

**CZECH UNIVERSITY OF LIFE SCIENCES
PRAGUE**

Faculty of Economics and Management

Department of Economics



Analysis of Chinese Real Estate

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Department of Economics

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

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Economics and Management

Thesis title

Analysis of Chinese real estate

Objectives of thesis

Evaluate policies concerning real state in Beijing of China in order to understand the situation and environment of the real estate in Beijing. Contrast the situation and environment in Beijing Guangzhou, Shanghai and other areas pertaining to the real estate.

Methodology

Literature review is done using methods of synthesis, extraction, abstraction, induction and deduction. Analytical section makes use of methods of regression, comparative methods using statistical indicators and correlation matrix.

The proposed extent of the thesis

50+ pages

Keywords

Real estate; Real state Policy analysis; Beijing and Shanghai property markets, vacancy rate

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Ahuja, A. and Myrvoda, A. (2012). The spillover effects of a downturn in China's real estate investment. Washington, D.C.: International Monetary Fund, Asia and Pacific Dept.

Hsing, Y. (2010). The great urban transformation. Oxford: Oxford University Press.

Lynn, D. and Wang, T. (2010). Emerging market real estate investment. Hoboken, N.J.: John Wiley.

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DECLARATION

I hereby declare that I have written this diploma thesis “Analysis of Chinese Real Estate” by myself with help of the literatures listed in reference.

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SUMMARY

The aim of this diploma thesis is to evaluate real estate and related policies in China especially the land policy and the housing policy in China. Also, it is necessary to assess similarities and differences of price composition between Beijing and other main city in the eastern coastal area of China. The main factors that influence the price of housing in eastern coastal area in China are evaluated using econometric methods. The main conclusions are that Chinese real estate market needs certain type of government control. The main factors that influence price of real estate are tax policy, number of developing firm on real estate, proportion of investment on real estate, production cost of real estate, the vacancy ratio and consumer income level. Although they have different efficient on real estate they are all important.

Key words: Housing in China, Land Policy in China, Housing Price Comparison, Legal framework, Factor Analysis, Regression Analysis.

SOUHRN

Cílem této diplomové práce je zhodnotit nemovitosti a souvisejících politiky v Číně zejména pak bytovou politiku v Číně. Je třeba posoudit a charakterizovat podobnosti a rozdíly v cenovém složení mezi Pekingem a jiným hlavním městem na východním pobřeží Číny. Hlavní faktory, které ovlivňují cenu bydlení ve východní pobřežní oblasti Číny, jsou hodnoceny pomocí ekonometrických metod. Hlavní závěry jsou následující. Čínský trh s nemovitostmi je třeba regulovat. Mezi hlavní faktory, které ovlivňují cenu nemovitostí, patří daňová politika, počet developerů, podíl investic na nemovitosti, výrobní náklady na nemovitosti, neobsazenost a úroveň příjmů spotřebitele. I když mají tyto faktory různou efektivitu, jsou všechny důležité.

Klíčová slova: bydlení v Číně, Politika bydlení v Číně, Srovnání cen bydlení, právní rámec, analýza faktorů, regresní analýza.

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ACRONYMS

CIHAF: China International Real Estate & Architectural Technology Fair.

WAWJ: 5I5J-WoAiWoJia, Love my home real estate firm.

Home Link: LianJia, Home link housing firm.

VAT: Value-added Tax.

HPF: Housing provident fund.

NDRC: National Development and Reform Commission.

NBS: National Bureau of Statistics of China.

CHN: The People's Republic of China.

1. Introduction

China mainland is 9.6 million square kilometers, about 1/15 from total world's land area, equal in Europe in addition to the former Soviet Union outside of the total area, China is the third of the world, only less than the Russian Federation (17.075 million square kilometers) and Canada (9.971 million square kilometers). The eastern region accounted for 10.5% in total, the central region accounted for 25.3%, accounted for 64.2% of the western region.

Mountain area are 3.2 million square kilometers, 2.5 million square kilometers of the plateau, the basin is 1.8 million square kilometers, 1.15 million square kilometers of hilly and plain, 950 thousands square kilometers. The most of eastern region is plain and hills, the central region is basin, hills and plain, the western region is mountain area and plateau. The weather in western region is in mountain plateau climate, the daily average temperature is below 10 °C(50°F), it is unsuitable for human residence in long-term. Temperate monsoon climate, tropical monsoon climate and subtropical monsoon climate in eastern region. Temperate continental climate in central region. So eastern and central region is more suitable for people residence in long term.

The reason why China have the contradiction between supply and demand on real estate is the large population. According to the data we learned before that the most people choose to live in eastern and central region. So most population is in eastern region and then is in central region. Find by figure 1-1 and 1-2, the population continue to grow straight upward from 1949 till now, but 1961 because of the natural disasters. In 1950s, Maos' government has adopted the policies to encourage women to have more children in the hope to promoting industrial production conclusively. Named the woman have more children that "Glorious Mother". The most family have at lest 2 children, some families have 5 to 7 children. In 1983, the government realized that the population was becoming a social problem, so the government made a proposal that birth control called 'family planning'. It is said that every family only can have one child and people have to pay extra taxes if they have more children. This policy for birth control still work now. The population in China have rapid growth by this policy till now and the rapid growth of population cause many

social problem one of them is price raise by contradiction between huge population and resource scarcity.

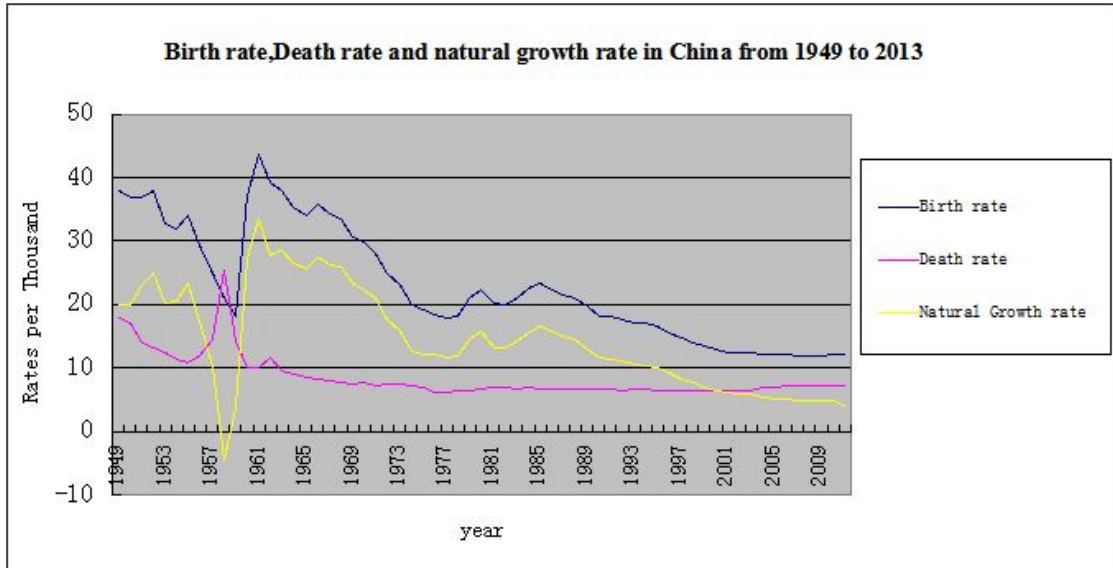
Although, the contradiction between supply and demand on real estate is the the contradiction between population growth and limited land recourse. The people's mind on housing and banking also a very important factor to influence the people behaviors in real estate market.

The another part which is important to introduce here is the Chinese culture. Chinese culture is quite difference with other countries, especially on real estate, housing and finance. Most foreigner can't understand Chinese people's behaviors and consideration on housing and banking.

In China, young people will consider to buy an apartment before they get married. Nowadays, more and more young people cannot afford to buy a new apartment then they consider to rent one or buy a second hand apartment. But the parents especially the parents from girl side will ask the boys family support an apartment, an auto and some deposit, the apartment is the necessary condition. Because parents think an apartment is the indemnification for stable life. The boy's parents also think they should offer a apartment for their children, so the problem on Chinese housing is not only on tangible factors but also on intangible factors such as culture. From the market price of Chinese real estate, people think real estate is the most fixed asset and can increase in value for long term. So many rich and middle class people want to use their unused to buy house of other kinds of real estate. Some rich family have more than 5 houses and apartment. These also lead the real estate market price increase.

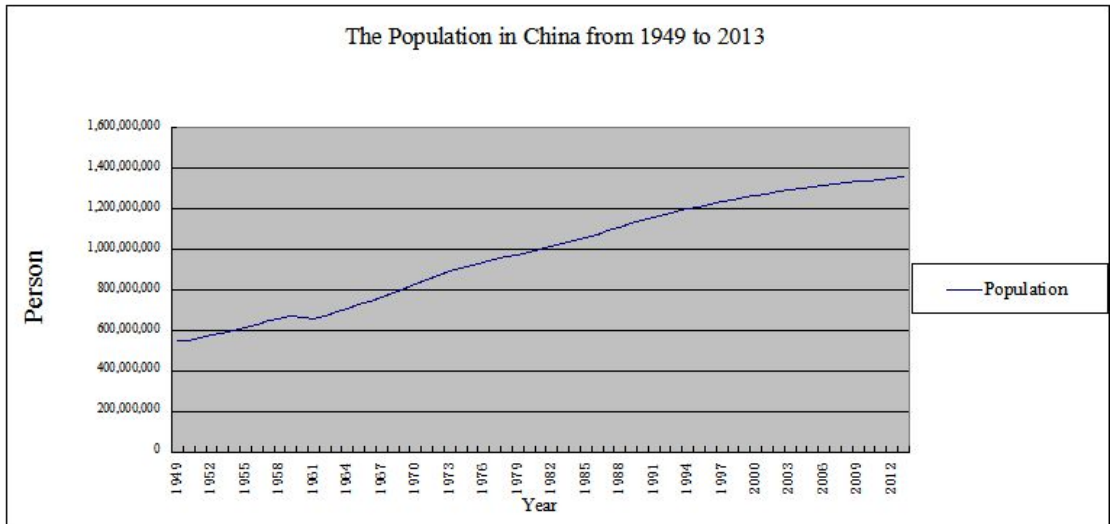
In Chinese culture, people like to save money when people have unused money. The most people in China also don't like loan money from bank, but nowadays young people can easy to loan from bank because the more and more expensive real estate price. Middle age people as the main target group on real estate they still keep the old mind on banking, they want to loan less and less money and pay the down payment as much as possible. This kind of way to thinking on banking, also because of the loan policy in Chinese real estate, we will talk about it in chapter 6.

Figure 1-1 Birth rate, death rate and natural growth rate in China from 1949 to 2013



(Source: National Bureau of Statistics of China)

Figure 1-2 The total population in China from 1949 to 2013



(Source: National Bureau of Statistics of China)

According to the data in figure 1-1 and 1-2 from National Bureau of Statistics, till 2013 there are more than 1.3 billion people in China. The natural growth rate in 2013 is 4.02 rate

per thousand. In nowadays, China still have huge amount of population growth in every year, it is a big problem on limited land resources.

2. Aims and Objectives

The aim of this diploma thesis is to understand the legal framework of real estate in China, especially the land policy and the housing policy in China. Learn the presentation of the situation on housing in China and the eastern coastal area of China which is the main real estate and housing market. Analyze similarities and differences on composition of price between Beijing, Shanghai, Guangdong and other main markets in eastern coastal area of China. Find out the main factors to influence the price of housing in eastern coastal area in China by economics model. By the result of modeling will find which factor can impact on the price of housing and real estate so that government can formulate the relative policies and laws referring to these results. Use the method of macro-control to influence the market of real estate.

3. Methodology

Literature review is the main study and analysis method. Literature review can help people to summarize the analysis and result from previous. Being more professional and doing clearly research by literature review, can make the author to understand more comprehensively about the theme and subject. By literature review, can learn the policy and developing trend on real estate in China, at the same time, to help author find the main factor to influence the price of real estate then helping the model to make hypothesis .

Comparative analysis and econometric modeling are used as the main methodological tools. The price of housing in China has different level in different area, therefore this thesis use comparative analysis to compare the difference between Beijing and the main city in the Eastern coastal area of China. The primary source of data is from ‘National bureau of statistics of China’.

Set model of the main factor of housing in China, use multiple regression analysis to find out which is the most important factor to impact Chinese real estate, the similar and difference on composition of price between Beijing and other main city in the eastern coastal area of China.

4. Research Question

What is the basic land policy in China ?

What is the current situation and problem on the housing in China, especially in the eastern coastal area of China where is the main market on real estate?

What are the main factors to influence the price of housing in China?

What is similar and different on composition of price between Beijing and other main city in the eastern coastal area of China ?

What approach can help to solve the problem and improve it?

5. Limitations

Most of eastern and central region of China are Plain and hills, they are suitable for the growth of crops and human habitation. Western region has more plateau and mountain area. Eastern and central region of China is more suitable for human habitation than western region of China. By the reason before, western region do not have contradiction between huge population and resource scarcity on real estate. Chinese market in this paper will not include western region but eastern and central region.

The data from National Bureau of Statistics can search from 1949 to 2013, due to the result that data in 2014 only be collected after March 2015. The data before 1949 was not able to be found. The data base collect after the founding of New China in 1949. Some of the cities or areas only have data in the past 10 to 20 years.

The data from housing enterprises and real estate enterprises are from Lianjia housing company and Woaiwojia real estate company. The price of housing and real estate are the market price but most of the price have discount in real transaction. That is only for consultation.

6. Literature Review

(1) Situation Analysis and Development Strategies of Chinese Real Estate^[16].

Chinese real estate development, from the first time to try the land reform in Shenzhen has lasted two decades. Today's macro-control in China's real estate, not only to solve the "housing difficult" problem of Chinese residents, but also to prevent the Chinese economic growth from becoming overheated and reducing the risk of inflation is an important task.

By housing benefits to the housing market gradually, with the fundamental reform of the national housing system, housing conditions of urban residents in China has been greatly improved, to the "everyone has their own home" the grand objective has taken a solid step, the real estate industry has become a pillar industry in China's economy. However, in full recognition of our achievements, we also have to confront with the currently existing Chinese real estate development problems. On the basis of analysis about the current situation of China real estate, try to provide some concrete measures for the healthy development of the real estate industry. Government should resolutely control premium rising trend.

(2) Development status and trend analysis of Chinese real estate^[17].

This paper discusses the development of the current situation and development trend of Chinese real estate market problems, the paper summarizes some of the data, especially from the China real estate market since 2004 into the 21st century, after which summarizes a number of law, in order to make future trends , has a certain significance.

In the 21st century, Chinese real estate market has become increasingly popular, and created a wealth of miracles one after another, in many areas, real estate and even become a pillar of the local economy. Under such a big trend, people have flocked to the real estate field, regardless of what kind of work done before, as if once people can enter the real estate assets to be increased by double. However, after years of blind hot real estate market bubble is increasing, the country and the government has also been aware of the problem, some control measures are rolled out, the real estate market finally began to return to rational. So what is the future trend of Chinese real estate industry? After the real estate business is no longer profits, whether the real estate market will completely collapse or

gradually decline as some people predicted ? This paper argues that thinking on this issue will contribute to the future development of standardized real estate market.

From the historical development of the developed countries, the real estate market for the economic development of these countries have made great contributions, but also have a lot of real estate and slip case, like decade of economic recession in Japan, the main reason is the real estate foam, including the global financial crisis, also triggered by the American real estate companies and banks, then the China real estate market bubble is an issue that people are most concerned about.

The data in this paper demonstrated show that Chinese real estate market will still be more room for development, thus we can estimate Chinese real estate market has entered a particular stage of development, the real needs of the real estate market has considerable room for upgrades, the Chinese real estate market in the future the total period of time will remain growth-oriented development period.

China has entered a new century, building a moderately prosperous society in the development stage, the disposable income of urban residents will continue to grow faster upgrading of consumption structure, which will improve the housing conditions of growing demand. At present, Chinese urban per capital housing area is in a period of rapid growth, which increased the demand of housing, stimulated the real estate market actively. Currently the uneven urban housing problem remains serious, income strata in the lower housing difficulties still exist, it should speed up structural adjustment of housing, expand affordable housing construction efforts, accelerate residential development, stimulate demand real estate market. Indeed, Chinese real estate market is still urgent need to regulate, but we have reason to give it a good development platform and space, I believe that in the near future, it will eventually grow into a mature market and ultimately to the world.

(3) Chinese Real Estate Industry Status Quo, Problems and Causes^[18].

China investment in real estate remains current rapid growth, high prices and other key issues constraining the healthy development of real estate, the impact of the acceleration of urbanization process in China, improving the people's living standards, building a harmonious society. Lack of macro-control real estate market; real estate market supply

and demand information asymmetry, shortsightedness financial interests of the Government and the developers of links, China investment channel is narrow and poor quality of China investors and other factors are the main factors affecting the healthy and stable development of Chinese real estate .

Chinese current real estate of the main problems existing in the process of development .

Real estate supply and demand is very prominent. By the supply side, the land supply enough influence major cause of real estate, but on the demand side, the per capital disposable income, urban population and housing prices affect the main reason enough demand for real estate.

Chinese basic situation is a little sleepy balanced regional economic development, the particularly large difference between the eastern and western region's economy.

Supervision and coordination of the real estate market regulation system, the system needs to be deepened reform of housing.

China real estate in recent years is hot, originated in Wenzhou(the city in eastern coastal of China, near Shanghai), then spread throughout the country, causing nationwide tangible asset bubble. The reason is that Chinese investment channels are limited when the people have the money without other investment channels, they will habitually buy a house, it is important to encourage real estate prices push hands.

(4) China Real Estate Industry Report^[19].

Since the beginning of 1984, real estate has gone through three development period and two low periods. From 1984 to 1988, which is a development period, about five years; 1989-1990 is a low period; from 1991 to 1994 is the second development period; 1995-1997 is a low period; Since the beginning of 1998 the real estate industry has entered a new period of development. The particularity of this real estate cycle has three aspects: at first, the frequency of the real estate cycle is about five years of development, two-year low, by the way it is 7-8 years for a period, and with the market and the industry matures this cycle has extended the trend; second is Chinese real estate cycle, recession, and trough relatively short period of growth and prosperity, while relatively long period of time,

which shows continued strong market demand for such characteristics, it significantly different the total amount of excess real estate in countries and regions; Third, the relationship between sales growth and investment growth analysis, sales growth directly affects the growth of investment.

Many real estate industry and the national economy are closely related, with strong industry relevance, such as steel, cement, wood, glass, plastic, household appliances and other industries are closely related to the real estate industry, according to statistics, Chinese annual steel 25 %, 70% cement, 40 % wood, 70% and 25% glass plastic products were used for real estate development and construction. Therefore, the development of real estate industry promotes the development of these industries, the ratio is 1: 1.17 per 100 yuan of real estate sales can drive sales of 170 yuan in related industries. In addition, the development of real estate industry can create some new service industry, such as property management, real estate appraisal, real estate agent and so on. Because the real estate industry has a strong industrial relevance, and therefore a high contribution rate of the real estate industry to the national economy, the contribution of the real estate industry to the national economy was 1.5 percentage points, meaning that the current GDP growth of 8% speed, 1% -1.5% is contributed by the real estate industry.

(5) An Empirical Study on the Interaction Between Real Estate Prices and Macro Economy ^[20].

With a panel data model analysis of a data set covering China's 31 provinces from 1995 to 2006, the author found that the real estate prices were significantly affected by China's interest rates and inflation rate, and fundamental macroeconomic variables such as supply of real estates and income determine the prices of real estates in the intermediate and long run. The prices of real estates evidently affected macroeconomic stability, increasing real estate prices tended to stimulate the total investment and total consumption, and investment in the real estate sector had significant effects on total investment. Therefore, China should stabilize the real estate prices in order to stabilize its economy and promote economic growth.

In the real estate market-oriented and the reform of housing system and the deepening of the process of real estate, prices of real estate as the representative of the relationship

between the asset prices and macroeconomic increasingly is getting close, formation the interaction of mechanism. Macroeconomic fluctuations can significantly affect the volatility of real estate prices, especially on interest rates and inflation are significant. This shows that the real estate as an asset, its price and interest rates quit close to each other, while its volatility showed significant positive feedback trading phenomenon. The real estate as an ordinary consumer goods, the price volatility on real estate still depends on income, price of other goods, real estate supply and other basis factors.

The fluctuations of real estate price will affect the overall long-term investment in the community, which is mainly due to rising real estate prices, so that developers profit is expected to increase, thus increasing the real estate development and investment. The real estate investment as part of the total social investment, on the one hand will increase the total direct investment in the community, on the other hand will lead to investment in other related industries. However, in the short term, the impact from real estate prices on the total social investment is not significant, indicating that investment behavior is a longer-term decisions, not influenced by short-term price fluctuations.

Real estate prices have been through the "wealth effect" affecting the total social consumption, regardless of all have a significant impact on China's society overall consumption, no matter in the short term or long term, real estate prices. Real estate prices rise on total society consumption has significant role in promoting, it also means to promote domestic demand have a significant positive effect by the stable real estate prices.

In short, the real estate as one of the main assets of households and businesses, its price volatility will be transmitted through the consumption and investment to the macroeconomic, and macroeconomic fluctuations will also affect real estate prices, so that no matter what causes fluctuations in real estate prices will eventually affect to macroeconomic stability, so to maintain growth in the current macroeconomic policy orientation, stabilize real estate prices is an important economic tool.

(6) Real Estate Tax, Market Structure and Housing Price. 1994-2010 China Academy Journal Electronic Publish house ^[21].

The paper developed a partial equilibrium model of housing and real estate flow market and investigated the relationship of the tax on real estate and housing price in the scenarios

of perfect monopoly and perfect competition. The model documented that the imposition and elevation of real estate tax would make housing price decline under different market structure. The greater the degree of monopoly was, the housing price would be higher and the impact of real estate tax on housing price would become greater. By using the data of 33 large and medium-sized cities in China from 1996 through 2008 the paper found that the influence of market structure upon housing price was greater than that of real estate tax. One percent increase of real estate tax would lead to 0.03% decline of housing price, but one percent increase of Lerner index would generate 0.16% augment of housing price. Accordingly, the property tax could not curb the inflated housing price effectively in China. More importantly, the policy-makers were supposed to pay great attention on market structure to mitigate the monopoly in the housing market.

(7) Impact of the Real Estate Fluctuations on the China's Macroeconomics ^[22].

The fluctuations of real estate industry affect the macroeconomics through many channels. We apply the cointegration model and VAR model to analyze the dynamic effects of real estate industry on macroeconomics, and the proved results as follows: (1) the fluctuations of real estate price have negative effects on the China's total consumption, contributing at least the 215% of the variance of consumption; (2) the fluctuations of real estate investment have significant positive effects on the GDP growth, proving that GDP growth rate rises 0.1181% when the growth rate of real estate investment increases by 1%, and 1 unit impulse of investment will push the GDP reach the greatest growth rate at the 4th season and declines slowly, which means the fluctuations of real estate investment have long term effects on the growth GDP; (3) the fluctuations of housing price also affect the inflation rate, and in our empirical analysis a 1% increase of housing price will cause the inflation rate to rise by 0.1118%; however the reaction of inflation rate to the impulse of house price's fluctuations are small and slow, showing that inflation rate reaches the maximum at the 8th month and then turns to decrease, even negative and instable.

Fluctuations in the real estate market will cause greater volatility in the macro economy. In terms of policy, in order to maintain macroeconomic stability and to circumvent China's macroeconomic risks, must pay more attention to the stable, healthy and sustainable development of China's real estate industry, government and the real estate firm should take the following measures:

Firstly, pay attention to monetary policy and proactive efforts and take counter-cyclical monetary policy, in order to avoid big ups and downs in house prices. In occasion of soaring housing prices, should be taken to avoid the formation of large real estate bubble; In occasion of gliding house prices, to guard against excessive falling house prices, In occasion of falling house prices, falling house prices to guard against excessive, large swings leading to real estate risk conduction to the financial sector. In addition, the government should increase efforts to control the real estate credit, strict implementation of this policy, and should differ for house prices and residential investment fluctuation difference and influence of various factors on the basis of the region, taking local conditions, discriminatory policies to avoid the country range across the board, so as to achieve effective control over the prices, residential investment growth situation.

Secondly, to ensure the premise of sustainable development on the real estate, at the same time to ensure the stability of the financial sector. Therefore, the need to develop a diversified real estate finance market, expand financing channels for real estate, and actively develop and improve the real estate investment trust, to provide comprehensive financial services on real estate development, sales, leasing and management.

Thirdly, consideration on the real estate industry as the leading industries, and its push forward and backward pulling effect is more significant, can foster the development of many industries, so as to promote economic growth. Therefore, the relevant departments to begin to adjust long-term industrial policy for the real estate development, and actively forming a real estate-centered, the chain on various industries in coordinated development.

Fourthly, on the basis of these policies, we should consider the structural contradictions of real estate and other real estate market issues, proceed restructuring, further implement affordable housing, low-rent housing and other kinds of land supply. Implement the proportion of small and medium sized apartment and housing. Provide appropriate affordable housing, and ensure the supply of housing from the source to achieve with Chinese characteristics, housing construction and consumption patterns through restructuring.

Fifthly, to cultivate and develop the secondary housing market. Because the market for second-hand housing restructuring, reduce prices, have an important role to stabilize prices of real estate.

Last but not the least, local governments should avoid excessive real estate industry's "blood draw" in the supply of land, collect taxes, environmental protection, etc., to avoid the land become a "second fiscal" to avoid irrational prices rise, so that the loss the power of sustainable development on real estate.

In short, we should try to avoid overheated real estate market and real estate bubble generation, meanwhile, attaches great importance to the real estate credit risk accumulation and avoid the outbreak of the real estate crisis and the emergence of the financial crisis.

6.1. Current Situation on Chinese Housing

In nowadays, the prices of real estate in China are much higher than the expectations of consumer, but overall, the vast majority of urban housing is far lower than the actual sales and transaction price levels.

From a macro operation in 2007 China's national economy and social development to examine, showing rapid economic growth, improve quality and efficiency, enhance coordination structure, increasing people's affordable good momentum of development. At the same time, investment growth is too fast, and too much money and credit loans, foreign trade surplus is too large, energy conservation situation is quite grim, five potential risks, such as the expansion of consumer prices cannot be ignored.

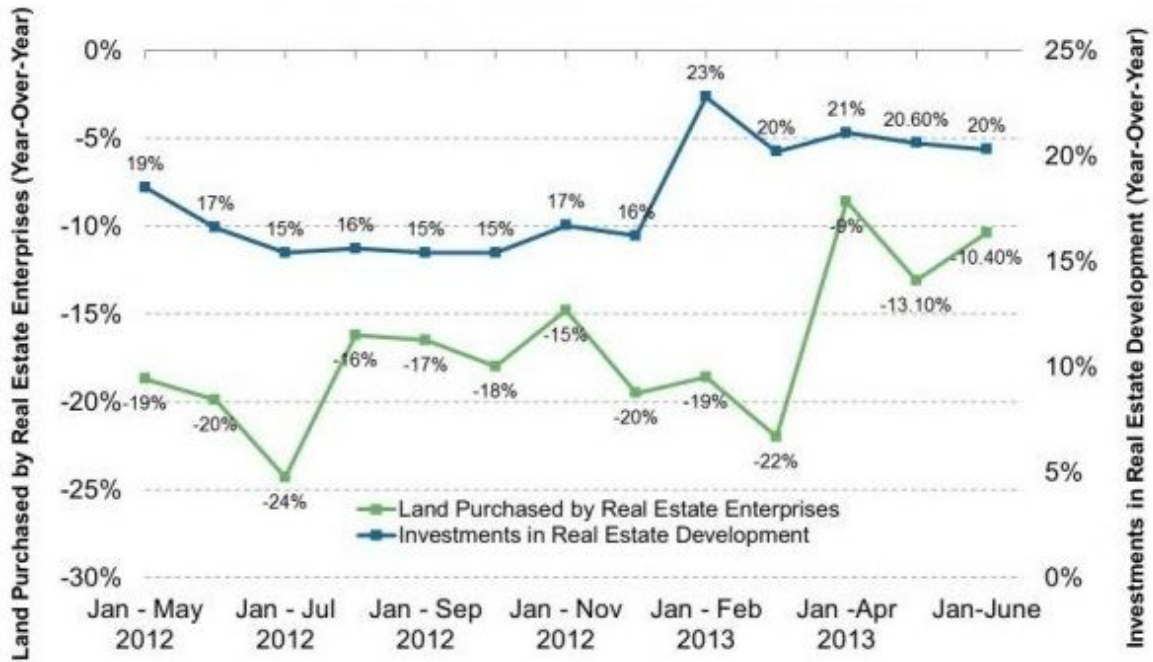
Therefore, Chinese current real estate market comprehensive regulation, rectification, but also to prevent China from becoming overheated economic growth, lower inflation risk is an important task.

While the national real estate development and investment growth overall decline in 2012, but in 2013 there is an upward trend from January to February; while the national real estate development company purchased the land area of growth from 2012 has always belonged to the type of negative growth and negative growth rates higher and higher Although in last August, this trend has slowed down, but in overall it seems the entire land

acquisitions are still in a relatively weak state. The data in this paper indicated that the real estate industry is in a warmer state, in addition to land acquisition, whether it is residential, office, commercial space business the sales area, sales volume in the construction and completion of an increase in the volume trend.

This strongly suggests that although national policies continue to combat real estate, but real estate is still reply trend, although not return to the early years of real estate profits circumstances, but housing prices are still high.

Chart 6-1 China Real Estate Investment Growth



(Source: National Bureau of Statistics of China)

From Chart 5-1 China Real Estate Investment Growth, the land purchased by real estate enterprises is negative growth in 2012 and 2013, it means that less and less land be purchased by real estate enterprises, the supply of real estate will be reduced in the future. In January 2012 the land purchased by real estate is decreased by 19%, in July 2012 decreased 24%, in December 2012 it is decreased 22% and in January 2013 it is decreased in 9% till June is 10.40% decreased.

Move to the investment in real estate development, from January 2012 to January 2013 the investment in real estate development were kept in small changes between 19% to 15% increase. From February 2013, the investment in real estate development increased 23%, and then keep around 20% rate of increase. That is means more and more real estate developed during 2012 and 2013, and these kind of situation will maintain in the future, at least in the short term.

6.1.1. National Land Finance

Land Finance consists of two parts. Firstly, land-related taxes, such as arable land occupation tax, sales tax, land tax and VAT on real estate and construction. Secondly, land-related non-tax revenue for government, such as land rent, land leasing, new construction land use fees, land reclamation fees, new vegetable plot construction fund and so on. At present, the main stress is placed on local government land transfer, transfer payments accounted for the proportion of local fiscal budgetary revenue reached 45%, a few local even more than budget revenues. Government to sell the land to obtain non-tax revenue transfer, enterprises, especially the real estate business has been engaged in the development of land, but also increase government revenue in the real estate and construction aspects. For local government, it seems to be a virtuous cycle, but in this cycle, the source is the transfer of land use rights, to maintain this cycle, we must continue to sell the land. Visible, land expansion and financial mechanisms are mechanisms requisition of land.

According to Chinese agriculture policy, China must conserve 1.8 billion hectare red line for arable land. At the same time, from aspect of the land finance this kind of local policy does no good for in long-term development.

In fact, land transfer fees is from the land use right price in period of years, that is government collect the rent for several years from real estate firm by one time. And the rent for enterprises means a concentrated paying for many years in the future that is belong to future profits, are Liability operation. In reality, many companies pay land transfer by bank loans, the nature of liabilities at a glance. Even with its own funds to pay for, is still essentially debt. If companies are in healthy status, they have stable profit then can gradually pay off this debt. On the other hand, if the firm is in poor management or

bankruptcy, they cannot pay off this debt, such as business interruption reproduction, this will eventually translate into a bad debt for bank, then it will to become a social problem.

Housing is a vital part of real estate, housing firm sale housing means the liabilities of the land use rights are transferred out at the same time. Perhaps the housing firm even get a small fortune, the one who will take over this debt is not housing companies, but consumers. General wage earners have to pay the price by bank loans but the nature is debt.

Consumers use the next few years or even decades of income, in order to gradually repay the debt, personal and household consumption power, living standards will be changed. Periodically, if the result of turn of events the consumer will become insolvent, not only individuals and their families will be misfortunate, but also will increase the bank's bad debt provision, eventually become a social problem. From the perspective of whole society, the amount of the government revenue from each obtained by selling land have a business or personal liability be correspondingly. That is, the government engaged in construction with the land transfer, land based business or personal overdraft future earnings as a precondition. It is not difficult to make the following judgment: the so-called land finance, is essentially a society relying on borrowing against future earnings development to seek the immediate development. Figuratively speaking, this is "living beyond."

6.1.2. Current Situation in Eastern Coastal Area

The eastern coastal area has 14 province (such the white area from Chart 5-1): Beijing, Liaoning, Tianjing, Hebei, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Hainan, Taiwan, Hongkong and Macao. Taiwan, Hongkong and Macao will not be a part of the research because these three provinces are in the different political systems. China have 'one nation, two policy', these three provinces have their own law and individual market are different from the main land.

There are excellent conditions for economic development in the eastern coastal area. Firstly, the eastern coastal area is close to Pacific Ocean, there are more than 60 ports, which contributes more convenience in transportation. This factor can help build more international trade and business. Secondly, the most famous university were set up in these provinces, such as Beijing university, Tsinghua University, Renmin University of China,

China Agricultural University and so on. The human capital in the eastern coastal area is higher than other area. The people in the eastern coastal area have higher education level and more new technical skills. Thirdly, the eastern coastal area is in plain and some hills, this kind of terrain is geographically good for building. By these reason, population in the eastern coastal area is also higher than other area. The contradiction between population and land is more obvious.

Because young people can get more chance on education, job and they also will get more income, so young people prefer to move to the eastern coastal area. For example: in Beijing the local people (birth in Beijing even their parents and grandparents birth in Beijing) is less than people from other province. Beijing, Shanghai, Guangzhou, Tianjin, Jiangsu is the top 5 city which are have more people are from other province. It is lead to traffic jam, pollution, shortage of resources and some other social problem. The quality of life in these province are in rapid decline.

In fact, the eastern coastal area have many problem now. The time in traffic jam is getting longer and longer. For example in Beijing, only the main road at 7:00-9:00 and 16:30-19:30 are the traffic jam time in 5 years ago, but nowadays, almost any time any place can traffic jam taken place in Beijing. There have no space on metro and bus, even some people cannot get on the metro or bus during the morning rush hour and evening rush hour. People in these kind of environment is easy to get into the irritable emotion then cause argue even fighting and other violent behavior.

The pollution in the eastern coastal area also in serious, everybody can learned from news that Beijing has very huge problem on air pollution and water pollution. People in Beijing usually with mask and other equipment on facing the air pollution, in particular during spring and winter. The air pollution in Beijing is because of the coal. The more people in Beijing the more coal will be used in Beijing. On one hand, the way to improve environment is to find new energy, the other hand is limit population in Beijing.

Chart 6-2 People Republic of China in Eastern, Central and Western area.



(Source: China Tourist Maps)

In China, 43% of land are mountains and hills, 26% are plateau, 19% are basins and the plains are 12% in total land ¹.

From table 5-2, there are 1288 person per kilometer square in Beijing, 3809 person per kilometer square in Shanghai, 774 person per kilometer square in Jiangsu, 592 person per kilometer square in Guangdong².

1. Data Sharing Infrastructure of Earth System Science

<http://www.geodata.cn/Portal/metadata/listMetadata.jsp?category=175&isCookieChecked=true>

2. National Bureau of Statistics of China.

<http://data.stats.gov.cn/search/keywordlist2.jsessionid=058803F0C7EB5988BCAF3B87FD3E4E70?keyword=%E4%BA%BA%E5%8F%A3>

For example, the developed country like the Czech Republic is 131 person per kilometer square³. We can found that Beijing has almost 10 more time person in per kilometer than Czech Republic.

Table 6-2 Acreage, Resident population and Per Capital area in Chinese real estate main market city (2013)

Province	Acreage	Resident Population (The end of year)	The per capital area
Beijing	16,411 km ²	21.15 million	1,288 person/km ²
Shanghai	6,340.5 km ²	24.15 million	3,809 person/km ²
Jiangsu	102,658 km ²	79.39 million	774 person/km ²
Guangdong	179,800 km ²	106.44 million	592 person/km ²

(Source: National Bureau of Statistics of China.)

7. Legal Framework and Land Policy of Housing

On December 9th, 2009, the State Council executive meeting decided that the exempting time on transfer of individual housing sales tax recovery from two years to five years, other housing consumption policies continue as before. December 14th the executive meeting of the State Council pointed out that the integrated use of land, finance, taxation and other means to strengthen and improve the regulation of the real estate market, to curb the

3. Baidu Baike.

http://baike.baidu.com/link?url=cOG_IGGu2GHS4I0ifCIMIT4_Q1oU8_q1XkdFVKGw7K-PXDZCFbBf91UUKj8CnNRpiGh8b4zeCQQq6ROZcVNi_

momentum on housing prices in some cities. On December 17th, the Ministry of Finance, the Department of Homeland and other five ministries introduced to the notice of further strengthen the management of land transfer balance of payment (later called: the notice). They clearly defined that when developer want to get the land they need pay for the land transfer price in installment payment term less than a year. special items can be fully paid agreement within two years, the first payment cannot less than 50% of all land transfer paragraph. If the developer is in arrears the payment, they are banned from participating in the new land transfer deals.

The essence of the notice is to unify and generally improve developer's down payment, it is resulting the fund Chain for developer getting tensions. In order to curb speculation and hoarding behavior in the real estate business. China has a number estate developers are hoarding land, selling land, but not developing land, these kinds of developers accounted for about 1/3, hoarding land cause supply and demand in imbalance. In recent years, it is leading to a sharp rise on housing prices in China. And in terms of the compliance and legitimate business enterprises , it has less affected.

In general, there are two factors can affecting the price changes on real estate, the one is supply and demand, the other one is the change of cost. As land policy cannot only affect both supply and demand, but also on directly determines the development costs, which in the real estate market regulation, in particular of obvious on real estate prices.

In China, only the central Government and department can enactments of the act and law on finance and others. The local government can issued on local land use policy and population control policy. But the local policy should followed the Constitution's Amendment Act of 1988 and state law.

The land policy in China show that total arable land cannot less than 1.8 billion acres which will keep the national food security. So the most arable land can't use for real estate investment and build any housing. The people who have the right to use arable land cannot sell the land, they can only use the land or leased out the land. The land after leased out must used on cultivate as before, but the user can change what kind of crops or plant to be crop.

7.1. National Legal Framework and Land Policy

7.1.1. The Land Policy as a Role of Regulation on Supply and Demand in Real Estate .

First, look at the impact on the supply of land, real estate as a factor of production, in real estate market regulation, mainly in the supply side, including the terms of the total supply, supply structure, supply rhythm, spatial layout. For example, by adjusting the land use planning and adjustment of the quantity of land supply, thereby regulating the amount of investment and the supply of real estate; by adjusting land supply plan, can adjust the land supply structure, thereby regulating the supply structure of the entire real estate market; by land adjust the supply plan, also can adjust the tempo of land supply, thereby regulating the real estate of new supply rate and listing rhythm.

Meanwhile, the land directly related tax, financial policies can also participate in the regulation on the supply of real estate. In the land tax policy, including three aspects: obtaining tax, ownership tax and turnover tax. For example, land acquisition tax increase, it will increase the cost of land, and then raise the prices; increased ownership tax, it will make the real estate development companies tend to sell the land, thereby increasing the supply of land on the market; increase in turnover tax, it is easy to make developers tend to retain the land, idle land will be increased, and the quantity of supply on land in the market will be reduced. In the land of financial policy, currently in China mainly for land mortgage policies. Relaxation of land mortgage policy restrictions, will make the development of corporate loans increased, so that the increase in real estate development; land mortgage tightening policy, the development of corporate loans will decrease, making the reduction of the amount of real estate development.

Secondly, on the impact of demand, when the land becomes a object on speculative "hype", land policy can also participate in the regulation of demand. If you relaxation the land transfer policies that allow free transfer of the land, then make "hype" to increase, resulting in a shortage of land on the market, prices will rise rapidly; if strengthening land transfer restrictions, suppression "speculation", it will reduce the demand for land, stabilize prices raising .

7.1.2. Land Policy as a Role in the Regulation of Real Estate Development Costs

Practice has proved that, by adjusting the policy on land price can regulate prices in directly. As an important part of land prices, land prices fluctuations will affect the prices of price of real estate and housing. From Chinese current constitution of land price, including acquisition costs (cost on land compensation and resettlement and relocation costs), development costs and government revenues (land-related taxes and net income of land). These three constitute roughly one-third of each.

Acquisition costs and development costs which presents a certain rigidity characteristics, little room for regulation, and the government has a certain portion of the proceeds is conditioned space. For example, choose a different way of land transfer, it will form a different price. If by "auction" means public sale, the price will be increased significantly; and by way of the agreement to sell, the price will be lower. In other example, when the price of land in unusual situation, direct control the transaction price will affect the change rate on real estate.

(After the land price, the other important part is the price on real estate development such as Steel, cement, wood and other raw materials on real estate.)

7.1.3. Land Policy in China

Under Chinese current tax sharing system, the local government is facing the dual pressures of financial and political achievements. China is currently the monopoly of local governments to implement land transfer system, many by "land finance" concept led the way through a number of local governments to raise land prices (such as the implementation of "Hungry Policy") in order to compensate for the lack of budget revenue, ease the financial pressure, but it might push up the price of residential land and housing prices.

Furthermore, in order to take advantage of the investment, many local governments depress the price of industrial land, residential land prices raise to compensate for the opportunity cost. Some research shows that in the case of controlling for other factors, the

more dependent on the "land finance" of the city, as well as low-cost transfer of industrial land carried out by the stronger cities attract investment, the higher the degree of limited supply of residential land, residential pressure on land prices is greater. However, the above acts conducted by the local government from land market to the residential market effects on the statistical significance is insignificant.

In recent years, Chinese real estate market is getting hot, housing prices in rapid increase. There are lot of idle house cannot be sell, but also ordinary people cannot afford to buy a house. According to this situation, the Chinese government has issued a series of policies on real estate and housing.

From 1949, the proprietary of housing are not belong to resident in urban area, the resident can only get 70 years use right. From 1949 till 2014 is 65 years, the first group of people got the use right of there house and still living there now, they face to change real estate license to get new 70 years right to use, but they should pay some tax on change the license. People who sell the house only sell the right to use.

The land policy in China, show that total arable land cannot less than 1.8 billion acres which will keep the national food security. In rural area, the right for land and house is belong to local government, if someone want to sell or rent the land where they use or live should get the permit from local government. The land be sell or rent cannot change the way to use, for example: the arable land can't be used like building factory, housing or in industry, it can only in arable land (but owner can control what to crop).

So the most arable land can't use for real estate investment and build any housing. The people who have the right to use on arable land cannot sell the land, they can only use the land or leased out the land. The land after leased out must used on cultivate as before.

7.1.4. Land Use Right in China

From the land ownership and land use rights ownership are separated, transfers of land use rights have accounted for most of the business activity in the primary real estate market since 1998. The Chinese Land Administration Authority has established an administrative practice of granting permission on behalf of the government to prospective land users willing to pay the required land transfer fees.

It is a significant step that amendment to the Constitution in 1988. From this amendment, the land use system had not been established base on leasehold. In the past, the most Chinese organizations and business company were assigned free property for use. Due to this reason, it is still operated on the two sides of land use system. On the one hand, they have to pay for the use of the required site by new private investors. On the other hand, old owners who are already in possession of the rights to use will still control the land obtained free use right from the State. Both these two sides owners may transfer their rights to other parties under certain conditions. Although the ultimate landowner is the State, and it is entitled to claim part of the profits from the owners who get free land use rights, a lack of binding legal provisions to force the State to make these claims has exempted owners from being asked to do so.

Under the Constitution's Amendment Act of 1988, land use rights become divisible from land ownership, that the private ownership of land from not possible in China to be possible then the using right of land to be privatized . A system to be adopted in China that can registering both land use rights and ownership of property. must be submitted applications for registration to land and housing administration departments of local government bodies then by the verification, the certificates are issued by the government body. Moreover, through the Improving Land Registration, the State Administration of Land has recently issued a circular on Implementation of the Administration of Urban Property Law, which specifies that registration should be applied for in the following situations:

1. Pre-sale of commercial premises
2. Granting of a lease
3. Change of land conditions
4. Obtaining land use rights by way of granting or allocation and building of houses on the land for real estate development
5. Mortgage of real estate

The State Land Administration Department is the regulatory authority responsible for overall administration of the State's land. All the land has to be registered and recorded by

the State Land Administration department. Conversely, the department issues a land registration certificate for entitlement of some specific use. There has no rights can be acquired from the primary market or further traded on the secondary market unless the site has been granted this kind of certificate. To obtain these rights, land users need to apply to the department for approval. Thus the department runs the most significant work in regulating land use activity in both the primary and secondary market.

7.2. Land Policy in Eastern Coastal Area of China

Land policy and real estate policy in the eastern coastal area of China is under the Constitution's Amendment Act of 1988. The local policy based on actual situation to help real estate and housing market.

Since 1996, Chinese government issued the <General Rules for Loans' Order No. 2, 1996 of the People's Bank of China>⁴ that is include the first rule for loans' order on real estate especially on housing.

In March, 2005, the down payment of personal mortgage from 20% increase to 30% that is for limited the purchase volume of housing and real estate. But this policy was not really useful in long-term.

On September 27th, 2007, the minimum down payment of the second apartment was increased to 50%. Loan interest rate went up to 1.1 times. This policy in order to limited middle class group people from buying the second apartment for investment, this kind of investment can increase the market price on housing. From this policy we know that the government control real estate market and housing market by increase the purchase cost. On the other hand, this policy only limited the group have some spare cash to buy the second apartment, but not the one who are rich enough that do not need loan money from bank (most rich people in China have at least 2 houses or apartment).

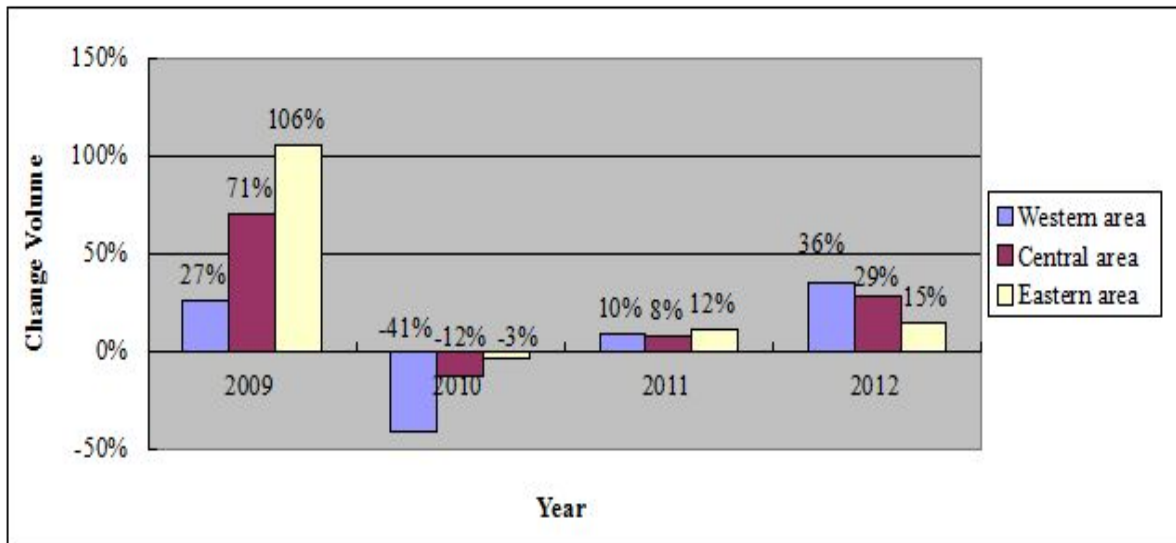
⁴ The People's Bank of China, Legal Affairs Apartment. <General Rules for Loans' Order No. 2, 1996 of the People's Bank of China>

On June 10th, 2008, government levy the individual income tax on company to purchase real estate for employee. In 1949, company or department built dormitory for there employee, people can got an apartment for free when people got a job, the employee can got the housing license when the employee work for more than 5 years or retired. About 10 years later more and more company not only belong to the government but also became joint venture, private and other kind of company, people can buy an apartment in a little money, company built and paid the most part of apartment. Till now on, still have some department and company will give a discount on apartment as a workfare. By this kind of system some leader in company or department they allocated the house and apartment of gerrymandering, some manager and their family got many extra apartment from this system.

By the reason before, government levy the individual income tax on company to purchase real estate for employee. More and more company and department cancel this workfare system. Nowadays, company and department use HPF (housing provident fund) as a workfare. HPF is an amount that people save 6%-8% from income and the company will save the same volume of money every month. People can use money from HPF only on housing purchase.

On July 14th, 2008, small property real estate cannot have homestead certificate. In rural area, when people face demolition and expropriation that is different from urban area. People in rural area cannot only get money for compensate but also a new apartment in the same proportion as their old house. The people who live in rural area can get small property of the given apartment. The small property housing can be rented but not for sold. Government try to use this policy separate housing market and compensatory housing.

Chart 7-1 The Change Volume of Housing Turnover from 2009 to 2012.



(Source: China Index Academy)

From Chart 6-1 The Change Volume of Housing Turnover from 2009 to 2012. No matter which area it is, after the negative growth in 2010 and a small increase in 2011, in 2012 the residential volume compared with the same period in 2011 appeared a significant rise. Although the increase still has large distance compared with 2009, but already the highest level for nearly three years which cities are in the eastern coastal area had turnover rose in 36%, the most significant recovery efforts, 9% point higher than 27% in 2009.

In 2010, the minimum down payment is 30% on the first apartment which the gross area more than 90m². Limit the remote purchase housing in Beijing, Shanghai, Chongqing and the other main real estate market. The remote purchase housing mean people who buy an apartment in Beijing, Shanghai, Chongqing and the other main housing market are not the residents in these cities.

People in China have their local ID card according to the place they birth. People cannot have universities entrance examination and retirement benefits in other city. Especially in Beijing, Shanghai, Chongqing and the eastern coastal area where have the most famous universities and higher level education quality. More and more people want to move to these eastern coastal area for study, work and live. Thanks to these, the eastern coastal area get much stress on population, then impact on housing market even market for real estate.

That is why Chinese government decide that limit the remote purchase housing in Beijing, Shanghai, Chongqing and the other main real estate market. For example: people work in Beijing who is not the local people in Beijing, after continuous 5 years work in Beijing, get the certification on paying tax or social insurance.

In 2011, expect the minimum down payment on the first apartment which the gross area more than 90m² is 30%, that the minimum down payment of the second apartment is 60%. The third apartment will not issue commercial loans.

By the policy shown above it is not difficult to learn that Chinese government use these policy for limit middle income level group to buy a big apartment and the second one. For the rich, they do not care how much down payment should they pay and how much lending rate for housing. By the way, the most population in China is the middle class that the policy from Chinese government is helpful and useful to a certain extent.

Personal research

8. Price of Real Estate in Eastern Coastal Areas in China

At the beginning, there has a special version situation on housing industry in eastern coastal area. The eastern coastal area in China have big contradiction between population and land that why the structure of housing are different from other region and country. In the eastern coastal area the most kind of housing in city place is apartment, only rural area has villa and other kind of luxury housing. In the central area and western area have both apartment and house but there are not include in luxury house.

For the reason before, the data in following function and chart 7-1 are use the price on general house and apartment in city area. The definition on which area belong to city area is according to the registered residence on peoples' ID card. (ID card clearly distinguish the rural and urban population). For example: the urban area defined by local people is urban population.

From chart 7-1 Housing Price-Income Ratio in Eight Major Chinese Market, 1999-2010 the simple is Beijing, Hangzhou, Shanghai, Shenzhen, Tianjin, Wuhan and Xian. Wuhan Chengdu, and Xian is city from central area but have big contradiction between population and land, these cities can compare with the eastern coastal area. The function on housing price-income ratio is:

$$\frac{\text{purchase - price - of - housing}}{\text{net - annual - income}}$$

(the rational is between 3 to 6, the unit is Yuan.)

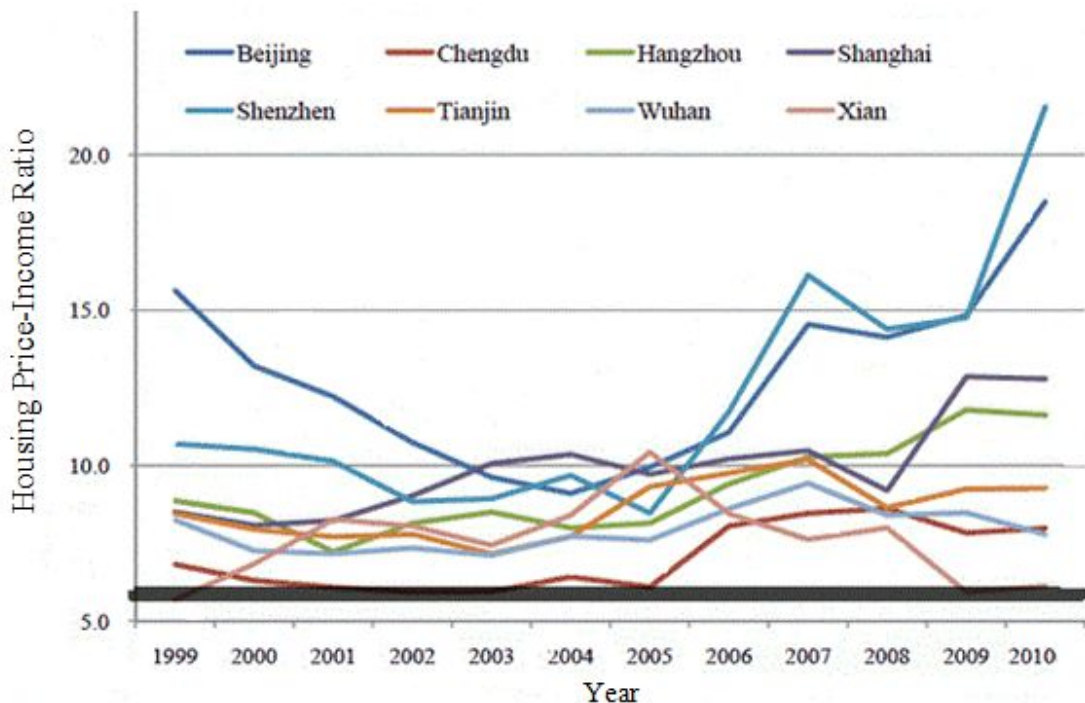
In housing price-income ratio 3 to 6 is the rational range means that people can afford an apartment. If the ratio is out of 6 that mean more people cannot afford an apartment.

From Chart 7-1 Housing Price-Income Ratio in Eight Major Chinese Market, 1999-2010 that Chengdu, Xian, Wuhan which is belong to central area is quite close but still higher than rational(the thick black line at bottom). Tianjing is close to Beijing and become the second choice for people who cannot afford the house and apartment in Beijing.

The fifth and sixth city is Hangzhou and Shanghai, these two cities are close to each other. Shanghai is the biggest trade and economic development city. Hangzhou to Shanghai is like Tianjing to Beijing, which is better for people living and remission the press in Shanghai. Shanghai, Beijing and Shenzhen has the highest one in housing price-income ratio. Beijing is over 15 and Shenzhen is over 20 in the housing price-income ratio. Beijing is 19.1 when the thesis writing in 2013. They are 3 times larger than rational.

By the chart 7-1 we can found that the slop of Beijing and Shenzhen is quite apparent, that mean there will have higher growth rate in Beijing and Shenzhen on the housing price-income ratio. More and more people cannot afford to buy an apartment in the future. It will cause many social problem, young people will lose their motivation on working even life.

Chart 8-1 Housing Price-Income Ratio in Eight Major Chinese Market, 1999-2010



(Source: National Bureau of Statistics of China.)

9. Model

In recent years, the real estate prices keeps going on. In 2000, average price of housing which is include: general housing, villas and luxury apartment in the eastern coastal area is 1,948 yuan / square meters, it is rose to 7338 yuan / square meter in 2012, the rate of increase is up to 276.69%. The commercial building prices from 2000 to 2012 is from 2,112 yuan / m² rose to 6,943 yuan / m², the rate of increase is 228.74 %.

At the same time, there are each parts of China has huge difference in the prices of real estate, the average selling price of commercial building in 2006: the highest area is Beijing where the average selling price is 8067 yuan / square meter, the lowest region of Jiangxi, the rate is 1648 yuan / square meter, the difference up to 4.895 times⁵.

According to a survey by NDRC and the NBS recently released show: in 2012, 70 cities nationwide housing prices rose 26.67 %, land transaction prices rose 16.15%. On March, the price of new housing rose 11.18%. Reflects the Chinese real estate market is still in the immature stage, ongoing continuous adjustment of industrial structure, the determinants factors of real estate prices are constantly changing from different structure.

9.1 Assumption

Dependent variable were selected 31 regions nationwide average sell price on residential housing (APSR) ⁶ and the average sales price of commercial building (APSC) ⁷. As a representative of variables, respectively, with hypothetical explanatory variables regression analysis, by comparing two regression equations can more accurately determine the determinant factors of real estate prices.

5. China Statistical Yearbook 2013, National Bureau of Statistics of People Republic of China.

^{6,7}. China Statistical Yearbook 2013, National Bureau of Statistics of People Republic of China.

According to the research and learning by relevant literature, there are 8 assumptions by 4 aspects. Demand of real estate, supply of real estate, type of real estate market and macro environment aspects of real estate.

9.1.1 Demand of Real Estate

Quantity of demand depends on a variety of factors, the main factors in consumer purchasing power, other related products price and consumer preferences etc. As the real estate alternatives theory do not exist in the system, and the high demand for real estate preference, it focuses on the consumer purchasing power for demand of real estate. Extract the consumer income levels and unemployment rates these two variables to describing consumer purchasing power.

(1) Consumer Income Level (CI)

There is positive correlation between the price of real estate and consumer income level. Consumers on the downstream in the value chain, the final demand on products. If the price level of real over the level of consumer purchasing power, there will be only price on label but no effective demand on real estate, real estate transactions will be at a standstill.

At this time, the automatic adjustment mechanism of the market prices will make adjustments, and eventually will be push to re-transactions. From the various regions of disposable income per capital (CI) to be the represent variables in this model .

(2) Unemployment Rates (UER)

There is negative correlation between real estate prices and the unemployment rate. The unemployment rate directly showed the employment situation of all the labor force in certain period. Which has indirectly reflected changes in the number of housing affordability conditions. The increasing of unemployment rate represents that reduction in the number of housing affordability, the effective demand of real estate in corresponding decreased prices. Price of real estate will show that downward as well from the various regional of unemployment rates (UER) as a representative variable in the model.

9.1.2 Supply of Real Estate

The quantity of supply also depends on the number of factors. The main factors are: production costs, availability of raw materials and the prices of related products. As mentioned earlier, in theory, there is no substitute for the real estate, it is from the production cost and availability of raw materials (ie. resources occupation of per person), these two aspects can examine the situation on supply of real estate.

(1) Production Cost (PC)

There is positive correlation between the price of real estate prices and production cost. Production cost covers the cost of the land, material costs, labor costs and all other factors of production, reflects the fundamental investment by real estate business. It is the reference for real estate business to achieve the profits and goals, it is a basic prerequisite for pricing. In this model, the building cost for real estate developers (PC⁸) as a representative variable.

(2) Resources Occupation of Per Capital (RPC)

There is negative correlation between prices of real estate and the amount of resources occupation of per capital. By the relative scarcity of resources to make a decision which is inevitable by configuration of resource to get into the consumer stage, the prices as a means to achieve efficient allocate the resources in the real estate market. The differences in per capital housing area of different regions show the differences in the relative scarcity of real estate. Further it is contributed to the regional disparity in the prices of real estate. In this model, the resources occupation of per capital(ie. per capital housing area - RPCH)⁹ as a representative variable.

8. Unit is: 10 thousands Yuan / m².

9. RPCH=Construction of the housing area / the population in these area.

The unit of RPCH is: m² / person

(3) The Vacancy Rate (VRC)

There is negative correlation between the prices of real estate and the vacancy rate. The vacancy rate refers to vacant real estate area as a percentage of the total area of real estate in a period, described the situation of real estate resources allocation.

The higher vacancy rate means that the supply of real estate is more, and the lower prices of real estate. According to international practice, commercial vacancy rate is between 5% to 10% as the reasonable area, supply and demand or real estate in the balance. Conducive to the sustainable development of the national economy. The vacancy rate between 10% to 20% is the danger zone of vacancy rate, should take certain measures to increase real estate sales efforts to ensure the normal operation of national economy and the normal development of the real estate market. When the vacancy rate over 20% means that is in the serious backlog area of commercial real estate. The vacancy rate (VRC¹⁰) in various regions as a representative variable in the model.

9.1.3 Type of Real Estate Market

Determine the type of market division has two basic factors: one is the number of firms in the market; second is the degree of difference in the productions produced by manufacturers. In the real estate market, there have non differentiation on degree and level of production. Besides the minority of luxury villas and affordable housing. It mainly relies on the quantity of real estate manufacturers to research the types of real estate market.

There is negative correlation between the prices of real estate and the number of firms on real estate. In the real estate market, the more producers in the real estate market the closer to competitive market, the less producers in the real estate market the closer to monopolize

10. $VRC = \text{completion of housing construction area} - \text{real estate sales} / \text{completion of housing construction area}$. Due to limitations of available data, the data is actually have a little error

markets. Financial barriers in the real estate market is quite high, but the difference between the productions in real estate is insignificant. Price of estate prices is certainly sensitivity on the number of development companies of real estate. The number of development company on real estate (NUM) is the represent variables in this model.

9.1.4 Macro Environment Aspects of Real Estate

Macro environment for industrial development has a strong positive or negative effects, there is a range of indicators examine the macroeconomic environment, the paper selected two major indicators: investment conditions and tax policy.

(1) Investment Conditions (RIC)

There is positive correlation between the price of real estate and the proportion of real estate investment in investment on fixed assets. This indicates that the larger proportion are explaining that the investment preferences prefer real estate funds, more money flows will into the real estate industry. Capital is the source for vigorous development on real estate industry, the development of industry to drive the changes of market prices. Therefore, a reasonable capital investment structure is maintained at a reasonable level of real estate prices in strong guarantee. The proportion of investment (RIC)¹¹ is the represent variables in this model.

(2) Tax Policy (TAX)

Prices of real estate and the intensity of tax have a positive correlation. Tax policy is the main way of the national fiscal policy. No matter who, either developer or consumer to be the nominal objective of levy in tax policy, by the shift principle taxation show that consumer is the real objective of levy in tax policy. Government hopes that to inhibit purchasing demand on real estate through taxation of real estate, adjust the overheating situation of real estate industry, but potentially also raise the price of real estate. The tax on real estate (TAX) is the represent variables in this model.

¹¹. Proportion of investment = investment on real estate / investment on fixed asset .

9.1.5 Other Factors of Real Estate

The other factor is increase rate of GDP, population in China and the rate of credit on buying real estate. There will try to find the relationship between ASPR, ASPC and these variable.

(1) Loan Rate on Real Estate Firm (RCRT)

There have positive correlation between price of real estate and the rate of credit on real estate (RCRT), if the lending rates increase the price of real estate will goes up. The increase on lending rate will included in the market price, finally consumer will be bear the cost. The credit on real estate (RCRT) is the represent variables in this model.

(2) Total Population (POPU)

There have positive correlation between price of real estate and population in China (POPU). The more people birth the less resources can be share, the same as real estate, more and more population will lead the price of real estate in rapid growth. The population in China (POPU) is the represent variables in the first model. But the population censuses will take place in every 10 years. The number of population in 'National Bureau of Statistics of People Republic of China' every year is depends on the birth and death record from hospital.

(3) Increase Rate of GDP (RGDP)

The negative correlation is between price of real estate and increase rate of GDP (RGDP). GDP is the general factor to measure industry economics. It is combine with the commercial real estate and will influence it. The increase rate of GDP is the represent variables in the second model

The eleven variables will use in to two models. Then find which variable will be the most important variable to influence average sell price on residential housing (APSR) and the average sales price of commercial building (APSC) .

9.2. Economic Model and Econometric Model

Table 9-1 Variable Setting in Model

Variable	Symbol	Unit
ASPR	y_1	10 thousands Yuan / square meter.
ASPC	y_1	10 thousands Yuan / square meter.
Unit vector	x_0	1
CI	x_1	10 thousands
UER	x_2	
PC	x_3	10 thousands Yuan / square meter.
RPC	x_4	10 thousands Yuan / square meter.
VRC	x_5	
NUM	x_6	
RIC	x_7	percentage
TAX	x_8	10 thousands
RGDP	x_9	percentage
POPU	x_{10}	person
RCRT	x_{11}	percentage
Stochastic variable	u_{1t}	

- Economic model:

$$y_1 = \gamma_1 x_1 + \gamma_3 x_3 + \gamma_4 x_4 + \gamma_6 x_6 + \gamma_7 x_7 + \gamma_8 x_8 + \gamma_9 x_9 + \gamma_{10} x_{10}$$

$$y_2 = \gamma_1 x_1 + \gamma_3 x_3 + \gamma_4 x_4 + \gamma_6 x_6 + \gamma_7 x_7 + \gamma_8 x_8 + \gamma_9 x_9 + \gamma_{11} x_{11}$$

Insert stochastic variable- u_{1t} into economic model to form econometric model.

- Econometric model:

$$y_1 = \gamma_{10} + \gamma_{11} x_1 + \gamma_{13} x_3 + \gamma_{14} x_4 + \gamma_{16} x_6 + \gamma_{17} x_7 + \gamma_{18} x_8 + \gamma_{19} x_9 + \gamma_{110} x_{10} + u_{1t} \text{-----} \textcircled{1}$$

$$y_2 = \gamma_{20} + \gamma_{21} x_1 + \gamma_{23} x_3 + \gamma_{24} x_4 + \gamma_{26} x_6 + \gamma_{27} x_7 + \gamma_{28} x_8 + \gamma_{19} x_9 + \gamma_{111} x_{11} + u_{1t} \text{-----} \textcircled{2}$$

9.3. Source of Data

National Bureau of Statistics of China.(National Data in 2000-2013).

9.4. Correlation Matrix

The correlation matrix is below :

Table 9-2 Correlation coefficients, using the observations 2000 - 2013

5% critical value (two-tailed) = 0.5324 for n = 14

y1	y2	x1	x3	x4	
1.0000	0.9985	0.9877	0.9032	0.9820	y1
	1.0000	0.9867	0.9045	0.9817	y2
		1.0000	0.8083	0.9974	x1
			1.0000	0.8861	x3
				1.0000	x4
x6	x7	x8	x9	x10	
0.9584	0.5731	0.9617	-0.1787	0.9721	y1
0.9579	0.5792	0.9622	-0.1483	0.9746	y2
0.9480	0.6142	0.9890	-0.2418	0.9681	x1
0.9711	0.5759	0.8609	-0.1120	0.9213	x3
0.9320	0.6373	0.9944	-0.2613	0.9567	x4
1.0000	0.5572	0.9076	-0.0950	0.9754	x6
	1.0000	0.6330	0.0922	0.6537	x7
		1.0000	-0.2926	0.9340	x8
			1.0000	-0.0434	x9
				1.0000	x10
				x11	
				0.3522	y1
				0.3800	y2
				0.3271	x1
				0.2770	x3
				0.3332	x4
				0.2753	x6
				0.3428	x7
				0.3267	x8
				0.5316	x9
				0.3483	x10
				1.0000	x11

(1) Multicollinearity elimination

Correlation between x_4 with x_1 and x_3 is 0.9974 and 0.8861 higher than 0.8 (there is multicollinearity between x_4 and x_1, x_3).

Correlation between x_8 with x_1, x_3, x_4 and x_6 is 0.9890, 0.8609, 0.9944 and 0.9076, they are higher than 0.8 (there is multicollinearity between x_8 and x_1, x_3, x_4, x_6).

Correlation between x_6 with x_1, x_3 and x_4 is 0.9480, 0.9711 and 0.9320 they are higher than 0.8 (there is multicollinearity between x_6 and x_1, x_3, x_4).

Correlation between x_{10} with x_1, x_3, x_4, x_6 and x_8 is 0.9681, 0.9213, 0.9567, 0.9754 and 0.9340, they are higher than 0.8 (there is multicollinearity between x_{10} and x_1, x_3, x_4, x_6, x_8).

Multicollinearity Elimination: x_4, x_6, x_8 and x_{10} will be replaced to eliminate multicollinearity.

The relative difference of x_4, x_6, x_8 and x_{10} will be used to replaced in the model, there are in first difference of $d_{x_4}, d_{x_6}, d_{x_8}$ and $d_{x_{10}}$.

(2) New econometric model:

$$y_1 = \gamma_{10} + \gamma_{11}x_1 + \gamma_{13}x_3 + \gamma_{14}dx_4 + \gamma_{16} dx_6 + \gamma_{17}x_7 + \gamma_{18}dx_8 + \gamma_{19}x_9 + \gamma_{110}dx_{10} + u_{1t} \text{-----} \textcircled{1}$$

$$y_2 = \gamma_{20} + \gamma_{21}x_1 + \gamma_{23}x_3 + \gamma_{24}dx_4 + \gamma_{26} dx_6 + \gamma_{27}x_7 + \gamma_{28}dx_8 + \gamma_{29}x_9 + \gamma_{211}x_{11} + u_{2t} \text{-----} \textcircled{2}$$

(3) Correlation matrix in new model:

Table 9-3 Correlation coefficients, using the observations 2000 - 2013 (NEW)

(missing values were skipped)

5% critical value (two-tailed) = 0.5324 for $n = 14$

y1	y2	x1	x3	x7	
1.0000	0.9985	0.9877	0.9032	0.5731	y1
	1.0000	0.9867	0.9045	0.5792	y2
		1.0000	0.8083	0.6142	x1
			1.0000	0.5759	x3
				1.0000	x7

x9	x11	d_x4	d_x8	d_x6	
-0.1787	0.3522	0.8509	0.8397	0.0371	y1
-0.1483	0.3800	0.8572	0.8492	0.0229	y2
-0.2418	0.3271	0.7422	0.8067	0.0921	x1
-0.1120	0.2770	0.7919	0.7673	0.3688	x3
0.0922	0.3428	0.7453	0.8180	0.3020	x7
1.0000	0.5316	-0.1644	-0.3286	-0.0763	x9
	1.0000	0.4075	0.3285	-0.1523	x11
		1.0000	0.8033	0.0393	d_x4
			1.0000	0.0925	d_x8
				1.0000	d_x6
				d_x10	
				-0.8401	y1
				-0.8473	y2
				-0.7970	x1
				-0.8278	x3
				-0.3844	x7
				-0.1393	x9
				-0.3869	x11
				-0.7417	d_x4
				-0.6096	d_x8
				-0.1624	d_x6
				1.0000	d_x10

Correlation between d_x8 and x1, x7, dx4 is 0.8067, 0.8180 and 0.8033 is not too high and they are significant variables so we can ignore it.

-----There is no multicollinearity between explanatory variables.

(4) Model identification

$$y_1 = \gamma_{10} + \gamma_{11}x_1 + \gamma_{13}x_3 + \gamma_{14}dx_4 + \gamma_{16} dx_6 + \gamma_{17}x_7 + \gamma_{18}dx_8 + \gamma_{19}x_9 + \gamma_{110}dx_{10} + u_{1t} \text{-----} \textcircled{1}$$

$$y_2 = \gamma_{20} + \gamma_{21}x_1 + \gamma_{23}x_3 + \gamma_{24}dx_4 + \gamma_{26} dx_6 + \gamma_{27}x_7 + \gamma_{28}dx_8 + \gamma_{19}x_9 + \gamma_{111}x_{11} + u_{1t} \text{-----} \textcircled{2}$$

First equation

$$k = 9; k^* = 8; k^{**} = 1; G = 2; G_{\Delta} = 1$$

$K^{**} = 1 > 0 = G_{\Delta} - 1$. Means that the first equation is over-identified.

Second equation

$$k = 9; k^* = 8; k^{**} = 1; G = 2; G_{\Delta} = 1$$

$K^{**} = 1 > 0 = G_{\Delta} - 1$. Means that the second equation is over-identified.

9.4.1. Parameters' Estimation

Table 9-4 Model 1: TSLS, using observations 2001-2013 (T = 13)

Dependent variable: y1

Instruments: const x1 x3 x7 x9 d_x4 d_x8 d_x6 d_x10

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
const	96.5359	6557.86	0.0147	0.98826	
x1	0.244576	0.068211	3.5856	0.00034	***
x3	0.4609	0.501605	0.9189	0.35817	
x7	10416	35777.3	0.2911	0.77095	
x9	-4.32656	104.101	-0.0416	0.96685	
d_x4	362.02	1006.17	0.3598	0.71900	
d_x8	-4.61182	5.98761	-0.7702	0.44117	
d_x6	-0.0657783	0.0630208	-1.0438	0.29660	
d_x10	-0.000164386	0.00042029	-0.3911	0.69571	

Mean dependent var	5131.434	S.D. dependent var	1880.936
Sum squared resid	417369.9	S.E. of regression	323.0209
R-squared	0.990169	Adjusted R-squared	0.970507
F(8, 4)	50.36019	P-value(F)	0.000948
Log-likelihood	-85.89526	Akaike criterion	189.7905
Schwarz criterion	194.8751	Hannan-Quinn	188.7454
rho	-0.341323	Durbin-Watson	2.681236

----Econometric model:

$$y_{1t} = 96.5359 + 0.244576x_{1t} + 0.4609x_{3t} + 10416x_{7t} - 4.32656x_{9t} + 362.02d_{x4t} + 0.0657783d_{x6t} - 4.61182d_{x8t} - 0.000164386d_{x10t} + u_{1t}$$

Table 9-5 Model 2: TSLS, using observations 2001-2013 (T = 13)

Dependent variable: y2

Instruments: const x1 x3 x7 x9 d_x4 d_x8 d_x6 x11

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
const	-944.502	5122.84	-0.1844	0.85372	
x1	0.269639	0.0446785	6.0351	<0.00001	***
x3	0.554361	0.420039	1.3198	0.18691	
x7	6117.57	30770.4	0.1988	0.84241	
x9	103.603	73.6861	1.4060	0.15972	
d_x4	281.954	725.938	0.3884	0.69772	
d_x8	-2.75335	5.06271	-0.5438	0.58655	
d_x6	-0.0771419	0.0520117	-1.4832	0.13803	
x11	-123.826	235.686	-0.5254	0.59931	

Mean dependent var	5514.879	S.D. dependent var	1998.263
Sum squared resid	292489.3	S.E. of regression	270.4114
R-squared	0.993896	Adjusted R-squared	0.981688
F(8, 4)	81.41178	P-value(F)	0.000368
Log-likelihood	-83.58422	Akaike criterion	185.1684
Schwarz criterion	190.2530	Hannan-Quinn	184.1233
rho	-0.379153	Durbin-Watson	2.757827

Econometric model:

$$y_{2t} = -944.502 + 0.269639x_{1t} + 0.554361x_{3t} + 6117.57x_{7t} + 103.603x_{9t} + 281.954d_{x4t} - 0.0771419d_{x6t} - 2.75335d_{x8t} - 123.826d_{x11t} + u_{1t}$$

9.5. Economic Verification of the Model

Table 9-6 Explanation of Parameter

Parameter	Value	Interpretation
γ_{10}	96.5359	represents the expected value of ASPR is 96.5359 when all independent variables are equal to zero. But in reality, all variables like CI - the consumer income level will never be zero.
γ_{11}	0.244576	Positive: When the consumer income level increases by 1 unit, the ASPR will increase by 0.244576 unit.
γ_{13}	0.4609	Positive: When relative difference of production cost increases by 1 unit, the ASPR will increase by 0.4609 unit.
γ_{17}	10416	Positive: When the proportion of investment increases by 1 unit, the ASPR will increase by 10416 unit.
γ_{19}	-4.32656	Negative: When the GDP rate of increases by 1 unit, the ASPR will decrease by 4.32656 unit.
γ_{14}	362.02	Positive: When the resource occupation of per capital increases by 1unit, ASPR will increase by 362.02 unit.
γ_{16}	0.0657783	Positive: When the number of development company on real estate increases by 1 unit, the ASPR will increase by 0.0657783 unit.
γ_{18}	-4.61182	Negative: When the number of tax of real estate increases by 1 unit, the ASPR will decrease by 4.61182 unit.
γ_{110}	-0.000164386	Negative: When the population increases by 1 unit, the ASPR will decrease by 0.000164386 unit.
γ_{20}	-944.502	represents the expected value of ASPC when all independent variables are equal to zero. But in reality, all variables like PC - the production cost will never

		be zero.
γ_{21}	0.269639	Positive: When the consumer income level increases by 1 unit, the ASPC will increase by 0.269639 unit.
γ_{23}	0.554361	Positive: When the Production cost increases by 1 unit, the ASPC will decrease by 0.554361 unit.
γ_{27}	6117.57	Positive: When the proportion of investment on real estate increases by 1 unit, the ASPC will decrease by 6117.57 unit.
γ_{29}	103.603	Positive: When the GDP rate of increases by 1 unit, the ASPC will decrease by 103.603 unit.
γ_{24}	281.954	Positive: When the resources occupation of per capital increases by 1 unit, the ASPC will increase by 281.954 unit.
γ_{26}	-0.0771419	Negative: When the number of development company on real estate increases by 1 unit, the ASPC will decrease by 0.0771419 unit.
γ_{28}	-2.75335	Positive: When the number of tax of real estate increases by 1 unit, the ASPC will decrease by 2.75335 unit.
γ_{211}	-123.826	Negative: When the rate of credit increases by 1 unit, the ASPC will decrease by 123.826 unit.

By the result from table 8-6, in first model there have γ_{14} , γ_{17} , γ_{18} are the most significant part to influence y_1 . That is mean, resources occupation of per capital, proportion of investment and tax policy on real estate will influence the average sell price on residential housing (APSR).

In the second model, γ_{24} , γ_{27} , γ_{28} , γ_{29} , γ_{211} are the most significant factors to influence y_2 , which means resources occupation of per capital, proportion of investment, tax policy, increase rate on GDP and rate of credit on real estate will influence on the average sales price of commercial building (APSC) .

9.6. Statistical Verification

9.6.1. Statistical Significance of Estimated Parameters-- T-test

(1) First equation

Number of observations: $n=14$; number of parameters = 9,

Degree of freedom =5

T-table (0.05; 5) = 2.015

Table 9-7 Comparing t-value and t-table on first model

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	Comparing with t-table 2.015	Parameter
const	96.5359	6557.86	0.0147	lower	Not significant
x1	0.244576	0.068211	3.5856	higher	significant
x3	0.4609	0.501605	0.9189	lower	Not significant
x7	10416	35777.3	0.2911	lower	Not significant
x9	-4.32656	104.101	-0.0416	lower	Not significant
d_x4	362.02	1006.17	0.3598	lower	Not significant
d_x8	-4.61182	5.98761	-0.7702	lower	Not significant
d_x6	-0.0657783	0.0630208	-1.0438	lower	Not significant
d_x10	-0.000164386	0.00042029	-0.3911	lower	Not significant

(2) Second equation:

Number of observations: $n=14$; number of parameters =9

Degree of freedom = 14 - 9 = 5

T-table (0.05; 5) = 2.015

Table 9-8 Comparing t-value and t-table on second model

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	Comparing with t-table 2.015	Parameter
const	-944.502	5122.84	-0.1844	lower	Not significant
x1	0.269639	0.0446785	6.0351	higher	significant
x3	0.554361	0.420039	1.3198	lower	Not significant
x7	6117.57	30770.4	0.1988	lower	Not significant
x9	103.603	73.6861	1.4060	lower	Not significant
d_x4	281.954	725.938	0.3884	lower	Not significant
d_x8	-2.75335	5.06271	-0.5438	lower	Not significant
d_x6	-0.0771419	0.0520117	-1.4832	lower	Not significant
x11	-123.826	235.686	-0.5254	lower	Not significant

9.6.2. R²--Goodness of fit

First equation: $R^2 = 0.990169 \rightarrow 99.02\%$ of average sell price on residential housing (APSR) can be explained by independent variables above. This percentage is higher than 50%, the model can be suitable.

Second equation: $R^2 = 0.993896 \rightarrow 99.39\%$ of average sells price of commercial building (APSC) can be explained by independent variables above. This percentage is higher than 50%, the model can be suitable.

9.7. Econometric Verification

9.7.1. Autocorrelation

H0: No autocorrelation in the model

H1: Exist autocorrelation in the model

$\alpha = 0,05$

First equation:

Model 9-9 Godfrey (1994) test for first-order autocorrelation TSLS, using observations 2002-2013 (T = 12)

Dependent variable: y1

Instruments: const x1 x3 x7 x9 d_x4 d_x8 d_x6 d_x10 uhat_1

	coefficient	std. error	z	p-value	
const	-8826.12	2301.79	-3.834	0.0001	***
x1	0.180315	0.0209242	8.618	6.84e-018	***
x3	1.01664	0.166544	6.104	1.03e-09	***
x7	12690.4	9950.08	1.275	0.2022	
x9	84.7656	31.3890	2.700	0.0069	***
d_x4	2056.92	384.133	5.355	8.57	***
d_x8	-3.50810	1.68618	-2.081	0.0375	**
d_x6	-0.167126	0.0224053	-7.459	8.70	***
d_x10	0.000731199	0.000209951	3.483	0.0005	***
uhat_1	-2.82971	0.391303	-7.232	4.78	***

Unadjusted R-squared = 0.999582

Test statistic: Pseudo-LMF = 52.294642,

with p-value = $P(F(1,3) > 52.2946) = 0.0186$

→ P-value = 0.0186 < confident level alpha 0.05 *we can reject H₀*

Second equation:

Model 9-10 Godfrey (1994) test for first-order autocorrelation TSLs, using observations 2002-2013 (T = 12)

Dependent variable: y2

Instruments: const x1 x3 x7 x9 d_x4 d_x8 d_x6 x11 uhat_1

	coefficient	std. error	z	p-value	
const	-4891.10	5125.59	-0.9543	0.3400	
x1	0.228799	0.0689483	3.318	0.0009	***
x3	0.780011	0.423724	1.841	0.0656	*
x7	28804.7	30953.5	0.9306	0.3521	
x9	115.482	123.596	0.9344	0.3501	
d_x4	159.272	636.647	0.2502	0.8025	
d_x8	-1.85320	4.58829	-0.4039	0.6863	
d_x6	-0.141131	0.0589101	-2.396	0.0166	**
x11	-143.584	343.483	-0.4180	0.6759	
uhat_1	-1.64714	0.907402	-1.815	0.0695	*

→ Unadjusted R-squared = 0.997328

→ Test statistic: Pseudo-LMF = 3.295028,

→ with p-value = $P(F(1,3) > 3.29503) = 0.211$

→ P-value = 0.211 > confident level alpha 0.05 we can't reject H_0

9.7.2. Heteroscedasticity Test

H_0 : There is Homoscedasticity

H_1 : There is Heteroscedasticity

$\alpha = 0,05$

First equation:

Model 9-11 Pesaran-Taylor test for heteroskedasticity, OLS, using observations

2001-2013 (T = 13) First Model

Dependent variable: uhat^2

	coefficient	std. error	t-ratio	p-value	
const	34630.0	23121.0	1.498	0.1623	
yhat^2	-8.53905	0.000654829	-0.1304	0.8986	

→ Unadjusted R-squared = 0.001543

→ Test statistic: HET_1 = |-0.000085| / 0.000655 = 0.130401,

→ with p-value = 2 * P(z > 0.130401) = 0.896

→ P-value = 0.896 > confident level alpha 0.05 we can't reject H₀

Second equation:

Model 9-12 Pesaran-Taylor test for heteroskedasticity OLS, using observations

2001-2013 (T = 13) Second Model

Dependent variable: uhat^2

	coefficient	std. error	t-ratio	p-value	
const	33879.1	15075.8	2.247	0.0461	**
yhat^2	-0.000333945	0.000372083	-0.8975	0.3887	

→ Unadjusted R-squared = 0.068232

→ Test statistic: HET_1 = |-0.000334| / 0.000372 = 0.897501,

→ with p-value = 2 * P(z > 0.897501) = 0.369

→ P-value = 0.369 > confident level alpha 0.05 we can't reject H₀

9.7.3. Normality Test

H0: There is no normality of residuals

H1: There is normality of residuals

$\alpha = 0,05$

First equation

Model 9-13 Frequency distribution for uhat6, obs 2-14

number of bins = 5, mean = -4.89728e-013, sd = 323.021

interval	midpt	frequency	rel.	cum.	
< -232.20	-317.04	2	15.38%	15.38%	*****
-232.20 - -62.524	-147.36	2	15.38%	30.77%	*****
-62.524 - 107.16	22.316	6	46.15%	76.92%	*****
107.16 - 276.84	192.00	2	15.38%	92.31%	*****
>= 276.84	361.68	1	7.69%	100.00%	**

→ Test for null hypothesis of normal distribution:

→ Chi-square(2) = 1.095 with p-value 0.57837

→ P -value = 0.57837 > $\alpha = 0.05$ we can't reject H0

Second equation

Model 9-14 Frequency distribution for uhat7, obs 2-14

number of bins = 5, mean = 2.09883e-013, sd = 270.411

interval	midpt	frequency	rel.	cum.	
< -228.91	-296.78	1	7.69%	7.69%	**
-228.91 - -93.150	-161.03	2	15.38%	23.08%	*****
-93.150 - 42.606	-25.272	5	38.46%	61.54%	*****
42.606 - 178.36	110.48	3	23.08%	84.62%	*****
>= 178.36	246.24	2	15.38%	100.00%	*****

→ Test for null hypothesis of normal distribution:

→ Chi-square(2) = 0.663 with p-value 0.71794

→ P -value = 0.71794 > $\alpha = 0.05$ we can't reject H0

Because of autocorrelation, Heteroscedasticity and normality of residuals exist in some equations, estimates are consistent and unbiased, but there are not the best standard errors of parameters are distorted, misleading:

- Problem with statistical verification.
- R^2 is higher according to tests.

9.8. Consequence

According to the model, the resources occupation of per capital (RPC), proportion of investment (RIP) and tax policy (TAX) on real estate is the factor which can influence on both APSR and APSC. Other factor can also influence on APSR and APSC but the quantity of impact is lower than these three main factors. The number of development company on real estate is the most difficult to influence on APSR and APSC.

First of all, the most influential one is X7 which is the proportion of investment on real estate (RIC). Theoretically, if the RIC increase by 1 unit the APSR will increase by 10,416 units, APSC will increase by 103.603 units. It shows that the mostly inflow of funds is from outside (investment from firms). This shows that the Chinese government and central bank improve the threshold on current real estate loan and strict control of policy-oriented loan amount is effective. It is able to inhibit the effect of price increases on real estate.

Secondly, resources occupation of per capital (RPC) also have a greater impact on real estate prices. For one unit increase on RPC the APSR will increase 362.02 units, APSC will increase by 281.954 units. In RPC we use the data on population is from urban which means people who live in the urban area and have the residence in that city. So from this result, people in urban area has purchase power on buying house or apartment. By the way, before choose the population from urban area the population of the whole nation are used in the model, but the result is quite low. It is means that, people in rural area still haven't have purchase power on buying real estate, especially in urban area they cannot afford an apartment or house. Urban and rural consumption still has significant gaps.

Thirdly, tax on real estate has less effect on prices than the resources occupation of per capital and the proportion of investment on real estate, but still significant effect on the APSC and APSR. From the model we can found that: if the tax on real estate increase on one unit then APSR will decrease 4.61182 units and APSC will decrease by 2.75335 units. Tax policy as one of the macro-control policies, regulatory role on prices is limited. So that if want to control the price of real estate government cannot focus on the tax policy, the tax policy only have a little effect on the real estate price.

Fourthly, the building cost for real estate development (PC) is also can effect on real estate price. From model if the PC increase for 1 unit the APSR will increase by 0.4609 units and APSC will increase 0.554361 units. By the literature review knew that till year 2006, if PC increase by one unit the price of housing will increase by 0.169 unit. It is become smaller negative effect factor on real estate price. The Chinese real estate market become buyers' market, the demand side has larger influence on real estate market price. Control policies should be tilted towards the supply side, in order to achieve maximum control effect. So that Chinese government use policy to limited non-local people investment on real estate and limited people buy second or more houses on loan policy is effective.

The number of development company (NUM) and consumer income level (CI) is quite insignificant. Because the APSR and APSC will change by NUM and CI less than 1 unit. That is mean: increase or decrease the number of development company and the resources occupation of per capital cannot change the price of real estate. If want to control the market price of real estate, resources occupation of per capital and the resources occupation of per capital is not the useful way.

The credit rate on development firm increase 1 unit, the APSC will decrease 123.826 units. That means government can practice tightening of lending policies to limit the development and investment on commercial building then control the price of commercial building.

The population in China increase by 1 unit then the APSR will decrease 0.000164386 units, it is in small changes so it seems like can ignore the GDP increase rate if we consider the average selling price of residential housing. In fact, the net amount of population growth

was seven million every year. The APSR will decrease 1,150.66. The total amount of price is not decrease too much, so we can really ignore the population increase rate.

Finally, the unemployment rate and the vacancy rate for housing prices do not have the ability to explain. Unemployment impact on house prices was not significant, probably due to statistical error of unemployment rate or be due to other reasons, need to study in the future. Theoretically, The vacancy rate should be able to reflect the trend of prices, but in recent years, scholars have found that the vacancy rate in the study on the price of interpretation capabilities are not very significant and showed a positive correlation between each other. People should be concerned about this phenomenon.

Real estate occupies a very important position in the national economic system, the relevant government departments, real estate developers and consumers should consciously regulate their own behavior, and strive to build a healthy and prosperous real estate market.

10. Conclusion

The basic land policy in China is quite different by the different situation on real estate market. But as time goes by, Chinese government utilize different kinds of policy (not only the direct real estate policy) to control and supervise the real estate market, such as: tax policy, loan policy, finance policy, land policy and other policy on raw materials. In general, there are two factors can affecting the price changes on real estate, the one is supply and demand, the other one is the change of cost. As land policy cannot only affect supply and demand, but also on directly determines the development costs, which in the real estate market regulation, in particular of obvious on real estate prices.

The current situation and problem on the housing in China, is the population and land contradictory, more and more people even family cannot afford the housing in urban area.especially in the eastern coastal area of China where is the main market on real estate. People have to rent an apartment or choose the house in rural area. But the rich family bought more and more apartment and house for investment, these situation lead to many social problem such as: people lose the motivation on working, the government will lose the confidence from citizens, intensified conflicts between the rich and the poor people, and so on.

From chapter 9 the main factors to influence the price of housing in China is tax, resources occupation of per capital, the proportion of investment on real estate, the building cost for real estate development and so on. People can try to use these factor to influence the real estate market in China.

Chinese market is different between other countries. The policy and other method from other countries can be the consultation but cannot use them indiscriminately.

The market of real estate is China still need more attention and care by government, consumer and the real estate firm. There have many way to regulate the market of real estate and macro-control by government. The most efficient method is policy on loan and tax.

As the firm, investment on real estate is the efficient method to influence the price of real estate, the real estate firm should control their quantity of investment on real estate to influence the price of real estate.

As the consumer in housing market, people need rational consumption and be dispassionate from the situation that real estate purchase price are rapid growth. In Chinese culture, people should buy an apartment or house when the want stable life such as: when they want to get married. So the citizen should change their mind and way to thinking. If can't afford to buy a house or apartment that they can try to rent one. Actually, nowadays, more and more young people choose rent an apartment rather than buy one. This kind of thinking will help the real estate market be cool.

All in all, there have not only one method to help real estate market in China. At the same time, either government, firm or consumer can't lead the market by only themselves, should each of them to do the mutual cooperation, and find the balance point in the real estate market.

The real estate market in China is still relatively young. The Land Administration Law and the Urban Real Estate Law standardize and regulate administration of the real estate market in China. However, due to the recent adoption of these two laws, there are many criticisms and concerns regarding their implementation. In March 2004, China's top legislature, the National People's Congress, adopted an amendment to its Constitution

stressing that China respect and protect private property. The constitutional amendment adds, “the State should give compensation” to the original stipulation that “the State has the rights to expropriate urban and rural land”. Under the amendment, residents’ housing on State-owned land should be compensated for as private property at a market-based price. This is an important shift in the Chinese real estate law towards ushering a greater private property orientation as well as a tilt towards greater market reforms.

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Appendix 1

Birth rate, death rate, natural growth rate and population in China

Year	Birth rate	Death rate	Natural	Population
1949	36	20	16	551,960,000
1950	37	18	19	551,960,000
1951	37.8	17.8	20	563,000,000
1952	37	17	20	574,820,000
1953	37	14	23	587,960,000
1954	37.97	13.18	24.79	602,660,000
1955	32.6	12.28	20.32	614,650,000
1956	31.9	11.4	20.5	628,280,000
1957	34.03	10.8	23.23	646,530,000
1958	29.22	11.98	17.24	659,940,000
1959	24.78	14.59	10.19	672,070,000
1960	20.86	25.43	-4.57	662,070,000
1961	18.13	14.33	3.8	658,590,000
1962	37.22	10.08	27.14	672,960,000
1963	43.6	10.1	33.5	691,720,000
1964	39.34	11.56	27.78	704,990,000
1965	38	9.5	28.5	725,380,000
1966	35.21	8.87	26.34	745,420,000
1967	34.12	8.47	25.65	763,680,000
1968	35.75	8.25	27.5	785,340,000
1969	34.25	8.06	26.19	806,710,000
1970	33.59	7.64	25.95	829,920,000
1971	30.74	7.34	23.4	852,290,000
1972	29.92	7.65	22.27	871,770,000
1973	28.07	7.08	20.99	892,110,000
1974	24.95	7.38	17.57	908,590,000
1975	23.13	7.36	15.77	924,200,000
1976	20.01	7.29	12.72	937,170,000
1977	19.03	6.91	12.12	949,740,000
1978	18.25	6.25	12	962,590,000
1979	17.82	6.21	11.61	975,420,000
1980	18.21	6.34	11.87	987,050,000
1981	20.91	6.36	14.55	1,000,720,000
1982	22.28	6.6	15.68	1,016,540,000
1983	20.19	6.9	13.29	1,030,080,000
1984	19.9	6.82	13.08	1,043,570,000
1985	21.04	6.78	14.26	1,058,510,000
1986	22.43	6.86	15.57	1,075,070,000
1987	23.33	6.72	16.61	1,093,000,000
1988	22.37	6.64	15.73	1,110,260,000
1989	21.58	6.54	15.04	1,127,040,000
1990	21.06	6.67	14.39	1,143,330,000
1991	19.68	6.7	12.98	1,158,230,000
1992	18.24	6.64	11.6	1,171,710,000

1993	18.09	6.64	11.45	1,185,170,000
1994	17.7	6.49	11.21	1,198,500,000
1995	17.12	6.57	10.55	1,211,210,000
1996	16.98	6.56	10.42	1,223,890,000
1997	16.57	6.51	10.06	1,236,260,000
1998	15.64	6.5	9.14	1,247,610,000
1999	14.64	6.46	8.18	1,257,860,000
2000	14.03	6.45	7.58	1,267,430,000
2001	13.38	6.43	6.95	1,276,270,000
2002	12.86	6.41	6.45	1,284,530,000
2003	12.41	6.4	6.01	1,292,270,000
2004	12.29	6.42	5.87	1,299,880,000
2005	12.4	6.51	5.89	1,307,560,000
2006	12.09	6.81	5.28	1,314,480,000
2007	12.1	6.93	5.17	1,321,290,000
2008	12.14	7.06	5.08	1,328,020,000
2009	11.95	7.08	4.87	1,334,500,000
2010	11.9	7.11	4.79	1,340,910,000
2011	11.93	7.14	4.79	1,347,350,000
2012	12.1	7.15	4.95	1,354,040,000
2013	12.08	7.16	4.02	1,360,720,000

Appendix 2

Average selling price of residential housing and average selling price of commercial building (2000-2013)

	Average selling price of residential housing	Average selling price of commercial building
2000	2782.67	3037.29
2001	2845.00	3031.60
2002	2884.67	3066.26
2003	2954.33	3162.48
2004	3654.00	3804.17
2005	3979.52	4452.03
2006	4356.99	4916.95
2007	4993.44	5462.10
2008	5059.00	5443.33
2009	6267.33	6558.67
2010	6897.00	7323.83
2011	7114.73	7723.63
2012	7560.37	8052.36
2013	8142.26	8696.02

Appendix 3

Middle and long term credit rate on commercial building in China (2000-2013)

Year	1-3 years	3-5 years	Over 5 years	Average
2000	5.94	6.03	6.21	6.06
2001	5.94	6.03	6.21	6.06
2002	5.49	5.58	5.76	5.61
2003	5.49	5.85	5.76	5.7
2004	5.76	5.85	6.12	5.91
2005	5.76	5.85	6.12	5.91
2006	6.3	6.48	6.84	6.54
2007	7.56	7.74	7.83	7.71
2008	5.4	5.76	5.94	5.7
2009	5.4	5.76	5.94	5.7
2010	5.85	6.22	6.4	6.16
2011	6.65	6.9	7.05	6.87
2012	6.15	6.4	6.55	6.37
2013	6.15	6.4	6.55	6.37

Appendix 4

The Average Net Income and The Rate of Resources Occupation per capital

(2000-2013)

Year	Average Net Income	Resources Occupation Rate
2000	6280.00	1.44
2001	6859.60	1.65
2002	7702.80	1.87
2003	8472.20	2.24
2004	9421.60	2.59
2005	10493.00	2.95
2006	11759.50	3.34
2007	13785.80	3.90
2008	15780.80	4.54
2009	17174.70	4.97
2010	19109.40	6.05
2011	21809.80	7.34
2012	24564.70	8.06
2013	26955.10	9.10

Appendix 5

The Total Cost on real estate, Number of Real Estate Company, the proportion of investment on real estate and Tax on Real Estate (2000-2013)

	Total Cost on real estate	Number of real estate company	proportion of investment on real estate	Tax on real estate
2000	1471.12	47518	0.15	20958000000.00
2001	1503.91	45893	0.17	22859000000.00
2002	1336.29	47820	0.18	28240000000.00
2003	1219.65	48688	0.18	32390000000.00
2004	2378.19	59018	0.19	36630000000.00
2005	2162.95	58750	0.18	43590000000.00
2006	2187.30	60166	0.18	51518000000.00
2007	2307.29	62074	0.18	57546000000.00
2008	3314.91	71095	0.18	68034000000.00
2009	2624.54	70817	0.16	69640000000.00
2010	2999.71	71863	0.19	87853000000.00
2011	3214.00	72280	0.20	110378000000.00
2012	3222.41	75280	0.19	130799000000.00
2013	3390.68	79528	0.19	154743000000.00