

# Analysis of Real Estate Market and Regulation Policy Recommendations - Based on Game Theory and Rational Expectation Theory

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**Abstract.** In recent years, China's real estate prices have risen rapidly, and the government has frequently introduced policies to regulate it, but real estate prices remain high. This paper analyzes the internal mechanism of the formation of high housing prices and the phenomenon of “more regulation, more growth” by using game theory and rational expectations theory. On this basis, the paper puts forward feasible suggestions for promoting the development of the real estate market and the reasonable fall of housing prices: speeding up the social housing construction; maintaining policy continuity and optimizing the investment environment in other sectors of society.

## 1. Introduction

Since 2005, real estate prices in domestic first- and second-tier cities have continued to rise in the long-term under the influence of many macro-control policies. So far, the price-to-income ratio in most parts of China has far exceeded the international average. Although the government has frequently introduced regulatory policies, it is still difficult to curb price increases. In addition to rising prices, some scholars worry that real estate is one of the most important industries in China's economy. The bubble of its price and the rapid decline after the high level will have a fatal impact on macroeconomic and financial stability. This paper uses game theory and rational expectation theory to analyze the reasons for the current trend of real estate prices, and puts forward suggestions for real estate regulation policies.

## 2. Game analysis of real estate market

### 2.1 Game between real estate business and consumers

#### 2.1.1 Model settings

For real estate developers, their profits are determined by home sales revenue and housing development and sales costs. Set the real estate provider's payment function to

$$U=R_i-C, \quad i=1, 2. \quad (1)$$

Among them,  $U$  represents the profit of the real estate business in the game, that is, profit.  $R$  represents the house sales income which is equivalent to the house price.  $R_1$  indicates the house price at the time of price reduction.  $R_2$  indicates the house price when the price is not reduced,  $R_1 < R_2$ ;  $C$  represents the cost of housing development and sales for real estate developers, and  $R_i > C$  (otherwise real estate business will withdraw from the market).

For consumers, their income is determined by the utility brought about by the purchase and the cost of the purchase. Let the consumer's payment function be

$$U_2=a-R_i, \quad i=1, 2. \quad (2)$$

Among them,  $U_2$  represents the benefit of consumers in the game; “ $a$ ” represents the satisfaction degree of the demand brought by the purchase of houses to consumers, i.e. utility (we assume that the satisfaction degree of consumers to the houses they want to buy is the same whether the real estate dealer reduces the price or not);  $R_1$  indicates the house price when the price is reduced, and  $R_2$  indicates the house price when the price is not reduced ( $R_1 < R_2$ ). What  $R$  means to consumers is

the cost of buying a house (here we ignore other costs such as the time it takes for consumers to buy a house).

In the housing sales market, real estate companies price according to market conditions and their own capital turnover needs, so real estate companies' strategies include price reduction and non-price reduction; while consumers choose to buy or wait according to their own judgments and expectations of market conditions. Around the price of housing, real estate business and consumers play a game, the benefit matrix is as follows:

		consumers	
		buy	wait
Real estate business	price reduction	$R_1 - c, a - R_1$	0,0
	no price reduction	$R_2 - C, a - R_2$	0,0

2.1.2 Game analysis

When  $a > R_2 > R_1$ , because  $a - R_1 > 0$ ,  $a - R_2 > 0$ , so whether the real estate agent chooses to cut prices or not, consumers will choose to buy; and when consumers choose to buy, because  $R_2 - C > R_1 - C$ , so real estate developers will not choose to cut prices; when consumers choose to wait, although the actual benefits of real estate developers at this time are both 0, real estate developers will not choose to cut prices because they know that once the price is cut, a more intense wait-and-see atmosphere will be formed as buyers may expect house prices to fall further, resulting in a “herd effect”. Therefore, the equilibrium of the game at this time is that real estate business choose to remain prices while consumers choose to buy.

This situation is closer to the actual situation of the current market, especially in cities such as Beijing and Shanghai. Due to the continued strong demand, the real estate market has always been in short supply, and the rigidity of demand makes the expected utility of the house larger. Therefore, no matter what state the house price is, consumers will enter the market.

And the reason why Beijing, Shanghai and other cities have always maintained strong demand are as follows: 1. There are a large influx of migrants every year, a large part of which is the workers who first entered the society, and these people form the just-needed people who buy houses. 2. The influence of ideas. In China, most people think that “a family” and “buying a house” are equal, and “home ownership” is a traditional concept of deeply embedded public psychology.

2.2 The game between the government and the public

2.2.1 Model settings

This part mainly analyzes the game between policy makers (governments) and market participants (people) under the influence of policies, and adds part of the time inconsistency and rational expectations theory to the model, so that the model can be more relevant to the actual situation.

The time inconsistency of policies means that the government formulates the current optimal policy based on certain market conditions. When people form corresponding expectations and act accordingly, the government finds that the previously announced policies are not optimal at this time, so there is inherent incentives for the government to abandon previous commitments and adopt the best policy at this stage. The inconsistency of policies makes people disbelieve the government's commitment. So boycott measures will be taken when the policy is first announced, which lead to the policy implementation effect deviating from the policy setting goals.

The rational expectation view is that rational people in the market have the ability to reason rationally. People will use all the information they can gather to judge the impact of an economic phenomenon or policy, and then take corresponding preventive measures to eliminate the impact. There can be errors in the expectations, but they will be corrected immediately when people find them. Therefore people will never make systematic mistakes.

### 2.2.2 Game analysis

Assume that during the  $t$  period, due to strong speculative demand and developers' "squatting" factors, housing prices are growing too fast. The government faces pressure from the majority of consumers to ask for house prices to fall. And at the same time, the real estate bubble may grow too large. The government will promise to implement a regulatory policy in  $t+1$  period to curb the excessive rise in housing prices and inform the public about its promised policies. Thereafter, if the public believes that the government will keep its promise, they will expect house prices to fall, and adjust their behavior accordingly, reducing purchases during the  $t$  period; and developers will also choose to cut prices. Thus, in the  $t+1$  period, house prices will fall. However, if the government continues to implement the control policy at this time, it may affect fiscal revenue and political achievements, and the benefit from abandoning commitments will be greater. Therefore, the government has internal incentives to abandon the previous policy, and choose to relax the regulation of the real estate market in the  $t+1$  period to increase the fiscal revenue brought by the real estate industry.

If people choose to trust the government, the government will abandon the promise, so people will naturally not trust the government.

Therefore, combining the perspective of time inconsistency and rational expectations, the game between the government and the public shows that the lack of government credibility leads to invalid real estate regulation policies, and house prices are still at a high level. At the same time, because the government breaks the promise, people will take measures to resist the policy, and it is difficult for them to form a stable forecast of the economic environment. As a result, the economic environment is more complicated and elusive.

## 3. Conclusions and recommendations

### 3.1 Accelerate the construction of affordable housing

In analyzing the game between real estate agencies and consumers, it is concluded that due to the continuous strong demand, supply always fails to meet the demand in the real estate market. Therefore, the government should strengthen the construction of affordable housing and expand the source of funds and supply methods for the construction of affordable housing to digest the purchase of housing as much as possible. In terms of management, the government should improve the access and exit mechanisms for affordable housing and strengthen the qualification review system for purchasers of affordable housing to prevent fraudulent rents and fraudulent purchases.

### 3.2 Maintaining continuity of policy

Through the game analysis between the government and the people, combined with the actual implementation effect of real estate control policies, it is not difficult to find that short-term, non-market-oriented regulatory policies are only effective in the short term, and in the long run, they cannot solve the problem of excessive housing price increases. On the other hand, short-term, non-market-oriented regulatory policies make it difficult for the public to form stable expectations for the policy and economic situation, and even cause a situation of "more regulation, more growth of price". This is not conducive to the stable development of the real estate market and the macro economy. Therefore, the regulatory policy should be continuous and thus effective.

### 3.3 Optimize the investment environment in other sectors of society

In the analysis of the previous section, we can understand that the long-term strong demand for home purchase is an important reason for real estate developers to maintain high housing prices. Another important reason for the strong demand in the real estate market is that investment demand is strong. Based on this situation, the government should focus on optimizing the investment environment in other markets, and use tax incentives and other policies to help other industries, such as strategic emerging industries and high-tech industries, to guide capital flows to other

markets. The flow of capital from the real estate market is conducive to reducing investment demand, thereby alleviating the contradiction between supply and demand; on the other hand, it is conducive to creating a calm market atmosphere, quelling public opinion on deliberately speculating high prices, and alleviating market anxiety.

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