THE CHINESE REAL ESTATE MARKET AND ITS RISK

By

BANGLONG ZHU

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Approved by:

Dr. Thomas Dalton
Department of Economics
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Abstract

With the rapid growth of the economy for the recent 10 years in China, the real estate market is also burgeoning. The seemingly ever-growing housing prices and the recurrence of record-breaking transaction prices for land not only excite academics, investors, and regular home buyers, but also raise their concerns about the crash of the market. This paper addresses these concerns by comparing the real estate (residential) market in China with international real estate bubbles, such as the asset-price bubble in 1980s of Japan and the 2007 US real estate bubble. Also, this paper provides an explanation of the definition of the real estate bubble and background information about the Chinese real estate market to help understand these issues. The results from the comparisons show that the Chinese real estate market from 2001-2012 was different from the bubble periods of US and Japan mentioned above.
Section I – Introduction

Real estate is one of the major forces driving the Chinese economy during the 21st century. Having a place to live is extraordinarily important for the Chinese. Therefore, a healthy and booming real estate market is expected by the majority of the people in China. However, the real estate market seems to grow much faster than what the general public expects. Furthermore, housing prices seem to be ever-growing; some people even argue that the growth is out of control. Because of the exceedingly high housing prices, there are a lot of debates on the issues of the Chinese real estate market bubble among academics, real estate experts, and the general public. What I want to contribute to the topic is to provide a new method to measure the risk of the real estate market. The risk in this paper mainly refers to the probability of the market crash associated with the bubble. If the estimated risk is low, the real estate market has a low probability of collapse. In order to measure the risk, I qualitatively and quantitatively compare the Chinese real estate market with the US’s 2007 real estate bubble and Japan’s 1980s asset-price bubble. Based on the results from the comparisons, it is plausible to infer that the Chinese real estate market was not overinflated, and it had a low to medium probability of crash up to 2012.

The details can be found in the following five sections. Section II focuses on the definition of a bubble. The bubble inherently carries the risk of the market crash, so Section II gives readers a deeper understanding of the core idea of this paper. Section III is about the history and the mechanism of the Chinese real estate market. This section helps readers understand the issues of the Chinese real estate market. Section IV talks about what factors contribute to the boom of the Chinese real estate market. Section V qualitatively compares the real estate market in China with previous housing bubbles in the US and Japan. Section VI
quantitatively compares the residential market in China with the US and Japan and measures the degree of its risk.

**Section II – Definition of Bubble**

A bubble, which is a large appreciation of an asset, is a buzz word that can catch people’s attention immediately. This is because the general public is vulnerable to the massive price fluctuation of some goods or a market crash. During the 2007-2009 recession, which was attributed to the collapse of the 2006 real estate bubble, the U.S. lost about 8 million jobs (Goodman and Mance 2011, 3). In order to protect the public from such a detrimental event and guide the economy to the right track, the government must always keep an eye on bubbles. Investors also show an enormous amount of interest in bubbles because they want to minimize the loss by pulling back their investment before the market crash or to anticipate a large gain by hedging the opposite position at the outbreak of an economic bubble. As a result, knowing the complexities of a bubble and its risk is critical to many parties, and the topic of a bubble is interesting to many researchers. The first step to understanding bubbles is to examine the history of rapid asset appreciation.

The early history of bubbles provides some insight into bubble activity. The first well-known bubble is said to be the Dutch tulip mania, which occurred during 1634-1637. The tulip was introduced into the Netherlands around the sixteenth century. Soon, it became popular among the wealthy due to its beauty and exoticism. In 1634, the price of tulip bulbs started to rise at an increasing rate. At the peak of the tulip mania, some tulip bulbs reached twentyfold of their original value (Garber 2000, 50-57). The madness did not last for a long time and ended during the first week of February 1637. Because of the collapse, the value of tulip bulbs dropped
tremendously. For example, the price of the English Admiral (bulb) depreciated at an annual rate of 24% (Garber 2000, 64).

The Dutch tulip mania is representative of bubble activity. There is an initial price increase followed by a dramatic price decline. However, Peter Garber (2000) argues that the Dutch experience is not a true economic bubble because rapid development of new varieties and increases in production justifies the substantial fall in price (68). The price drop from his point of view is the result of changes in market fundamentals that cause consumers to adjust their preferences. This argument leads to another important aspect about a bubble. For a plunge of the asset price to be regarded as a bubble, it needs to be unexplained by some market fundamentals, such as supply of goods, the inherent value of goods, and so on. Joseph Stiglitz (1990) provides a similar view, that a remarkable price decline for an asset does not necessarily mean the breaking of a bubble because the fall in the price might be attributed to new information on the emergence of substitutes (16).

Whether the Dutch tulip mania is a bubble is not a central piece of this research topic. However, we can find three crucial points that help us define a bubble by reviewing this history. Firstly, a bubble should have a pattern of price movement similar to a parabola with time as x and the price of some goods as y. Secondly, the price movement of some goods cannot be justified by changes of market fundamentals for a bubble. Lastly, the nature of underlying goods will have an impact on the formation of a bubble and make the bubble bear some characteristics different from other types of bubbles. In his Famous First Bubbles, Garber (2000) concludes that it is in the tulip’s nature to cause dramatic price fluctuations (78).

History repeats itself occasionally. People learn from history but uncertainty never disappears, so they are apt to repeat the same mistakes in the future that they made in the past.
Bitcoin, which was introduced to the market as a decentralized digital currency in 2009, not only seems to repeat the history, but also provides a good example to help us understand a bubble. Bitcoin, which was priced at $127.256/coin on October 1 2013, started to rocket and peaked at $1124.365 (800% appreciation) in November 30 2013 (see Fig II-1). However, it lost more than half of its value ($539.132) in the following three weeks. Is this drastic price movement regarded as a bubble? Although people are not able to officially classify bitcoin as a bubble at this moment, its development provides some insights about a bubble. The main function of bitcoin is to act as an exchange medium that facilitates commerce. Nevertheless, its value is not relatively stable in contrast to the traditional currencies, like dollars and the euro. Based on my observation, the bitcoin-price of HP ProBook 6475b C6Z45UT, sold at the bitcoinstore.com, varied from 1.0 BTC on January 15 2014 to 1.4 BTC on March 2. This ongoing fluctuation of the bitcoin-price for the same product contradicts the nature of a currency. However, it does not prevent the crowd from bidding up the dollar price of bitcoin. Many of them speculate on the future appreciation of bitcoin rather than using it as a currency. Such a speculation without much justification is one characteristic of a bubble. The definition of a bubble from Robert Shiller and Karl Case (2003) in some way illustrates this point: “we believed that in its widespread use the term refers to a situation in which excessive public expectations of future price increases causes prices to be temporarily elevated” (299).
In his “Symposium on Bubbles,” Stiglitz (1990) states that “if the reason that the price is high today is only because investors believe that the selling price will be high tomorrow – when ‘fundamental’ factors do not seem to justify such a price – then a bubble exists” (13). Three crucial factors that are involved in defining a bubble are a high price today, investors’ psychology, and market fundamentals. Among them, the psychology factor is the most difficult to measure. Often times, people fail to capture a bubble before its outbreak because market participants’ psychology is too intricate to quantify. As a consequence, someone like Jeremy Siegel has tried to give an operational definition for a bubble. Siegel (2003) defines an asset-price bubble to exhibit more than two standard deviations of the realized return from the expected return over a pre-determined finite period of time (14). A drawback of Siegel’s approach is that this definition tends to be retrospective instead of forward-looking.

Overall, a concrete definition that provides simple measureable procedures for a bubble is not easily given. This is because the psychology of people is complex and hard to predict, and
some key information needed to define a bubble is missing. For example, Stiglitz (1990) points out that there are problems finding the terminal value of the asset and the rate of discount for cash flow (13). Consequently, people tend to define a bubble from a conceptual perspective. The working definition I use in this paper has three elements.

a) Generally, a bubble should have two phases in its price movement. The first phase displays a price that is rising for an extended period of time or rockets to very high levels in a short period of time. The other phase is a dramatic fall in price in a short period of time. The second phase does not necessarily have to occur. The duration of bubble and the degree of price fluctuation cannot be precisely specified. A bubble could be sustained for more than one year, for instance.

b) These price movements cannot be justified by market fundamentals. These market fundamentals are those associated with the factors that change the supply and demand relationship. For real estate, examples of fundamentals are personal income, rental, housing starts, housing completion, mortgage rates, and so on.

c) A certain degree of speculation has to be involved in the trading activities. One example is people trading some usable good for the sole purpose of making a profit from its expected price increase. Speculators have little commitment to a market and will quickly exit when they decide that profits will not materialize. Such behaviors exacerbate the fall of the asset price.

A real estate bubble is defined by the characteristics listed in a)-c) above. In addition, it may have a relatively high proportion of empty houses and a distorted price-to-rental ratio. In contrast to the stock market, the drop in prices is less severe in real estate markets during a crash. Because of the dot-com bubble, the NASDAQ lost about 60% of its peak value from 2000 to
2001 (Yahoo!Finance). On the other hand, the largest one-year drop was 18.35% for US real estate in 2008 (Case-Shiller Index). Even, the real estate markets at the city-level, which had more dramatic fluctuations, did not crash more fiercely than the dot-com bubble. This difference arises because transactions costs are lower and the liquidity is higher in equity markets. Whether it is a real estate bubble, or a tulip mania, the fundamental way to analyze the bubble is to focus on the supply and demand relationship.

Section III – History and Mechanism of the Chinese Real Estate Market

A Brief History of the Development of the Real Estate Market in China:

When the People’s Republic China was founded in 1949, necessary social and residential infrastructures were insufficient to satisfy the general public’s living needs. In pursuit of socialism, the Chinese government started to nationalize private owned land and properties. With the nationalization of land resources, the government invested heavily in residential construction, which it distributed to the general public. With years of practice and improvement, it established a welfare housing system, which was similar to the Soviet Union’s housing system. The welfare housing system consisted of two sectors based on the planned economy. One was the rural housing system; the other was the urban housing system. In the urban areas, the government allocated housing units to individuals for a very low rent. However, this urban welfare housing system did not satisfy the people’s housing needs because the very low rent could not cover the cost of construction and maintenance for the government and prohibited building more residential properties (Hang, Jian, and Zhang 2012, 276). Also, it negatively impacted the

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1 This research paper focuses on the urban housing market because major breakthroughs and the central part of marketization occur in the urban real estate market. Therefore, I mainly discuss the urban welfare housing system. Moreover, “Chinese real estate market” in this paper mainly refers to the urban real estate market. If rural real estate market is specifically discussed, it will be clearly indicated. In addition, the central part of “Chinese real estate market” in this paper is the residential market.
development of the Chinese economy. As a result, the Chinese government decided to reform its housing system.

Since the Chinese economic reform in 1978, the Chinese government has started to propose different plans to replace the old welfare housing system. During 1979-1981, it selected some cities to experiment with selling new residential properties at the cost of production. To further promote the sale of properties, the government selected some cities to test the one third subsidy-sale model in 1982. Individuals paid one-third, and the stated-owned enterprises paid the rest of the cost of the housing. These trials were not very successful because the majority of individuals could still get houses through the old welfare housing system, and the state-owned enterprises bore a large amount of cost (Ding, Dong, and Tao 2012, 248). Learning from the previous experimenting experience, the State Council issued a comprehensive plan to reform the welfare housing system in 1988. This plan set several goals, such as, the commercialization of the residential properties, increasing the rent for the public housing, and improving auxiliaries from the fields of tax, financing, real estate management, and so on. Also, a critical Constitutional Amendment was enacted to separate the land-use right from the land ownership that was fully controlled by the state and to legalize the transfer of the land-use right in 1988. This change in the Constitution laid a foundation for the marketization of the real estate market.

After three normal years, 1991 became a breakthrough year because the State Council issued several crucial directive documents to formally state the goal of promoting the reform of the housing system nationally, which included the sale of state-owned housing, the launch of the housing public accumulation fund system, and a new policy promulgating that newly-built properties would be regulated by the new housing system rather than the old one (Hang, Jian, and Zhang 2012, 279). In 1992, the first housing public accumulation fund system in which
participants and employers contributed to fund the purchase of the new housing properties was launched. This milestone pioneered the formal establishment of a stable funding channel for the housing (Hang, Jian, and Zhang 2012, 279).

The years from 1994-1998 were a period of the intensification of the reform in the housing system (Ding, Dong, and Tao 2012, 252). In 1994, the State Council released one decisive document to improve and rectify previous housing policies, prioritize the professionalism as to responsibilities of each participant, clarify the definition of the monetary housing allocation that was based on how much an individual could contribute, and set up two housing supply systems (affordable housing for low-income families vs. commercial housing for high-income families) that had a big impact on the real estate industry and the security of the housing (Ding, Dong, and Tao 2012, 253). In addition, the government abolished all the state-allocated housing and reduced the restrictions of personal housing mortgages to accelerate the reform of the real estate market in 1998. Because of these implementations, individuals became more enthusiastic to participate in the buying and selling of the properties, and the real estate market entered into a new era (Ding, Dong, and Tao 2012, 255).

**Mechanism of the Real Estate Market in China:**

In China, there are generally two forms of land ownership. The first one is that the land is owned by the state. The other one is that the land is collectively owned by peasants. A simple way to distinguish them is that the urban land is state-owned in contrast to the rural land owned by collectives. In order to use the land owned by peasants collectively for other purposes, such as social welfare projects (e.g., highway) and commercial construction, the government has to compensate these peasants. According to the current law in China, the government separates the land-use right from the land ownership, creating the land-use granting system. Under such a
system, land use rights can be traded in the open market so that a market-oriented real estate market can be realized. In order to acquire the land-use right, individuals or companies have to bid under a public auction organized by the government. The ownership of land-use right does not last forever in China. The term depends on the usage of the land. For example, the ownership of land-use right for residential land expires after 70 years. The land-use right for industrial land only lasts 50 years. The current law requires the owner to pay another fee in order to continue to use the land at the expiration. However, the details of how to continue the ownership of land-use rights have not been released yet.

Because of the unique land-use granting system, the real estate market can also be divided into three markets. The first type is the primary real estate market, i.e., land market, where land is traded. It is controlled by different levels of government agencies. In other words, the primary real estate market is monopolized by the state. The secondary real estate market is where new properties developed by the real estate companies are sold or rented to others. This market also includes the transfer of land-use rights since its first grant. The third real estate market is where people can buy or rent “old” properties owned by others. Unlike the classification of the real estate market, the tax system related to the real estate is more complex. This is because there are more categories in taxes and the actual implementation of levy varies over cities. Even, some authorities do not know the exact number of taxes in China (Ding, Dong, and Tao 2012, 266). Generally, there are 11 types of tax involved in real estate, such as land value-added tax, tax on land occupation, contract tax and so forth. The existing real estate tax system heavily levies on the development of real estate instead of owning properties (e.g., property tax for owning residential properties); this distorted design increases the cost of construction, which in turn adds to the price of properties, and encourages people to own more
properties (Ding, Dong, and Tao 2012, 287). Therefore, the government is planning to impose a new nationwide property tax to keep down speculation. Now, the government has experimented with the new property tax in Shanghai and Chongqing. The prospects of the property tax remain to be seen.

In the current Chinese real estate market, there are many different types of properties, like low-rental housing provided for low income families, affordable housing sold to the families who barely meet the average income level or earn less than the average, commercial housing, and so on. It is confusing for people who are new to the Chinese real estate market when they first encounter commercial housing and commercial properties. As one type of residential property, commercial housing is part of commercial properties, which include office, retail, recreational, and so on. Commercial properties built by real estate developers are most important because they are free traded in the market.

The Chinese government is the organization behind the establishment of all these market settings and plays the role of manager in the real estate market. Therefore, it is necessary to discuss the government with respect to the Chinese real estate market. It not only controls the supply of land, but also is able to use different policies to regulate the market and change the behaviors of market participants. For example, the government enforced restrictions on property trading in Beijing in March of 2013 because the Beijing real estate market was overheated during the last quarter of 2012. The down payment for a second house rose to 70% of the sale price, and the profit from selling a residential property was taxed at 20%. The 20% forced some people to come up with a new scheme in which a seller and a buyer signed a contract with a lower price for the government but traded at a higher price under the table. Here are some typical methods the government uses to regulate the real estate market: adjust the level of reserve requirements on
deposits, mortgage rates, and the down payment; control the number of mortgages individuals can take and the number of houses a family can purchase. Because of the critical role the Chinese government plays in the real estate market, all market participants closely watch for the government’s actions. This is truer for foreign investors in China. According to Cheng, He, and Wang’s research (2011), local governments with market-oriented regulation and strong commitment to law enforcement are more attractive to Foreign Direct Investment in Real Estate Development (291).

Section IV – What Contributes to the Boom of the Chinese Real Estate Market

With the progress of economic reforms, the invisible hand of the market plays a more important role in China’s economy than in the past. On the other hand, the Chinese government still uses its authoritative hand to lead and to regulate the economy. In 99% of the market reforms, the central government sets a tone and empowers lower-hierarchy agencies and the general public to make the transition. Every breakthrough housing reform has a corresponding document issued by the government. For example, the abolishment of state-allocated residential properties in 1998 came from the “Notice to Further Augmenting the Urban Housing System Reform and Accelerating Housing Construction”. Therefore, the government laid a foundation for the boom of the Chinese Real Estate Market since 2003 (see Fig IV-1).

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2 http://www.gj.gov.cn/vfggw/qtfg/200806/t20080610_262964
There are two critical driving factors, which are also related to the government, for the boom of the Chinese real estate market. The idea of ownership has been greatly promoted in China. This encourages the general public to buy houses because they know that the government will not confiscate this property without lawful reason. In his *Irrational Exuberance*, Shiller (2005) also argues that the ownership society propels market bubbles (33). Another crucial factor is urbanization. During the past decades, the Chinese government has committed to transforming more rural population into urban residents, improving their living standards, and building a sustainable modern community. According to the National Bureau of Statistics of China, the urbanization rate (by population) increased from 36.2% in 2000 to 49.7% in 2010. About 200 million rural citizens became urban residents. This generated a potential demand for the housing market. Furthermore, the trend may continue. As estimated by the United Nations4, China’s percentage of urban residents will increase to 65.4% in 2025. Xi Rao and Yinggang (2010) Zhou

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3 http://www.stats.gov.cn
4 http://esa.un.org/unup/unup
also think the urbanization would “promise substantial new markets for urban housing,” based on their research (31).

As urbanization progresses, more land will be used for building properties to support people’s daily activities. However, the land in China is a relatively scarce resource. This relative scarcity of land contributes to inflation in the real estate market. China has a population of about 1.35 billion, which is four times larger than the population of the United States. Particularly, land scarcity is an intense problem in cities. Many Chinese cities are built around a center focus, and then the city construction spreads out from the center. Therefore, it is often seen that the housing price in downtown areas is very high. Chinese like to live in downtown or near downtown, but the land in downtown areas is limited. This is how the relative land scarcity is reinforced in cities. People may change their minds, but it was true in the past. Because China is populous, it must have enough arable land to raise crops to feed people. Nevertheless, the agriculture acreage per capita for China was ranked as the third last among the countries whose population is over 50 million (Ding, Dong, and Tao 2012, 17). With an eye to the future, the government set up 180 million mu for the area of arable land as a bottom line in 2006. How exactly this bottom line affects the supply of land in the future is unknown, but at least we know land is relatively scarce in China. Besides the food coming from the land, the trade of the land generates a considerable amount of fiscal revenues for the government. As a result, the government expects the price of the real estate to continue to grow healthily.

Monetary expansion is another possible source of housing appreciation, which is attributed to the government policy. It increases aggregate demand, which causes both output and prices to grow. Also, real estate developers can more easily access these funds for their projects from the commercial banks because of the momentary expansion. More of the general

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5 180 million mu ≈ 0.4636 million square miles
public can borrow money to finance their housing investment. In the 10-year period (2003-2012), China quadrupled its M2 from 18891858 million yuan to 97414880 million yuan (the People’s Bank of China). This remarkable amount of money issue invigorated the housing trades and boosted the real estate market. At the same time, China’s nominal GDP grew very fast averaging above 10% with the support of the large money issuance. The general public benefited from the high-growth economy underpinned by investment and international trade. In turn, they used their accumulated wealth to buy houses.

The extra money issued does not necessarily flow to the real estate market. However, investors lack profitable investment channels other than real estate in China. The stock market, which is usually a favorable alternative for investment, does not perform as well as expected in China (see Fig IV-2). Starting as of 2001, the stock market (Shanghai Composite Index) had continued to fall until the end of 2005. In 2007, it reached its record high 6124, which was one of a few moments Chinese investors could fully enjoy. Since then, it has fallen and disappointed investors for a long time. Some reasons, which could explain this uncommon phenomenon, include inappropriate regulation (e.g., lack of proper delisting mechanism), insider trades, fraudulent balance sheets, and so on. As a consequence, investors prefer investing in real estate. Such an investor preference contributes to the boom of the real estate market.
Besides regular investors, many corporations whose major business is not real estate participate in trading in real estate. In Wenzhou, which is well known for its small business, more than 40 manufacturing companies listed in the Top 100 local corporations in 2010 were involved in the real estate market (Li et al. 2013, 322). Unlike regular investors, these big companies have sufficient funds or are able to borrow a lot of money from banks to trade a large volume of real estate. In some sense, their participation speeds up the escalation of housing prices.

Due to seemingly ever-growing housing prices and a lack of attractive alternative investment channels as discussed above, more and more investors turn to the Chinese real estate market. They bet on the future price upsurge in order to gain when they sell their houses. If they make profits from trading properties, some of them will continue to buy to gain more. Housing prices will be bid up even higher. When investors see that housing prices are increasing, more investors enter the market because they are more confident and expect future price increments. It is similar to a loop, which will repeat again and again until investors lose confidence in the
market. As shown in the Fig IV-1, this loop is evident during 2003-2012. A more formal way to describe the loop is that it is a feedback mechanism. Shiller (2005) also believes “as prices continue to rise, the level of exuberance is enhanced by the price rise itself” (81).

Last but not least, owning a house is an essential condition for marriage in Chinese culture in recent years. The parents of a daughter often require the prospective groom to own a house if he wants to marry their daughter. This is not an individual case; instead, it is a social phenomenon. The requirement of owning a house for marriage firstly comes from parents, who in turn influence their children’s decisions. The percentage of couples who own a house when they marry is unknown, but usually new couples will buy houses for marriage as long as they are able to afford the mortgages. According to an investigation by China Everbright Bank and a real estate company, the average age of a first-home mortgagor in Beijing is 27, which is lower than other countries, like the UK (35), Japan (42), and so on6. Therefore, the social value of owning a house for marriage urges people to buy houses and generates the power to propel housing prices upward.

Section V – Qualitative Comparison among China, Japan, and US

To better understand the issues of the Chinese real estate market, it is wise to look for international comparisons. The 2007 real estate bubble in the United States and the asset-price bubble in the 1980s of Japan are two good examples to compare. They are chosen because the size of the two real estate bubbles were gigantic, they were well-documented and researched by many experts, and they were the first influential real estate bubbles in their countries’ modern histories. Currently, China is experiencing its first real estate bubble, so there may be more similarities among them. Also, the United States and China have similar geographies, which consist of thousands of cities and towns spread over a large area. On the other hand, Japan’s

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6 http://data.163.com/13/0120/22/8LMQG0SU00014MTN.html
asset-price bubble developed and broke during the period when it was the world’s second largest economy and had relatively high GDP growth. China overtook Japan as the world’s second-biggest economy in 2010, and is pursuing fast GDP growth. The followings are some recent developments in the Chinese real estate market and some background about the two earlier real estate bubbles:

**China:**

1998 could be viewed as another breakthrough year in Chinese housing reform because the government formally ended the state-controlled allocation of residential properties. From 1998 to 2003, the real estate market in China grew at a stable pace. The average sale price for commercial properties increased from ¥ 2063 per square meter\(^7\) to ¥ 2359 per square meter (Li et al. 2011, 1). Since 2003, the real estate market has boomed unprecedentedly (see Fig IV-1). The never-seen-before soaring housing prices have attracted a great number of investors. On the other hand, it gives rise to the worries about the crash of the real estate market in China. The market has not collapsed yet at the time this paper is written, but “ghost towns,” in which few people live have appeared in some cities. According to Davis and Fung’s news report (2014), the houses were overbuilt in some cities, such as Changzhou, and developers enticed people to buy apartments by reducing prices and providing additional benefits like parking space. All these provide a warning sign about the Chinese real estate market.

**United States:**

The dot-com bubble during 1995-2000 seemed to put the United States into another big recession, but the recession only lasted about three quarters. The economy recovered under a low interest rate policy by the Federal Reserve and grew 1.8% in 2002 as opposed to only 1% real GDP growth in 2001. The favorable trend continued to 2006 when the real estate market reached

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\(^7\) 1m\(^2\)=10.764ft\(^2\)
its peak. In fact, the real estate market boomed starting from 1997 to 2005 (see Fig V-1). This boom was partially attributed to the large amount of financing from banks. The general public could easily get loans to afford houses. In 2007, the fabulous real estate story came to an end. The United States entered the Great Recession, which officially ended in June of 2009, but the US economy is still on its way to recovery.

Figure V-1

![S&P/Case-Shiller National Home Price Index](image)

Source: S&P Dow Jones Indices

**Japan:**

In Japan, there was a myth that land values never fell until the collapse of the land market in 1991. Since the setup of the Urban Land Price Index, which captures the movement of the Japanese real estate market from 1955, the urban land had appreciated for 36 years (see Fig V-2). In addition, the stock market, which peaked in 1989, rose by about 490% in the 1980s. During the same period, the land value doubled. In 1985, Japan, France, West Germany, the United States, and the United Kingdom signed the Plaza Accord to depreciate the U.S. dollar relative to the Japanese yen and German Deutsche mark with coordinated interventions in New York City.
Afterwards, the yen appreciated about 52% against the U.S. dollar in one year. Due to the fear of the adverse effect on the flourishing economy by the appreciation of the yen, the Bank of Japan implemented a loose monetary policy in the late 1980s. Under such a monetary policy, the asset markets continued to grow, which sustained a myth of rapid wealth accumulation during this period. However, the fairy tale finally ended with the crashes of the Japanese stock market in 1990 and then the land market in 1991. The Nikkei index lost about 79% of its value from February to September in 1991. The average price of the commercial land fell to only about 25% of its peak value, and the residential land fell by about half of its value in the Tokyo Metropolitan area by 2001 (Saito 2001, 365). These extraordinary inflations and deflations in the two asset markets comprised Japan’s famous asset-price bubble of the 1980s-90s.

**Figure V-2**

![Japan Urban Land Price Index - Residential](source: Statistics Japan)
Qualitative Comparison – How Risky the Chinese Real Estate Market is:

Monetary policy is a crucial factor in the real estate market because the creation of a real estate bubble requires a substantial amount of money. By examining the history of the two real estate bubbles in the United States and Japan, I found that these two countries practiced a loose monetary policy before the collapse of the bubble. Hitosh Saito (2001), who is a higher-up of the largest Japanese real estate company, Mitsui Fudosan, thinks the excessive money supply along with extremely low interest rates is the cause of the asset-price bubble in Japan (367). Figure V-3 describes Japan’s historical interest rate during the bubble period:

Figure V-3

Not just Saito holds this opinion; Mitsuhiro Fukao (2003) and Kazuo Ueda (2011) argue the easy monetary policy caused the asset price inflation (367, 51). As to the real estate bubble in the United States, Ashok Bardhan (2009) believes that years of historically low interest rates contributed to the formation of the real estate bubble (2). Here is the graph of US interest rate from 1998 to 2010:
Compared to the United States and Japan, China is also experiencing a stimulative monetary policy, like the issuance of a substantial amount of money. However, there is one important difference between China and these two countries in terms of the personal lending standard. Fukao holds a view that undisciplined lending led to the Japanese bubble. Here is one quote from his paper to describe the frenzied behavior: “During the bubble period, even an ordinary salaried worker living in Tokyo could easily borrow up to 100 million yen for any purpose at the long-term prime rate if his house could be used as collateral” (Fukao 2003, 368). Bardhan (2009) has a similar opinion on the US side (2). Even those who did not meet the lending criteria were able to borrow to finance their investment. Some of these same individuals paid a zero down payment during the period the US bubble developed. By contrast, the Chinese commercial banks strictly followed the minimum 20% down payment for the home mortgage of the first house as required by the Chinese government. This stricter practice mitigates the risk of the Chinese real estate market from a comparative perspective.
Another potential risk in the Chinese real estate market may come from the credit side. The Chinese government officially set the saving interest rate at a very low level. Therefore, the cost of lending is not high in the regular commercial banks. Real estate developers, especially some with government background, can raise funds for their projects at a cheap price. This stimulates their participation in the real estate market. The overbuilding, as discussed above, is partially attributed to it. On the other hand, wealth management products, which offer a much higher return and are created by trusts, have become popular among the general public partially because of the low saving interest rate. Banks help trusts sell these investment products. After raising funds, trusts manage the money by reinvesting so that the purchaser of WMPs can earn interest and get back the principal at the end. It is the Chinese version of the shadow banking system. A large portion of the money raised by WMPs flows to the real estate market. Several aspects of the collapse of the bubble are reinforcing. Once the housing price starts falling and continues to fall to a level that some borrowers cannot accept, these borrowers, especially the real estate developers, have to sell collateralized assets to fulfill the obligations. As more houses are sold, prices begin to fall, and borrowers, especially those who are over-leveraged, get into trouble. Finally, the crash is triggered. This is similar to the subprime crisis in the United States.

**Section – Quantitative Comparison among Three Countries at the National Level**

Generally, there are two ways to measure a real estate bubble. One way is to construct an indicator to show the degree of the real estate bubble, such as an indicator based on the ratio of home price-to-rental or the vacancy ratio. The other way is to construct a mathematical model, i.e., find a formula to measure the degree of the real estate bubble. For example, a possible mathematical model could be built on the fundamentals, such as housing starts, average mortgage interest rates, prices of houses, and so on. In this section, I use two simple methods to
evaluate the residential market, which is the central part of the Chinese real estate market. The first one, associated with correlation and growth rates, measures whether the residential market in China was highly risky up to 2012. Its mechanism is similar to an economic indicator. The second one creates a moving average to measure how risky the Chinese residential market was up to 2012. Its mechanism is similar to a mix of a mathematical model and an indicator model. In both methods, I focus on the growth rate (e.g., the percentage change of housing prices over time) because a bubble typically exhibits a pattern of rapid appreciation. Moreover, the growth rate can capture the degree of change in the down trend. The disposable personal income is chosen because purchasing houses is a huge investment for the general public. The income directly affects their ability to purchase houses. As discussed in the Introduction, the risk here is the probability of the market crash associated with the bubble.

In order to more accurately measure the dynamics of the real estate bubble, I define three periods for the United States and Japan. They are Pre-boom, House Boom, and After-peak. I include the period of the real estate bubble in the House Boom because the exact starting point of a real estate bubble is extremely difficult to define. For each country, there is a slightly different rule to determine the three periods due to their respective unique market conditions and the restriction on the availability of data. For instance, I set 1964, which is 27 years before the break of the real estate bubble, as the beginning of Pre-boom for Japan because the Japanese land market was growing for nearly 40 years from the 1950s. If I shorten the Pre-boom, it may not accurately capture the growing momentum in Japan’s land market. Despite these constraints, there is a definitive rule to determine the end of the House Boom, which is the peak of the housing index. Here is Table VI-1 showing different periods for the United States and Japan:
Table VI-1

<table>
<thead>
<tr>
<th>Country</th>
<th>Pre-Boom</th>
<th>House Boom</th>
<th>After-peak</th>
</tr>
</thead>
</table>

There are six sets of raw data used in the tests:

1) S&P/Case-Shiller U.S. National Home Price Index
2) US annual disposable personal income from “Table 2.1. Personal Income and Its Disposition of BEA”
3) Urban Land Price Index (residential) for Japan from Chapter 22 Prices (22-20) in Statistics Japan
4) Japanese annual disposable income from Chapter 20 Family Income and Expenditure (20-2-c) in Statistics Japan
5) Average price of commercial residential property for China from National Bureau of Statistics of China
6) Disposable personal income for urban residents in China from National Bureau of Statistics of China

**Method 1 – Whether the residential market in China was highly risky up to 2012:**

The following shows the basic steps for the first method of analysis:

1) Calculate the annual percentage change of the national index and the annual percentage of change of income for each country
2) Find a correlation between the percentage change of the national housing index per year and the percentage change of the income per year for each period, like Pre-boom, House Boom, and After-peak (see “correlation” in the Table VI-2,3,4 for results)

\(^8\) After converting the quarterly S&P/Case-Shiller U.S. National Home Price Index to an annual basis, the peak of the US real estate bubble changes from 2006 quarter 2 to 2005.
3) Average the percentage change of the national index and the percentage of change of income for different periods

4) Calculate the ratio of the percentage change of the housing index to the percentage change of income for each period by using the averages from Step 3 (see Table VI-2,3,4 for results)

5) Compare the results among the countries

In the Pre-boom of the US home market, the movement of the growth rate of the housing price was highly positively correlated to the movement of the growth rate of disposable income (see Table VI-2: \( r = 0.71 \)). This makes sense in a way because people have more money to purchase more expensive houses or to purchase houses that they were not able to afford before. The ratio of the percentage change of the housing index to the percentage change of income, 0.5, shows incomes grew faster than the housing prices in the Pre-boom of the United States, (see Table VI-2). This well matches the characteristics of what a Pre-boom should be. However, these relationships do not hold when the time moves to the House Boom, which includes the 2007 real estate bubble. The ratio increases to 1.92, and the disposable income growth rate just has a 0.19 correlation with the growth rate of housing prices for 1995-2005 of US (see Table VI-3). The key finding for the US House Boom is that the ratios of the percentage change of the housing index to the percentage change of income for three sub-periods (1995-2005, 2001-2005, and 2003-2005) are very high and increase as the time gets close to the peak of the bubble. This means when the market is booming, the housing prices grow much faster than the growth of income in the United States.

Although the pattern of correlation coefficients is different between the United States and Japan during the House Boom, the pattern of the ratio of the percentage change of the housing
index to the percentage change of income is similar. As the time is closing to the peak for Japan (1991), the ratio is increasing. China has a ratio of the percentage change of the housing index to the percentage change of income, 0.76, from 2001 to 2012. It means the growth of income outstrips the growth of housing prices in China. In contrast to the United States’ and Japan’s House Booms, this 0.76 ratio falls far behind (see Table VI-3). Rather, it is closer to the Pre-boom for the US and Japan (see Table VI-2).

Based on the current analysis, it is reasonable to infer the Chinese real estate (residential) market up to 2012 was not highly risky from a nationwide perspective.

<table>
<thead>
<tr>
<th>Table VI-2 – Pre-boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>US (1987-1994)</td>
</tr>
<tr>
<td>Japan (1964-1975)</td>
</tr>
<tr>
<td>China (2001-2012)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table VI-3 – House Boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>US (1995-2005)</td>
</tr>
<tr>
<td>US (2001-2005)</td>
</tr>
<tr>
<td>US (2003-2005)</td>
</tr>
<tr>
<td>Japan (1976-1991)</td>
</tr>
<tr>
<td>Japan (1985-1991)</td>
</tr>
<tr>
<td>Japan (1987-1991)</td>
</tr>
<tr>
<td>Japan (1989-1991)</td>
</tr>
<tr>
<td>China (2001-2012)</td>
</tr>
<tr>
<td>China (2010-2012)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table VI-4 – After-peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>US (2006-2011)</td>
</tr>
<tr>
<td>Japan (1992-2005)</td>
</tr>
<tr>
<td>China (2001-2012)</td>
</tr>
</tbody>
</table>
Method 2 – How risky the Chinese residential market was up to 2012:

The preceding analysis does not measure the degree of risk the economy faces. In order to do so, I apply a three-year moving average to the analysis:

1) Calculate the annual percentage change of the housing index and the percentage change of income for each country

2) Run a three-year moving average for the percentage changes attained from Step 1 to generate new annual the percentage changes that still measure the growth rate of the housing price and income, but are based on the three-year moving average.

3) Use the new the percentage change data to calculate the ratios of the percentage change of the housing index to the percentage change of income for each year

4) Run a correlation test for different periods (see Table VI-5,6,7)

5) Find a benchmark ratio as a base to test the degree of risk for the Chinese residential market

6) Compare results among the countries

After the preliminary work, I match the year right after the peak for the United States (2006) to Japan (1992) to make them have the same length of time (1976-1992 vs. 1990-2006). Although the movements of “new” ratios\(^9\) during the first half for the United States and Japan are not quite similar, the movements of the 6-year period ending at the peak are highly matched (see Fig VI-1). The correlation between the 6-year periods for the US and Japan (1986-1991 and for Japan and 2000-2005 for US) is 0.9.

---

\(^9\)“New” ratios are the ratios of the percentage change of housing price to the percentage change of income based on the three-year moving average.
Therefore, I directly use the 0.9 correlation coefficient as a benchmark to measure the degree of risk that the Chinese residential market had up to 2012. Moreover, I do two panels of tests to measure to see which period that the 2003-2012 period for the Chinese residential market most likely falls into. Firstly, I run a correlation test on “new” ratios from 2007-2012 in China against two 6-year periods for Japan and the United States to test the risk assuming 2012 is the peak of the residential market. Here is the table showing the results:

Table VI-5 – Correlation

<table>
<thead>
<tr>
<th></th>
<th>2007-2012 (China)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986-1991 (Japan)</td>
<td>-0.21</td>
</tr>
<tr>
<td>2000-2005 (US)</td>
<td>0.16</td>
</tr>
</tbody>
</table>

As you can see from results shown in the table, the correlation, which is regarded as the degree of risk in this particular test, is low between China and Japan or the United States. The estimated risk is calculated as:

\[
\text{Correlation between Target Country and the Benchmark Country} = 0.90
\]
According to the formula, the highest risk is $0.18 \frac{0.16}{0.90}$, which is low. This means the Chinese residential market up to 2012 had a low probability of a crash. One interesting thing I find here is the correlation between the “new” ratios from 1976-1999 of Japan and 1990-2013 of the US\(^\text{10}\) is 0.84, which could be a long-term risk base in the formula above.

For the second test, I run a correlation test on “new” ratios from 2003-2012 in China against five different periods for Japan and the United States. The following tables show the results:

Table VI-6 – Correlation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2012 (China)</td>
<td>-0.27</td>
<td>0.06</td>
<td>0.42</td>
<td>0.37</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Table VI-7 – Correlation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2012 (China)</td>
<td>0.01</td>
<td>0.03</td>
<td>-0.06</td>
<td>0.06</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Table VI-8

<table>
<thead>
<tr>
<th>Japan</th>
<th>&quot;New&quot; Ratio</th>
<th>US</th>
<th>&quot;New&quot; Ratio</th>
<th>China</th>
<th>&quot;New&quot; Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>0.49</td>
<td>1990</td>
<td>0.70</td>
<td>China</td>
<td>&quot;New&quot; Ratio</td>
</tr>
<tr>
<td>1977</td>
<td>0.04</td>
<td>1991</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>0.44</td>
<td>1992</td>
<td>-0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>0.76</td>
<td>1993</td>
<td>0.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1.39</td>
<td>1994</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>1.97</td>
<td>1995</td>
<td>0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>2.12</td>
<td>1996</td>
<td>0.54</td>
<td>2003</td>
<td>0.39</td>
</tr>
<tr>
<td>1983</td>
<td>2.23</td>
<td>1997</td>
<td>0.69</td>
<td>2004</td>
<td>0.82</td>
</tr>
<tr>
<td>1984</td>
<td>1.45</td>
<td>1998</td>
<td>0.97</td>
<td>2005</td>
<td>1.12</td>
</tr>
<tr>
<td>1985</td>
<td>1.10</td>
<td>1999</td>
<td>1.44</td>
<td>2006</td>
<td>1.08</td>
</tr>
<tr>
<td>1986</td>
<td>0.84</td>
<td>2000</td>
<td>1.65</td>
<td>2007</td>
<td>0.88</td>
</tr>
<tr>
<td>1987</td>
<td>1.23</td>
<td>2001</td>
<td>2.08</td>
<td>2008</td>
<td>0.48</td>
</tr>
<tr>
<td>1988</td>
<td>1.78</td>
<td>2002</td>
<td>2.23</td>
<td>2009</td>
<td>0.98</td>
</tr>
<tr>
<td>1989</td>
<td>1.72</td>
<td>2003</td>
<td>2.58</td>
<td>2010</td>
<td>0.83</td>
</tr>
<tr>
<td>1990</td>
<td>2.03</td>
<td>2004</td>
<td>2.46</td>
<td>2011</td>
<td>1.06</td>
</tr>
<tr>
<td>1991</td>
<td>2.05</td>
<td>2005</td>
<td>2.93</td>
<td>2012</td>
<td>0.54</td>
</tr>
</tbody>
</table>

\(^{10}\) 1990-2013 covers all data time periods. Also, I match the peak of the US home market to the peak of Japanese residential land market (2005 vs. 1991).
The movement of the Chinese residential market has a very low correlation to the periods before the peak of the US home market. Compared to Japan, the period of 2003-2012 in China most likely falls into is the period of 1980-1989. The correlation is 0.42, which is highest among the five test results but still not high. Based on the results of two tests, it is reasonable to infer the risk of the Chinese real estate market up to 2012 was low.

There are four possible explanations for the low risk at the national level. One possible explanation is the Chinese government interferes much more than the other two countries. Whenever the real estate market is overheated, the government steps in to cool it down. For example, the government set a restriction on the number of houses a family can purchase in some cities in recent years. Another possible explanation is the accuracy of data for the Chinese market is low. In fact, there are gaps among the housing prices collected by the different agencies in China. The third explanation is the Chinese real estate market exhibits a larger difference over the cities because more cities have a flat real estate market, and fewer cities are overdeveloped. The last possible explanation is the low risk is the truth of the Chinese residential market. The risk is overstated by the media and some experts.

Section VII – Conclusion

The qualitative comparisons among the US, Japan and China indicate that the Chinese real estate market is not as risky as the US’s and Japan’s bubble periods. Although China practices a stimulative monetary policy similar to the US and Japan and is exposed to the potential risk from a shadow banking system as the US did before the crash, the stricter standard for home mortgages put the Chinese real estate market into a safer region. The quantitative comparisons show the Chinese residential market had a low risk up to 2012. The ratio of the percentage change of the housing index to the percentage change of income was below 1 for
most of time during 2003-2012 for China (see Table VI-8). This means that personal income grows faster than the growth of the housing prices in China. The general public has money in their pocket to support purchases of new homes and growth of the house prices. Moreover, the benchmark test shows the degree of risk for the Chinese residential market was 0.18, which was low up to 2012. Based on the qualitative and quantitative analyses in this paper, the Chinese real estate (residential) market had a low to medium risk up to 2012. One thing we should pay attention to is that all important analyses are done at the national level. Because China is a more unbalanced economy, the boom of real estate tends to center on the large cities. It is more precise to analyze the real estate market at the city level. Despite of this imperfection, the quantitative model here provides one possible way to measure the degree of risk in the Chinese real estate market. As discussed in the Section II, the speculation has to be involved in the real estate bubble. Currently, the Chinese government is setting up an electronic system to track the residential properties. The general public is required to report how many houses they have. Therefore, I want to propose a new method to measure the risk and provide additional accuracy. This new method calculates the average number of the residential properties owned by one individual, which implies the degree of speculation. Only the individuals who own the houses are counted. The higher the average number is, the riskier the real estate market is. This is because regular home buyers purchase typically one home for living, but speculators purchase additional homes for profits.
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Yahoo!Finance. [http://finance.yahoo.com/echarts?s=%5EIXIC+Interactive#symbol=%5EIXIC;range=5y](http://finance.yahoo.com/echarts?s=%5EIXIC+Interactive#symbol=%5EIXIC;range=5y).