Analysis of the Situation of Real Estate Industry in China and the United States Based on Behavioral Economics

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ABSTRACT

In recent a few years, the rapid development of Chinese real estate industry brought a wave of unprecedented prosperity to the Chinese economy, making it jump fast to the second highest in the world in a short time. In our opinion, although this economic cycle seems to be a Kuznets cycle, it is still different from the classical theory put forward by Simon Kuznets when we use the theory of behavioral economics to analyze. The purpose of this article is to analyze the causes and effects of this economic peak from the perspective of macroeconomic management by using the theory and method of behavioral economics.1

INTRODUCTION

In order to clarify the background of our study, we display the preliminary statistics of available data first: According to China Central Bureau of Statistics, for the past 16 years,(2000-2015), the correlation coefficient between Chinese commercial real estate sales turnover and GDP was approximate to 0.988, in which the real estate saleroom is a strong significant variable. Its p value less than 0.001(to be specific, it is $5.6837 \times 10^{-13}$). Moreover, in those years, the commercial real estate sale take round 66.65% of the GDP (the average of all the ratio in these 16 years.). How are these U.S. data performances? This is difficult to compare directly. According to the statistics of the National Bureau of Statistics the single-family

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home sales after the US annual and seasonal adjustments were about 550000 in May 2016. The average price of this single-family house is around US$360000 each. According to this calculation the total sales volume should be around US$200 billion. According to the National Institute of Real Estate of the United States based on annual and seasonal adjustments in May 2016, sales volume of all types of housing in the United States should be around 5.5 million, while the total value should be around 1.3 trillion US dollar. Considering that the GDP of the US in 2016 was around 1862.4 trillion, obviously in the US the real estate industry is not a pillar industry but in China things are just on the contrast.

Moreover, the length of increase stage of Chinese reality is significantly longer than that in the US. In the masterpiece Secular Movement in Production and Price, the Kuznets Cycle, which was put forward by Simon Kuznets do not longer than 15 years[1]. See figure1.1. It is obvious that the production and price are negatively related and this is also obey the fundamental economic law. Well the situation is China is not quite so simple, and we will proceed later.

Figure 1. The production and price movement of Portland cement in the US, year 1880-1924.
By comparison, in China, these two variables shows the opposite situation. In China, these is some optional variables related to real estate industry, but to match the variable chosen by Kuznets as much as possible, we selected the building area of commercial residential housings. The result is shown in figure 1.2. They are positively related!

What an even odd it is, it is obviously that the price and sold quantity (in area) are also positively related. (See figure 3)
It is obvious that these two variables are positively related, and to be specific, the correlation coefficient is 0.974. In the classical economic theory, only limited kinds of commodities can have this kind of phenomena that their price and aggregate demand are positive, those are the luxury products, Giffen product and the financial products like stock and bonds. Obviously houses do not belong to each of them (of course, some high-class houses are belong to luxury products, but they do not take the major proportion, so we ignore them).

CHAPTER 1. THE PRECONDITION OF BEHAVIORAL ECONOMIC ANALYSIS

The Theory of Macroeconomic Sector Model

John Maynard Keynes put forward the well-known macroeconomic sector model in his masterpiece The General Theory of Employment, Interest and Money [2]. Here we use the simplified model [3] to analyze the situation of the United States first, also take the house property tax on American residents into consideration. According to relative information, the U.S. government had formulated several typical regulations and control policies of real estate industry as below, see figure 4.

![Figure 4. The macro economy department model in the US.](image-url)
In China, the situation is different as here most banks are state own commercial banks. Even some of them are listed companies, the nation capital still control the most proportion of share, so for China, we put the commercial banks and government together as a whole. So for China, the model is as figure 5 shows.

A recent set of data can show us the interest relationship between government and the real estate manufactures:

In 2017, the average debt ratio of 136 listed housing enterprises reached 79.1%, reaching the highest level since 2005; in the first quarter of this year, the debt ratio of the real estate industry was close to 80%, which was second only to banks and non-bank finance in all industries. In the first quarter of this year, of the 136 listed real estate development companies, the asset-liability ratio of nearly 40 companies exceeded 80%, accounting for nearly 26%, and nearly half of the development companies had a debt ratio of more than 70%.

At the end of 2017, the net debt ratio of listed real estate companies reached 100.6%, which was nearly 20 percentage points higher than that of 2016, and even rose to 118.2% in the first quarter. Even after excluding advance receipts, the net debt ratio of listed real estate companies rose from 69.7% in 2016 to 73% in 2017, a record high in nearly five years.

We can easily imagine: should the price of real estate be effectively suppressed, then the manufactures could not pay for their debt, the government would suffer a great loss, which including the decreased taxes, land occupancy fee and those unpayable debts from the manufactures. Or, at least the government will never suppress the price from the supply side. Of course, if certain investors are burdening debt from commercial banks, their unpayable loans would also add to the lost of commercial banks(we will proceed the detailed situations in next part).

On contrast, this kind of things can never happen in the US, for in it the interests of commercial do not tightly linked with the federal government, also should the
price of real estate rise so significantly, the government would have to pay large sum of money to residents for compensation.

**Consumer Psychology Analysis of Consumer Residents Based on Behavioral Bias Theory**

In order to better study the behavior of residents, we first distinguish two different groups of residents in the purchase of real estate: consumers and speculators.

It is worth pointing out that many media and analysts also have the sayings of "investment groups" and "real estate speculators." We do not distinguish here. Because in the traditional theory of finance, there is no absolute boundary between investment and speculation, and in the real estate industry, there is almost impossible to exist a phenomenon of value investment. Naturally, real estate companies will not pay dividends to the owners like the listed companies, also no one can make profit in this industry, using the method of short selling. So for real estate investors, the only profit space is the spread cross time period, so there is virtually no difference between speculation and investment on this issue. As for the "real estate speculators," it is even unilaterally misappropriation of financial word. The reason for the existence of speculators in stock markets is that short-term investors, even individual investors, may be able to drive up the stock price sharply. In reality, the real estate price is almost always determined by the aggregate demand and aggregate supply. The collective purchase of all people (similar to the flock effect) will of course increase house prices, but this is quite different from the quotation mechanism of the stock market. All in all, in this thesis, we do not accept the notion of "speculating(nor as some other researchers said hyphen) real estate", only use the expression of real estate investment behavior.

First look at the consumers' responses to the rise in real estate prices: According to the Prospect Theory[4]: Consumers will weigh the benefits of different prospects to get the total expected benefits. We look at consumers. They buy a house, of course, for living. And from the general perspective of the Chinese people: It is essential for them to own a stable housing. Therefore, for the utility function of this problem, assuming that the utility of the real estate in the long-term future is 2 times the spot price, and according to the theory of loss aversion proposed by Kahneman, it can be concluded that the utility of not having housing is (-5) times of its forward price, as it is necessary to consider not only the failure of obtaining a property but also the risk that the house price may increase further in the future. The average resident is disgusted with the loss. Using online data, we can see that house prices in Beijing in mid-2009 are around 15,000 yuan/m2, assuming that a consumer is going to buy 60 square meters of housing. In this way, the immediate utility value can be found to be 1.8×106 yuan, and for the consumers who have already obtained the house, the long-term and immediate utility can be considered as no difference. The long-term price is not yet known, but according to the experience of the previous
trend, the increase is about 10.5%. Therefore, the prospective effect of waiting is about \(-4.725 \times 10^6 + 1.8 \times 10^6 = -2.925 \times 10^6\) yuan. As a result of this, the residents will generally choose to buy their homes at an acceptable time rather than take on future risks. This explains the rigid demand of the real estate industry.

**Psychoanalysis of Investment Household Based on Behavioral Deviation Theory**

Since investment demand is for the purpose of profit-making, it appears to be biased toward information that is beneficial to itself. Since the real estate industry at that time had experienced consecutive rises of more than one year, investors would tend to overestimate the probability of rising house prices [5]. (According to the actual situation, the investors in the first-tier cities at that time were correctly estimated, but there were also examples of failure: For example, those who ever made real estate investment in the Hunan New District in Shenyang have lost large sums of money.) Therefore, some real estate control policies at that time were ignored by the general public. It can be assumed that in the eyes of real estate investors, the probability of housing rise will be 80%, the probability of a fall will be 5%, and the rest will be the price-invariant corresponding probability. In this way, it is very easy to obtain the prospective return on their investment property (assuming the potential increase and decrease is equal) to be 15,000 \times 10.5\% \times (80\%-5\%) = 1181.25\text{(yuan/m²)}. In this way, we can easily explain at that time the crazy (even in some terms extreme) "real estate speculation tide" from the demand side.

**CHAPTER 2. ANALYSIS OF GAMING CONDITIONS AND MODELS OF DIFFERENT PARTIES**

**Gaming between Macroeconomic Managers and Real Estate Manufacturers**

The gaming between macroeconomic managers and real estate developers, we believe, can be explained by the model between incumbents and entrants. We assume that the real estate manufacturers (those speculators should also belong to this group, as they also wish the price to rise up.) can make profit of around 100 thousand yuan (using the value in the previous sector, and assume the area is around 85 m².). However, if the price was suppressed by government, they can only earn 80 per cent. Moreover, the government can earn around 2% from the trade (in China, all the taxes traders have to pay equals to around 2% of the price.)

From the previous analysis, we can conclude that the influence of national regulation of housing prices on the macroeconomic is negative (real estate industry size has a positive correlation with GDP). So naturally, should the price of real estate went down the nation would suffer some lost. This can be explained by the model between incumbents and entrants put forward by economist John C. Harsanyi[6]. The one who act later can take the advantage. Of course, the country’s tax policies
must be opened to everyone, so the real estate manufactures can take the strategy on the decisions of government.

According to the previous analyses, we assume that if the government tried to suppress the price by providing more affordable housing and the policies can work (some share of market size will be attracted by the cheaper houses.). Let us reuse the previous figure, and suppose that there are 100 families now searching for house (all their target houses are at the same price of 900 thousand yuan). The government has to provide the houses at their essential cost, and the essential cost would be afforded by the buyers. So the loss of government equals the tax income, which equals 2% of the total decreased trade volume plus the bad-debt provision from the real estate manufactures, which indicates 70% percent of the decreased trade volume. As we have said previously, the debt ratio of the real estate companies is approximately at this level. So in this way, if the government provides 80 percent of the aggregate demand and the manufactures still drive up the price (raise 10.5%), the manufacturers can only gain 20 percent of the total consumers (those in the lag of supply and demand); at the same condition, if the manufactures do not drive up, they can attracted 30 percent of the total consumers. In the same way, if the government provide only 20 percent of the aggregate demand, and the manufactures still drive up the price, 80 percent of the consumers are reluctant to choose the houses provided by the manufactures, no matter whether they drive up price or not. All the lost of government is its tax income, which equals 2% of the decreased trade volume. The cheaper affordable houses do not provide tax income. As for those manufactures, they now can earn profit of 100 thousand yuan for one commodity hose, if the price raise 10.5%, their profit afterwards will be 90×(1+10.5%)-80=19.45 thousand yuan per house.

Figure 6. Gaming tree of macroeconomic manager and real estate manufactures.
As the polices of government must be opened to all citizens, the manufacturers can act on the already known polices, so the gaming obey the law of entry deterrence model[7]. To be simple, the later acting player can take the advantage of late-mover advantage. How about the lost of government? As the land occupation cost is unknown, we only talk about the lost of all kinds of taxes. From figure 3, we can easily draw to a conclusion, that should the government spend lots of money in building cheaper houses, it would lose land occupation income and sell income tax(from manufactures), as well as the trade tax(from residents). There are so many interest relevant aspects(still less the sale volume of relevant industries, like decoration materials and so on), but one thing is certain that should the price actually go down, the government would suffer a great loss. For convenience and based on the previous given data, let us suppose that the lost of government equals72 percent of the decreased commercial sale volume. We use the changed price to calculate and the negative number to show that it means the lost. The first number is the loss of macro economy managers is and the second one is the profit of manufactures(in million) and we assume that the manufactures built the exact quantity of houses in demand.

Now let’s look at the turnover(see figure 6)

Do not feel surprising? There is just a best strategy for both the government and the manufactures! It is also easy to discover that whether the manufacturers drive up the housing price or not depends entirely on whether the country really suppress the price. If our previous analysis is credible, the state will not significantly lower housing prices, which is a relative promise. As a result, with such a promise, real estate manufacturers always raise the housing price arbitrarily.

These are only theoretical analysis, what about actual situations? Let’s look at several important national regulations of real estate industry since 2010:

Firstly, on March 9th 2010, the Ministry of Land and Resources issued the Notice on Improving the State Council’s Approval of Declaration and Implementation of Urban Constructional Lands, which states that for all declarations of residential lands, the rate of lands for affordable housing, low-rent housing and small and medium-sized ordinary commercial housing must not lower than 70%. The State Council also promulgated Article 11 to strict loan management of a second house, stipulating that the down payment is above 40% and intensifying the guidance of real estate loan.

Secondly, on April 7, the National Development and Reform Commission announced the Core of Economic and Social Development for 2010, putting forward that it’s necessary to further strengthen the real estate regulation, increase effective supplies of ordinary commercial housing, support the consumption of general or improved self-occupied housing and energetically rectify the market order of the real estate. The Ministry of Finance issued a circular, stating that for two or more individuals who are purchasing ordinary houses of no more than 90 m2 together, the tax preferential policies for first-purchase of ordinary houses will not be applicable if anyone of them has have purchase record before.
Thirdly, on April 15, the Ministry of Land and Resources announced Housing Supply Plan, aiming at increasing the total supply by more than 130% over the same period of last year, while medium and small-sized apartments will account for over 40%.

Moreover, State Council also introduced specific measures for families require loans to purchase a second home that the down payment of loans should not be lower than 50%, while the loan interest rate should not be less than 1.1 times of the benchmark interest rate. For those who purchase the first home with a dwelling size of more than 90 m2, the down payment should be less than 30%. Liu Mingkang, the chairman of China Banking Regulatory Commission, declared that the CBRC required all banks to submit assessment reports of their loan situations by the end of June. He also mentioned that risk exposure of the real estate was large, speculations shall be strictly controlled and down payment ratio and interest rate of loans shall be substantially raised, some banks in Beijing had lifted down payment of the second home to 60%.

It seems that these regulatory policies were forceful, but the result was actually in vain. For example, the height record of buildings in 2010 was repeatedly refreshed, and the policy implementation and government credibility had always been criticized because of the nonstop increasing housing price. The data from National Bureau of Statistics shows that in 70 nationwide large and medium-sized cities, the housing sales price rose 11.7% over the same period in 2009. From January to March, 2010, Chinese real estate investment reached ¥659.4 million with year-on-year growth of 35.1%; new housing area was 323 million m2 (increased 60.8%) and commercial housing sales was ¥797.7 million (increased 57.7%).

What is the reason? We can conclude from the above analysis that the government didn't put forward any stipulations to curb the housing price (or to suppress the housing price from the supply side) explicitly. Instead, the only purpose they held was to inhibit speculative demands.

So it is easy to explain why real estate manufacturers had always been "emboldened" to raise the housing price. Because they got a suggestive promise: "National regulations of real estate almost only suppress the demand side and the supply side would not be involved!"

**Game between Individual Residents and Manufacturers**

In our opinion, it is not very appropriate to use Game Theory to analyze this issue, because we have mentioned before that this is an obvious sellers' market. However, in order to consider the factors of macroeconomic policies, we can use the Principle of related equalization of the same signal to explain and analyze that means the players would at last reach a correlated equilibrium[8]. In addition, for simplicity, we suppose that this is a zero-sum game. The signal is the government regulatory policies and the signal is open to all the players.
First of all, let's analyze the situation when there is no signal (still use figures from the above conclusion and only talk about the income. Also suppose that the price used to be around 814480 or rather say always at the same increase rate, well the macro market trend and the raise behavior of manufactures can both push up the price by 10.5% and the multiplier effects can come into effect together).

We can easily draw from the matrix of game theory that residents will choose to buy houses (based on the assumption that they can afford or can apply for loans) and manufacturers will raise the housing price without hesitation.

What if there are signals? This situation displays specifically as governmental policies which limit the housing purchase. The over-produced profit of real estate manufacturers will decline (assuming that among real estate purchasers, 50% are speculators and among them 50% will give up speculation because of regulatory policies) and this amount is equal to the earning of residents. From the classical investment theory, if the price rise the investors (including the speculators) would turn to trade; if the price stay still, they will turn to wait and look on.

At this time, there is no optimal solution that only consists of strategies, but we do not need hybrid strategies, because the two sides are still in an unequal position: residents can only passively accept the housing price. Using the method of Front and Back Game Theory, it is easy to get the gaming tree of real estate manufactures and the resident. Let us see figure 7, it is obvious that the manufactures have the first mover advantage.

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<th>TABLE II. GAMING CONDITION OF RESIDENTS AND REAL ESTATE MANUFACTURES (WITH SIGNALS).</th>
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Residents will buy houses if manufacturers raise the housing price, otherwise will continue to wait. As a result, manufacturers will certainly increase the price and residents (at least those who have self-living purpose) will have to buy.

Up to now, we have been solely focusing on the situations of Chinese real estate industry, but how about those in the US? To tell the truth, we haven’t done detailed research in it. But from the relevant polices we have listed, and the macro economy sector model of the US, we can easily draw to a conclusion: The US government (including the Freddie Mac and Fannie Mae as a whole) has been make effort to restrict the real estate price from both the supply side and demand sides (And we can say most of the polices are from the supply side.) Whatever, if we merely focus on the result of this matter, these policies are essential and effective. Of course, we could not say that those financial tools and fiscal policies are perfect. For instance, one of the roots causing the subprime crisis in 2008 was the over issued packed subprime.

Other Aspects

GAME BETWEEN RESIDENTS AND NATIONAL MACROECONOMIC POLICY MAKERS; GAME AMONG INDIVIDUAL RESIDENTS

There is almost no game between residents and national macroeconomic policy makers, because policy makers hardly take personal gain and loss into consideration. According to macroeconomic theory, the objective of macroeconomic policies is to maintain inflation at a reasonable level and ensure the employment market improvement and economic growth. However, in terms of specific effects, macro-control policies will certainly have an impact on individual consumption or speculation, but such effects can completely be indicated by the above game tree.
Also, people (at least those who have self-living and risk-avoiding purpose) will buy houses whether the state controls the housing price or not.

Besides, the game among individual residents should totally be ignored, because under the macro background of China, individuals demand whether consumptions or speculations are certainly just price-recipients, their mutual game has no effects on the overall price of real estate industry. Even if the game is influential, it can only be the herding effect of speculators. Once a small group of people benefit from real estate speculations, others will immediately follow them. But we convince that their influence is limited.

GAME AMONG THE REAL ESTATE MANUFACTURERS

How about the gaming within Real Estate Manufacturers? Do they ever foster the price alliance to drive up the price? Of course, if that really happen they will easily obtain the surplus profit. We can easily see this result using the model of the prisoners’ dilemma (If the players can plot with each other, they can all get surplus profit.). [9] In modern economy this kind of plot is called price alliance. The problem is that all above are from the theoretical analysis, what is indeed the case? Of course we do not know the exact condition, but we can guess based on the record in classical works.

In the masterpiece Causes of the Wealth of Nations, sir Adam Smith ever gave an interesting discovery: “People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices. It is impossible indeed to prevent such meetings, by any law which either could be executed, or would be consistent with liberty and justice.”[10]

In this description, sir Smith directly told us that if there are price alliance (or rather say, their gaming reach to a cooperative game) the manufactures can obtain much more surplus profit and this kind of situations really happen in economic life.

This situation can easily be explained, just as in the famous prisoner’s dilemma, if the prisoners could not plot with each other, they would both decide to frank, but if the prisoners could plot with each other, they would both decide to deny. The similar thing might have happened in the real estate industry and the “plotting result” was all the manufactures decide to drive up their sale price.

As I am not a manager in this industry, I can solely guess (from the result and based on the description of sir Smith): certain manufactures in a same city or province might have plotted with each other and decided to drive up the price of their products.

CHAPTER 3. EMPIRICAL TEST AND ANALYSIS

Judging from the national average housing price trend in recent years(see figure 8), it was obvious that the house price was accompanied by an increased ratio of
reality price to personal income. This phenomenon illustrates the stable aggregate demand in China. For though the burden of house is increasing and increasing, people will have to buy houses for the essential reason that in the future, they may face even more severe burden to buy a house (and the past experiences have proved this worry over and over again.)

As mentioned above, in 2010, despite that many demand-side restrictions had been implemented, Chinese government had explicitly "promised" (or reveal any "signs") not to suppress the housing price. In fact, the price around 2010 rose the most fiercely.

Of course, we do not fully agree with the opinion on the website that for the housing price, Chinese government is "pretending to control but virtually rising it". We believe that Chinese government is suppressing the housing price abstemiously and slowly, because if the real estate market is excessively depressed, it will surely cause a macroeconomic recession in a short period of time. Therefore, in order to balance short-term steady growth and the long-run good economic conditions, our government could only choose to act in this way.

![Figure 8. Recent year Chinese commodity house price trend.](image)

Let's look at the turnover (figure 9):
Figure 9. Recent year Chinese commodity house saleroom trend.

Figure 10. Recent year Chinese commodity house saleroom trend.
The net growth of nationwide commercial housing price had almost kept the same direction and extent with the overall housing price, which fully matches our previous theoretical analysis.

However, the only deviation occurred in 2017 (of course it is only an estimate), from which we can conclude that the regulation and the change of market demand will have impact on real estate industry, changing the final selection structure of the game tree in 2.2 to do not increase price, wait. This conclusion can be verified by the expected zero sales increasing rate from the above chart and the expected negative growth of new housing areas in 2017 as figure 10 shows.

CONCLUSIONS

Chinese real estate industry is complicated. For instance, its price and trading volume are not only simply determined by market supply and demand, but also by macro-control and psychological expectations, while other factors like economic cycle and raw material market could not be ignored. In fact, the behavioral economic analysis in this article only stands on one dimension that tries explaining the reality, and we are delighted that it fortunately matches the actual situation well. But the involved behavioral theory is still very simple and we believe the credibility would not be fully enough. The analysis of Chinese real estate industry needs more professional and in-depth interpretation.

Also, for this period of time, every year Chinese government pushes some new polices to control this industry, we need to keep on focusing the new trend (both the macro polices and the market trend), then polish our model to make it more suitable.

REFERENCES