to-Income Ratio Approach

The most commonly utilized measure is the expenditure-to-income ratio indicator (Hulchanski, 1995). This approach focus lies in determining if households are allocating an appropriate fraction of their earnings to housing expenses. A key distinction exists between the house price-to-income ratio, serving as a benchmark for housing accessibility, and the expenditure-to-income ratio, which measures housing affordability after acquisition. According to this standard, housing is considered 'affordable' if a household allocates no more than 30% (or 25%) of its pre-tax income towards housing expenses.

The fundamental formula of the expenditure-to-income ratio method is: the proportion of housing expenditure equals the average monthly housing expenditure divided by the average monthly household income. Average monthly housing expenses include monthly mortgage payments or housing-related expenses such as rent, property costs, home insurance, and property taxes. Average monthly household income refers to the total after-tax monthly income of family members, including salary, bonus, investment income and other types of income.

I take several famous cities in China as examples: Beijing, Shanghai (A first-tier city refers to an urban area characterized by a highly developed economy, dense population, and extensive urban infrastructure.). Xiamen, Changchun (second-tier city, In addition to the first-tier cities with a higher level of economic development and strong comprehensive strength of the city). Sanya, Guilin (third-tier city, the level of development is relatively low, but it also has certain economic strength and development potential).

Beijing: In 2021, the average disposable income per capita for urban residents in Beijing was reported at 75,002 yuan. Based on the standard of middle income, which typically ranges from 0.75 to 1.25 times the median income, the annual income of the middle-income group in Beijing would be approximately 56,250 to 93,750 yuan. The annual income of a middle-income family is about 168,750-281,250 yuan, and the monthly income is about 14,062-23,437yuan. According to the data of Shell Research Institute in 2021, for middle-income people, the average monthly rent in Beijing is about 9,000 yuan. Therefore, we can conclude that the proportion of housing expenditure of the median household in Beijing in 2021 will be 38.40% to 64.00%.

Shanghai: In 2021, the average disposable income per capita for urban residents in Shanghai was reported at 78,027 yuan. Based on the standard of middle income, which typically ranges from 0.75 to 1.25 times the median income, the annual income of the middle-income group in Beijing would be approximately 58,500 to 97,500 yuan. Taking a family of three as an example, the annual income of a middle-income family is about 175,500-292,500 yuan, and the monthly income is about 14,625-24,375yuan. According to data from Shell Research Institute in 2021, the average monthly rent in Shanghai is about 8500 yuan/month. Therefore, we can conclude that the proportion of housing expenditure of the median household in Shanghai in 2021 will be 34.87% to 58.12%.

Xiamen: In 2021, the average disposable income per capita for urban residents in Xiamen was reported at 61,851 yuan. Based on the standard of middle income, which typically ranges from 0.75 to 1.25 times the median income, the annual income of the middle-income group in Xiamen would be approximately 46,440 to 77,300 yuan. Taking a family of three as an example, the annual income of a middle-income family is about 139,200 to 231,900 yuan, and the monthly income is about 11,600 to 19,325 yuan. According to Anjuke's 2021 data, the average monthly rent in Xiamen is about 4750yuan/month. Therefore, we can conclude that the proportion of housing expenditure of the median household in Xiamen in 2021 will be 24.57% to 40.94%.

Changchun: According to the 2021 National Economic and Social Development Statistics Bulletin of Changchun City, the per capita disposable income of urban residents in Changchun City was 36,772 yuan in 2021. According to the standard of middle income (0.75-1.25 times the median), the annual income of the middle-income group in Changchun will be about 27,579-45,965 yuan. Taking a family of three as an example, the annual income of a middle-income family is about 82,737 to 137,895yuan, and the monthly income is about 6,895to 11,491 yuan. According to the 2021 Statistical Communique on National Economic and Social Development of Changchun issued by the Changchun Bureau of Statistics, the average monthly housing expenditure for middle-income families is about 3,000 yuan. Therefore, we can conclude that the proportion of housing expenditure of the median household in Changchun in 2021 will be 26.11% to 43.51%.

Sanya: In 2021, the average disposable income per capita for urban residents in Sanya was recorded at 42,716 yuan. Applying the standard range for middle income, which typically spans from 0.75 to 1.25 times the median income, the annual income of the middle-income group in Sanya would approximately fall within the range of 32,037 to 53,395 yuan. The annual income of a middle-income family is about 96,111-160,185 yuan, and the monthly income is about 8,009-13,349yuan. According to market research conducted by local property websites and property agencies, The average monthly housing expenditure in Sanya in 2021 will be

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about 3,000 yuan. Therefore, we can conclude that the proportion of housing expenditure of the median household in Sanya in 2021 will be 22.47% to 37.45%.

Guilin: According to the 2021 Guilin National Economic and Social Development Statistics Bulletin released by the Guilin Municipal Bureau of Statistics, the per capita disposable income of urban residents in Guilin in 2021 was 39356 yuan, according to the standard of middle income (0.75-1.25 times the median), the yearly income range for the middle-income demographic in Guilin is anticipated to be around 29,517 to 49,195 yuan. The annual income of a middle-income family is about 88,551-147,585 yuan, and the monthly income is about 7,379-12,299yuan. According to Anjue's 2021 data, the average monthly rent in Guilin is about2500yuan/month. Therefore, we can conclude that the proportion of housing expenditure of the median household in Guilin in 2021 will be 20.32% to 33.87%.

Expenditure-to-Income Ratio Approach		
First-tier city	Second-tier city	Third-tier city
Beijing (38.40%-64.00%)	Xiamen (24.57%-40.94%)	Sanya (22.47% -37.45%)
Shanghai (34.87%-58.12%)	Changchun (26.11%-43.51%.)	Guilin (20.32% -33.87%)

### Residual Income Approach

The issue of apartment affordability in the US became more prominent in the 1960s and early 1970s. Dolbear (1966) played a pioneering role in challenging the standard ratio method and introducing the residual income model. Later, Grigsby and Rosenberg (1975) and Stone (1975) significantly refined this model. Grigsby and Rosenberg (1975) particularly emphasized the concept by aligning family income with the expenses necessary for maintaining an acceptable standard of living.

Adopting the residual income method in China offers benefits to policymakers and analysts. Primarily, it facilitates precise assessment of the affordability disparity, sets policy objectives, and assesses the efficacy of public measures in detail. Secondly, it integrates existing housing wealth into affordability calculations, a crucial aspect given Beijing's recent privatization of substantial public housing stock. Thirdly, the method's adaptability permits assessing affordability across diverse socioeconomic groups. This is a pressing concern given China's escalating income gaps, which exacerbate housing affordability issues.

Like the samples taken in the previous method, I still take Beijing, Shanghai, Xiamen, Changchun, Sanya and Guilin as examples to calculate their residual income respectively.

Monthly residual income is usually divided into four groups: 1.0%-20%: This may indicate weak housing affordability. If the percentage of residual income is low. 2.20%-40%: This indicates some housing affordability.3. 40%-60%: This indicates a strong housing affordability. 4.More than 60%: This may indicate very strong housing affordability

Beijing: According to National Economic and Social Development. In 2023, the per capita disposable income of the city's residents will be 81,752 yuan in 2023. The monthly disposable income is 6,813 yuan. According to the standard of middle income (0.75-1.25 times the median). In 2023, the monthly disposable income of the middle-income group in Beijing will range from 5,110 yuan to 8,517 yuan. According to the Beijing Bureau of Statistics, the monthly expenditure of the middle-income group in Beijing will be about 3,966 yuan in 2023.In 2023, the monthly residual income of the middle-income group in Beijing will be 1,144 to 4,549 yuan. The remaining percentage is 22.39% to 53.42%

Shanghai: According to the National Bureau of Statistics, per capita disposable income in Shanghai averages about 7,069 yuan per month. According to the standard of middle income (0.75-1.25 times the median). In 2023, the monthly disposable income of the middle-income group in Shanghai will range from 5,302 yuan to 8,836 yuan. The per capita consumption expenditure of the middle-income group in Shanghai is 4,376 yuan. In 2023, the monthly residual income of the middle-income group in Shanghai will be 926 to 4,460 yuan. The remaining percentage is 17.46% to 50.47%.

Xiamen: According to the sample survey data of the report obtained by the Xiamen investigation team found that in 2023, the per capita disposable income of Xiamen residents will be 71,062 yuan, and the per capita monthly income will be 5922 yuan. According to the standard of middle income (0.75-1.25 times the median). In 2023, the monthly disposable income of the middle-income group in Xiamen will range from 4,442 yuan to 7,403 yuan. According to statistics from the Xiamen Bureau of Statistics, the per capita consumption expenditure of urban residents in the middle-income bracket stands at 3,951 yuan. By 2023, the monthly disposable income range for the middle-income group in Xiamen is projected to be between 491 and 3,452 yuan, translating to a remaining percentage of 11.05% to 46.62%.

Changchun: In 2023, the monthly disposable income of urban residents in Changchun will be 4,318 yuan. The disposable income of the middle-income group is 3,239 to 5,398 yuan. According to the statistics of 2023, the per capita consumption expenditure of the middle-income group in Changchun is 1,784 yuan. In 2023, the monthly residual income of the middle-income group in Changchun will be 1455 to 3,641 yuan. The remaining percentage is 44.92% to 67.45%.

Sanya: As per the Statistical Bulletin of Sanya's National Economic and Social Development for 2023, urban residents in Sanya had a per capita disposable income of 3,823 yuan. The disposable income of the middle-income group is 2,867 to 4,778 yuan. The per capita consumption expenditure of all urban residents in Sanya is 1980 yuan. In 2023, the monthly residual income of the middle-

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income group in Sanya will be 887 to 2,798 yuan. The remaining percentage is 44.8% to 58.56%.

Guilin: According to statistics from the National Bureau of Statistics, the per capita disposable income for the middle-income group in urban areas of Guilin was 3,641 yuan in 2023. The disposable income of the middle-income group is 2,731 to 4,552 yuan. The per capita consumption expenditure of urban residents in Guilin is 1944 yuan. In 2023, the monthly residual income of the middle-income group in Guilin will be 787 to 2,608 yuan. The remaining percentage is 28.81% to 57.29%

Residual Income Approach		
First-tier city	Second-tier city	Third-tier city
Beijing (22.39%-53.42%)	Xiamen(11.05%-46.62%)	Sanya(44.80% -58.56%)
Shanghai (17.46%-50.47%)	Changchun (44.92%-67.45%)	Guilin(28.81% -57.29%)

### The Housing Affordability Index

The Housing Affordability Index (HAI), developed by the National Association of Realtors (NAR), gauges the proportion of the population capable of affording a home priced at the median level. Essentially, it underscores the disparity between the national median family income and the income required to obtain a loan adequate for buying an average home sold in the current timeframe. If we want to use HAI, we need to know the price of homes bought by middle-income people, the down payment rate, the household income, the total number of mortgages and the interest rate.

Index values greater than 100%: When the Household Affordability index is greater than 100, it means that the income of a middle-income household exceeds the income needed to afford the house price, and the housing is affordable. A higher index number means a home is more affordable.

Index value equal to 100%: When the Household Affordability Index is equal to 100, it means that the median household income is just enough to cover the housing cost of its home price. Says housing is neither easy nor overly stressful for middle-income families.

Index value less than 100%: When the Household Affordability index is less than 100, it means that the middle-income family is not enough to afford the housing cost of its purchase price, and the housing is unaffordable. The lower the index value, the less affordable the house.

Housing Affordability Index	
>100	The house is affordable
=100	Just enough to cover the housing cost of its home price
<100	The housing is unaffordable

### Price-to-Income Ratio

The price-to-income ratio serves as a critical gauge for evaluating housing affordability, and it can also be applied to assess the affordability of middle-income households. This ratio is computed by dividing the total house price by the annual income. Generally speaking, if the ratio is between 1 and 3, it indicates that the housing is affordable and the level of purchase is strong. If the ratio is between 3 and 5, it indicates that the housing affordability is average and the purchase level is average. If the ratio exceeds 5, it indicates that housing affordability is weak and the level of purchase is weak.

Price-to-Income Ratio	
1-3	The apartment affordability is strong
3-5	The apartment affordability is average and the purchase level is average
>5	The apartment affordability is weak and the level of purchase is weak

### Results and Discussion

Using the expenditures-to-income ratio method, we can get a clear picture of these six cities. Through the standard we know that when the ratio is greater than 30%, the apartment is unaffordable. In 2021, the proportion of middle-income people in Beijing and Shanghai will exceed 30 percent, which shows that living in first-tier cities like Beijing and Shanghai faces high affordability and great pressure. The second-tier cities are Xiamen and Changchun. The range for both cities is closer to more than 30%. This indicates that the affordability of apartments in second-tier cities is moderate. The third-tier cities are Sanya and Guilin, and their expenditure to income ratio range is closer to less than 30%, indicating that the affordability of apartments in third tier cities is the weakest.

I also used another method to analyse apartment affordability in these six cities: the residual income method. The method is used to divide the remaining income of a middle-income group by the total income each month to determine the housing affordability faced by the area in which they live. According to the results of the latest data in 2023, the middle-income groups living in Xiamen and Shanghai have the weakest apartment affordability, with some of their range values below 20 percent. This is followed by Beijing



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and Guilin, where the affordability of apartments is average and most of them are concentrated in the 30 percent range. Finally, Sanya and Changchun have more affordable apartments, most of which are concentrated in the range of more than 40%.

In the first two methods, I mainly analyse the situation of middle-income family tenants. The last two methods are based on the analysis of household conditions. Because the size of the house purchased by different middle-income families, the length of the loan, the annual income, the down payment ratio, and the total price of the house are not uniform, there is no way to calculate the value.

The Housing Affordability Index is one of the most common and popular ways to measure housing affordability. The formula is very complex and requires data such as the price of the house purchased, the current income of the family, the down payment rate, the total number of years of the mortgage and the current interest rate. Through the value of the house price index, we can have a judgment: if it is greater than 100%, it proves that the affordability of apartments is strong. If it is equal to 100%, the apartment is moderately affordable. If it is less than 100%, the apartment is less affordable.

The price-to-income ratio is a popular measure of apartment affordability. The method is derived by dividing the overall price of the apartment by the current gross income. If the value is between 1-3, there is evidence of strong apartment affordability. If the value is between 3 and 5, the apartment is moderately affordable. If the value is greater than 5, the apartment is less affordable.

From the above results, we can conclude that the affordability of apartments living in first-tier cities (Beijing, Shanghai) is weak. Apartments living in second-tier cities (Xiamen, Changchun) are generally affordable, while those living in third-tier cities (Sanya, Guilin) are more affordable. Why is there such a big difference between cities? I think the discussion can be made from three aspects: the degree of economic advancement, the size of the urban area, and the conditions of medical and education.

The first is the level of economic development. Why are so many people willing to go to Beijing and Shanghai when housing affordability is low? I think the level of economic development is the most important position. Beijing serves as China's capital and holds significance as the political and cultural hub of the nation. Beijing's GDP will reach 3.63 trillion yuan in 2021. Shanghai is the economic center of China and one of the international financial centers. It has the most complete financial market system in China. Shanghai's GDP will reach 3.89 trillion yuan in 2021. Their economic development level is in the leading position in the country. This is why many people are willing to move to these two cities despite the low affordability of apartments.

The second reason is the size of the city. Why are the residual income ratios of Changchun and Xiamen, both second-tier cities, so different? According to official statistics, the area of Xiamen is 1,699 square kilometres, and the area of Changchun is 20,554 square kilometers, 12.1 times that of Xiamen. The smaller the land area, the higher the housing price (Hong Kong is an example). From this, we can see that the difference in affordability of urban apartments under the same category is partly due to the size of the land area.

The last reason I think is medical education. First-tier cities usually have more top hospitals, specialized hospitals and advanced medical equipment, and are rich in medical resources. There are some specialized hospitals in second-tier cities, and the medical resources are relatively good. The medical resources of third-tier cities are relatively scarce, and there are few high-level specialized hospitals, so the medical resources are relatively scarce. At the same time, first-tier cities can attract more excellent teachers and experts than second-tier cities, and second-tier cities can attract more excellent teachers and experts than third-tier cities. For these reasons, the group is more willing to move to better cities for development and living. The increase in the number of people leads to an increase in apartment prices, apartment rents, making apartment affordability weaker in better cities.

### Policy Implications and Conclusions

In general, most cities in China have a certain affordability problem of apartments. Meanwhile, cities with better economy and more educational resources have more obvious affordability of apartments. The government has an extremely important role to play in dealing with apartment affordability. Among them, the purchase restriction policy, the housing provident fund policy, the affordable housing policy can effectively reduce the affordability of the apartment of the middle-income group

1. Purchase restriction policy: Purchase restriction policy refers to the number of properties that are limited to purchase. Locally registered families can buy up to two properties. Non-local residents can only buy one property. The purchase restriction policy mainly targets first - and second-tier cities (Beijing, Shanghai, Xiamen, Changchun). It can effectively restrain housing from rising too fast, reduce the upward pressure on housing prices and rents, and encourage the rental market. It can effectively improve the apartment affordability of middle-income groups.
2. Housing provident fund policy. Under this policy, the state forces companies to contribute a certain percentage of their employees' housing savings. This housing savings can be used to finance the purchase of a house and pay the rent. This policy applies to all Chinese cities. It can well improve the affordability of apartments for middle-income people.
3. Affordable housing policy. The affordable housing policy mainly addresses housing difficulties. According to the above data, the affordability of apartments of middle-income groups is relatively low. Through market mechanism regulation and intervention, the government provides affordable and reliable apartments for low - and middle-income groups. It can guarantee the basic housing rights of the low- and middle-income groups and link the housing contradiction. Effectively improve their apartment affordability

We have identified several cities, including Beijing, Shanghai, and Xiamen, that face significant housing affordability problems.

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These issues stem from both a shortage of housing supply and apartment purchase restrictions in these cities. To address housing affordability, various policies have been or will be implemented in Chinese cities, particularly in larger urban areas. These policies can effectively ease the affordability of apartments for middle-income people, but they are clearly not enough. Only by allocating resources reasonably, issuing appropriate policies according to different cities, and accelerating the economic development level of second - and third-tier cities without affecting the development level of first-tier cities, can the affordability of apartments for middle-income people be effectively alleviated.

### ACKNOWLEDGEMENT

This paper results from an academic exercise for EPPE6154 funded by EP-2018-001 at the Faculty of Economics and Management, Universiti Kebangsaan Malaysia.

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