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Literature Review of Real Estate Bubble Measurement Methods

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Abstract: The real estate industry is the pillar industry of China's economic development, and the excessive bubble in its market will seriously affect the normal development of the national economy. The rapidly expanding real estate bubble has laid many hidden dangers for the outbreak of the financial crisis. Therefore, scientific analysis of the bubble in the real estate market and accurate measurement of the degree of market bubble are the prerequisites for taking appropriate corresponding measures. This article compares and evaluates the different measurement methods of real estate bubbles by domestic and foreign scholars, and puts forward reasonable suggestions.

Keywords: Real Estate Bubble; Measurement method; Comparative Study

1. Introduction

In recent years, China's real estate industry has developed rapidly and occupies an important position in the national economy. Its development not only promotes the development of steel, chemical and other related industries, but also contributes to local finance and employment. However, since the second half of 2003, housing demand has exceeded supply, and housing prices have continued to skyrocket, which has seriously affected the normal order of social development. Whether there is a bubble in China's real estate industry or not, to what extent, it is necessary to make correct judgments about reality based on mature theoretical knowledge. In view of this, how to measure the real estate bubble comprehensively and accurately and judge its severity is very necessary.

2. Review of foreign literature

For the study of the real estate bubble measurement method, the foreign real estate market is more mature than China, and the statistical data is complete. Their research is generally divided into two categories, namely, The present value of earnings method and statistical test method.

2.1 The present value of earnings method

Drawing lessons from the research method in finance that asset prices are equal to the future returns of assets, the basic price of real estate can be represented by future rent returns. Therefore, the future rent of real estate can be restored to the basic value of real estate, and the basic value of the restored rent can be compared with the actual real estate price, so as to judge the bubble situation in the real estate market. Noguchi Yukio (1989) first proposed this method. He used the formula theoretical land price=land rent/reasonable interest rate to calculate the basic land price of Tokyo, and compared it with the actual land price to measure the degree of market bubble. Nakao Hiroshi (1996) further refined the calculation model, and its calculation formula is theoretical price=net income/(safe asset interest rate+risk compensation rate-expected rent increase rate). Fraser (2008) studied the New Zealand real estate bubble from 1970 to 2005 using a dynamic present value model of income.

2.2 Statistical test model

The statistical test method is also called the indirect test method. The theoretical basis of this method is to use the statistical principles of metrology to analyze the law of changes in real estate prices. When there is no real estate bubble in the market, the changes in real estate prices and rents should show the same law. Statistical analysis can find this law, but when there is a real estate bubble in the market, the statistical law between price and rent will be abnormal, so that the existence of the real estate bubble can be judged.

Shiller proposed the use of variance bounds tests to measure the real estate bubble in 1981. The principle is that under the null hypothesis that there is no real estate bubble, the current real estate price can be described by the expected discounted value of income. Then the variance of the market price must be smaller than the variance of the fully predicted endogenous price.

3. Review of Chinese literature

China's real estate market began to develop in the 1990s and stopped welfare housing allocation in 1998. However, the use of modeling methods commonly used by foreign scholars to study the real estate bubble requires the support of a large number of sample data. Therefore, domestic scholars' measurement methods for real estate bubbles are different from those of foreign scholars. The most common of these is the index method.

3.1 Index method

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The principle is to examine the performance of various aspects of the real estate market by selecting a series of economic indicators closely related to the real estate market. The indicators are generally selected from several evaluation indicators related to the development of real estate in terms of production, transaction, finance, and consumption. Compare the actual value of the indicator with the critical value. If the value is less than the critical value, it indicates that there is no bubble and greater than the critical value, it indicates the existence of bubbles. Li Weizhe and Qu Bo (2002) designed four indicators on the real estate bubble, which are production indicators, transaction indicators, consumption indicators and financial indicators. Liu Zhisong (2003) evaluated the applicability of the three indicators of vacancy rate, housing price-to-income ratio, and housing price growth rate/GDP growth rate for measuring the level of China's real estate bubble, and used this indicator to judge the level of China's real estate bubble.Qiu Qiang (2005) uses the indicators of housing price-to-income ratio, vacancy rate, and real estate industry profit rate to measure the real estate bubble.

3.2 Theoretical price model

The theoretical price method starts from the definition of a real estate bubble, uses mathematical models to estimate the basic value of real estate, and compares it with actual prices to find out whether there is a bubble and its severity. According to the different ideas of calculating the basic value of real estate, various methods of calculating the basic value of real estate are extended.

The marginal rate of return method of capital starts from the real economy and uses the marginal rate of return of capital in the optimal equilibrium and stable state as a benchmark to obtain the basic value of real estate, thereby measuring the real estate bubble. Most Chinese scholars draw on the Ramsey model in the neoclassical economic growth theory. In this model, the economic system is assumed to be an exchange system composed purely of households and firms. All products consumed by households are purchased from the market, and income is obtained by selling the production factors they own, and their utility is maximized under income constraints. The manufacturer is only responsible for production, purchasing the necessary production factors from the family, and maximizing its profits under technical constraints. In the optimal equilibrium and stable state, the marginal product of capital is equal to the sum of population growth rate and time preference. If the economy is effective in this state, the marginal product of capital at this time is the basic value of assets. Ye Weiping and Wang Xuefeng (2005) used this model to measure China's real estate bubble. Yang Can and Liu Yun (2008) not only considered the population growth rate, but also considered the two factors of technological progress rate and depreciation rate, and introduced the family utility function to improve the Ramsey model. Sun Yanlin et al. (2015) used different measurement methods to empirically measure the real estate bubble in Shanghai from 2003 to 2011, and the results showed that the measurement results of the marginal return on capital method and the economic fundamentals method are roughly the same.

4. Comparison of the applicability of different measurement methods

There are many methods to measure the real estate bubble, and the advantages, disadvantages and applicability of each method are different.The statistical test method takes the absence of bubbles as the null hypothesis, and does not directly test the bubble itself. Once the null hypothesis is rejected, it cannot be concluded that there must be a bubble in the market.In addition, statistical testing methods can only determine the existence of bubbles, but cannot determine the severity of bubbles, and the data required for testing will be restricted by accuracy and time series span, thus limiting the validity of the conclusions.

In the index method, with the in-depth research of the real estate market by domestic and foreign scholars, there are more and more evaluation indexes to choose from. However, compared with the more sound real estate market abroad, the designed indexes may not be suitable for China's national conditions. Regarding whether the critical value of each indicator is scientific, how to choose the weight of a single indicator in the multiple indicator method, different scholars based on the development of China's real estate industry and their different understandings of international experience, the judgment standard needs to be further improved.

The present value of earnings method is closest to the definition of a bubble and can accurately detect the size of a real estate bubble. However, for the Chinese real estate market, due to the late start of the Chinese real estate market and the non-marketization of interest rates, it is difficult to obtain data on rental income, which reduces the feasibility of this method.

The economic fundamental factor regression method mainly starts from the perspective of market supply and demand factors, selects variables that affect the real estate supply and demand, and calculates the basic value of the real estate market. This method is easy to understand, and there are a wide variety of influencing factors to choose from, but it also causes the measurement framework and factor selection to not be supported by a rigorous mathematical model, which easily causes the existence of multicollinearity of variables and affects the empirical conclusion.

The Marginal Rate of Return of Capital Method based on Ramsey's model links the virtual economic system with the real economic system and obtains the basic value of real estate. In the actual calculation process, the data is easy to obtain and the calculation is simple, which is a very convenient theory.

The main idea of the partial equilibrium model of the real estate market is to obtain the basic value of real estate and measure the real estate bubble by realizing the balance of supply and demand in the real estate market under the condition of partial equilibrium.

The partial equilibrium model measurement method, like the economic fundamental measurement method, can select different factors that affect the supply and demand of the real estate market, and the profits of real estate developers and the utility of consumers are maximized. Therefore, the basic value of real estate calculated by this model is more accurate. In view of the incomplete development of China's real estate market and lack of data, the partial equilibrium model is also more suitable for measuring China's real estate bubble.

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