

**Czech University of Life
Sciences Prague**

**Faculty of Economics and Management
Department of Economics**



Bachelor thesis

Analysis of Residential Real Estate Development in Beijing

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Department of Economics
Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

Li Pengge

Agricultural Economics and Management

Thesis title

Analysis of Residential Real Estate Development in Beijing

Objectives of thesis

The aim of the bachelor thesis is to define the main factors influencing the real estate in Beijing and to evaluate its development in selected period.

This aim will be fulfilled based on the partial aims. Then, several hypotheses will be defined and verified. Based on the results of an empirical analysis the final conclusions will be introduced.

Methodology

The bachelor thesis will cover both theoretical and empirical part. Theoretical part will contain theoretical background of the selected topic as well as the methodological framework. Scientific literature will be used to prepare the literature overview. The empirical analysis will be based mainly on the time series analysis. Other suitable methods will be employed as well. Based on the empirical analysis the results will be presented and some recommendations will be suggested.

To fulfill the aim of the thesis the selected methods and indicators of time series analysis will be employed as following:

- trend functions, coefficient of determination
- base index, chain index

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Keywords

Real estate, Beijing, base index, chain index, trend function, coefficient of determination.

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Prague March 27. 2012

Declaration

I hereby declare that I have worked on my Bachelor thesis titled “Analysis of Residential Real Estate Development in Beijing” solely and completely on my own and that I have marked all quotations in the text. The literature and other material I have used are mentioned in the Bibliography section of the thesis.

In Prague on 29th of March 2012

PengGe Li

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Analýza vývoje trhu s nemovitostmi v Pekingu

Analysis of Residential Real Estate Development in Beijing

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Souhrn

Čínská města zaznamenala významné zvýšení cen nemovitosti v posledních 20 letech. Zejména v Pekingu v důsledku faktorů, jako jsou populační růst a hospodářský růst, jsou obytné nemovitosti těžko dostupné pro průměrné rodiny. Tato bakalářská práce je zaměřena na definování hlavních faktorů ovlivňujících pekingský trh s nemovitostmi a hodnocení těchto faktorů. Dílčím cílem je zhodnotit pekingský realitní rozvoj založený na indexech, poměrech a terminologiích. Hlavní užívanou metodou je analýza časových řad pomocí bazického indexu a řetězového indexu, trendové funkce a koeficienty determinace. Vlastní analýza ukázala, že celkové investice, celková prodejní plocha a celková dokončená plocha vykazují ve sledovaném období rostoucí tendenci. Avšak nízké příjmy v kombinaci s vysokou cenou realit vedly k velmi nízké dostupnosti nemovitostí.

Klíčová slova

nemovitosti, Peking, bazický index, řetězový index, trendová funkce, koeficient determinace

Abstract

China's major cities have experienced significant real estate price increases in the past 20 years. Especially in Beijing, due to factors such as population increase and economic growth, residential property is hardly affordable for average families. This bachelor thesis is aimed at defining the main factors influencing Beijing real estate market and evaluating the factors. The second aim is to evaluate Beijing real estate development based on Indices, ratios and terminologies. The main method used is time series analysis, by using base index, chain index trend function and coefficient of determination to find out that the total investment, total space floor area sales, total floor space completed are all in an increasing trend of Beijing real estate development. But low incomes, combined with the high price of property, have resulted in real estate property affordability being very low.

Key words

Real estate, Beijing, Base index, Chain index, Trend function, Coefficient of determination.

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Chapter-1 Introduction

China has become an increasingly urbanized and industrialized country, and has experienced substantial economic growth and rapid urbanization over the past 20 years. With the increasing population of China, China accommodates one-sixth of the world's population and its real estate markets are still in a state of evolution. This past decade, Beijing's real estate market has been in a stage of booming.

Rapid urbanization took place most notably in the capital and eastern coastal cities, such as Beijing, Shanghai, Guangzhou, and Shenzhen. A natural consequence of rapid increase in population and economic affluence leads to strong demand for residential real estate, in terms of both quantity and quality.

Beijing is the capital city of China, and according to the Beijing statistical office, the population in Beijing on December 2011 was approximately 19,872,000. The population increased more than 70% in the last twenty years. The per capita floor area increased from 11.64 m² to 20m² from 1991 to 2010.

The most rapid growth of Beijing's economy happened in the past twenty years, and with Beijing's economy growing very fast, real estate is an important factor that pushes the economy forward. The supply and demand of real estate is one of the most important indicators showing that the economy has increased.

Economy increased and peoples living condition, living standard and income has also increased. But with higher growth of economy and high demand of housing, the housing affordability for average Beijing living residents is still low.

Chapter-2 Objectives and Methodology

2.1 Objectives of the Thesis

The main aim of the bachelor thesis is to define the main factors influencing the real estate in Beijing and to evaluate its development in the last 2 decades.

To achieve the main aim of this bachelor thesis, there are several partial aims that must be fulfilled.

The primary aim is to define the main factors influencing real estate in Beijing.

The second aim is to evaluate the main factors influencing real estate based on Indices, ratios and terminologies.

The third aim of this bachelor thesis is to prognose for the real estate development in Beijing.

The central hypothesis of this bachelor thesis is that the Beijing residential real estate market is currently on the booming stage of the real estate market cycle.

The secondary hypothesis is that residential properties are hardly affordable for first time buyers due to the high price of residential real estate and the low overall income.

The real estate industry in Beijing increased sharply between the time periods 1991-2010.

All of these hypotheses will be verified based on the result of empirical analysis.

2.2. Methodology

To achieve the objectives, several research methodological tools are used. The main tool of this bachelor thesis is based on Time series analysis. The data set is determined by its availability.

A time series is a sequence of data points, measured typically at successive time instants spaced at uniform time intervals. Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics, and also to predict future values based on previously observed values.

An index number is a specialized average designed to measure the changes in a variable with respect to time, geographical location or characteristic such as income and so on. The main method used in this bachelor thesis employed:

- ◆ Base index - Helps to understand and interpret changing percentage over time, based on a chosen year as the base year, by comparing the percentage change to base year per unit the same item.

- ◆ Chain index - Chain index numbers are first expressed as a percentage of the preceding year. The percentages are chained together by successive multiplication to form a chain index, which chain base year index method of base year changes from year to year.

- ◆ Trend function- Is a consistent long-term change in the average level of the forecast variable per unit of time. The trend formed by using points that belong to the graph. This trend has either an increasing or a decreasing slope.

- ◆ Coefficient of Determination - the proportion of the total variation in the dependent variable Y that is accounted for, by the variation in the independent variable X. ¹

¹ Lind, Marchal, Wathen STATISTICAL TECHNIQUES IN BUSINESS & ECONOMICS 13TH Edition 2008 ISBN 978-0-07-303022-7 or MHID 0-07-303022-8.

Time series analysis

Definition of time series

A time series is an ordered sequence of values for a variable taken at equally spaced points through time. Forecasting time series movements can be approached from two different basic angles:

- ◆ Identifying historic patterns in the time series and self-projecting the series into the future (trend analysis), used in this thesis.

- ◆ Identifying relationships between variables and the market, and using those variables to project the movement of the market into the future (regression analysis).

Consider that for each time period we get a sample of size one (one observation) on each of the random variables of a stochastic process. Therefore, we get a series of observations corresponding to each time period and to each different random variable. This series of observations is called a 'time series' and is denoted with X_t ².

(Tyler 2007) The correlation coefficient measures the degree to which two variables move in step with each other. However, finding a correlation between two variables does not necessarily imply that changes in one cause changes in the other.

There are two main methods for calculating the correlation between two series of numbers. Spearman's technique is used primarily for ordinal data, such as rankings, and Pearson's product moment technique for interval - or ratio-type data, which is set out above.

Both methods produce a correlation coefficient that can vary from -1 to +1. A positive correlation indicates that an increase in one variable is reflected by an increase in the other up until the point where they move in lockstep, when the correlation would be one. If the variables work against each other the correlation will be negative. A correlation of zero indicates no relationship.

² Sarah Sayce, Judy Smith, Richard Cooper and Piers Venmore-Rowland REAL ESTATE APPRAISAL FOR VALUE TO WORTH First published 2006 by Blackwell Publishing Ltd ISBN-10:1-051-000-X or ISBN-13:978-1-4051-0001-4.

Base index

Suppose there are a series of observations over time on a single item. To form a base index, one time period is chosen as a base, and every period is expressed as a percentage of the base period. Thus if P0 denotes in the base period and P1 in a second period, the index for this second period is as follows. (Newbold, L. Carlson, Thorne 2010):

$$\text{Equation} = (P1/P0) * 100$$

Chain index

In chain index there is no fixed base period, and the year immediately preceding the one for which price index has to be calculated is assumed to be the base year. For example, for the year 1994 the base year would be 1993, for 1993 it would be 1992 and for 1992 it would be 1992 and so on. In this way, there is no fixed base. It continually changes. The chief advantage of this method is that the relative prices during a year can be compared with the price level of the preceding year. Another advantage of the chain base method is that it is possible to include new items in an index number or to delete old times which are no longer important.

$$\text{Equation: Chain index} = (\text{current year} / \text{current year} - 1) * 100$$

Trend function

The trend of the linear function is said to be increasing if the slope is positive. The trend of a linear function is said to be decreasing if the slope is negative.

Trend function can also be used to forecast the succeeding year.

$$\text{Equation } f(x) = mx + b.$$

Coefficient of determination R²

(H.R.Seddighi,K.A.Lawler and A. V. Katos 2000) says the coefficient of determination of R^2 provides a measure of 'goodness of fit' of the estimated line to the sample data. In particular, it shows the percentage/proportion of total sample variation in the dependent variable which is due to sample variations in all the independent variables of the model. The higher the value of R^2 , the better the fit is of the estimated linear relationship to the sample data points.

To find a measure of the 'goodness of fit' based on these observations, we notice that variations in the value of the dependent variable from one observation to the next are due to changes in either the values of the regressors/regressors or, the influence of the disturbance term, or both. If we can separate these two influences and find the percentage of the sample variations in the imports which can be explained by variation in the regressors', then the higher this percentage is, the better the fit of the sample regression line to sample data should be.

The total sample variation in the dependent variables is defined as the sum of the squares of deviation of each observation from the sample mean value of the dependent variable. This is Total sum of squares (TSS) =sum of (observation on the dependent variable - sample mean of the dependent variable) ²

If you multiply the R^2 value by 100, then you can find the percentage of sample variations in the dependent variable which can be explained by sample variations in the independent variables of the model. R^2 takes only positive values between zero and one. It shows the extent of linear association between the dependent and all the independent variables of the model.

Note that the coefficient of determination is only a measure of the 'goodness of fit' of the linear relationship and in the case of non-linear relationships, R^2 values could be zero, even if there is a perfect non-linear relationship between variable.

Chapter-3. Literature overview

3.1 Definition of Real estate

The term 'real estate' is defined as land, including the air above it and the ground below it, and any buildings or structures on it. It also refers to any kind of realty. It covers residential housing, commercial offices, trading spaces such as theaters, hotels and restaurants, retail outlets, industrial buildings such as factories and government buildings. Real estate involves the purchase, sale, and development of land, residential and non-residential buildings real estate is a tangible asset (Real estate - chapter 7.6 2002).

Real estate can also be an intangible asset, and it can be viewed as an intangible right associated with the ownership, improvement to, and use of site. These are the rights to the services, or benefits, that real estate provides its users (C. Ling, Wayne R, Archer 2010).

3.2 The importance of real estate in national economy

The entire national economy is composed of many industries, in a large, multi-leveled trade system. In different historical periods and in different stages of productivity, each industry has a different position. As time progresses and productivity changes, the position of the industry changes in the national economy. In general, the importance of a position in the industry is compared in the national economy with other industries to assess this industry's necessity, the importance and the impact of constraints with other industries. Real estate is separated from the construction industry and gradually grows up, as time evolved, it has been in a very important position in national economy. Especially, it has crucial impacts in urbanization, industrialization, and the ecological environmental improvement process.

The residential real estate is guiding the development and management as the main basis of the entire national economy, in the social and economic activities. The Real estate industry provided the goods and labor with the subsistence and dual nature of production; it is an

essential element of people's lives, and also the basic element of social production. As a whole element of commodity of economy it is any social activities, especially in urban economic activities, the basic necessary material condition, so the basic industries of Real estate belonging to the national economy. The proper development of the Real estate industry plays an important role in driving the national economic industry. Operating the Real estate industry is related to a large number of industries in the national economy.

3.3 Main factors influencing real estate market

Economic factors.

Overall development of economy plays an important role on influencing real estate development. With increasing economy, the demand for real estate will increase. Economic factors are generally measured by economic indicators such as GDP, employment data, and also the prices of goods, etc.

Demographic factors.

Population and real estate development are closely related. When the population increases, the demand of real estate will increase as well, and the real estate will develop. When the population decreases, the demand of real estate will also decrease, and the real estate development will fall.

Income is also a factor that affects real estate development. With high income, people can afford to buy properties, because income is a very important indicator to calculate affordability, and the affordability of residential property influences the real estate market, as well as the development.

Government policy

Legislation is another important factor that influences real estate development.

Land is the main factor affecting the real estate market, particularly the scarcity of land. The state has adopted a more strict land policy, which includes land in the standardized procedures for land monitoring.

Tax refers to the primary means of fiscal policy, including the fields of housing, real estate taxes, land use tax, land tax, property tax, and so on.

Monetary policy also has an effect on real estate price growth, and expansionary monetary policy tends to accelerate the subsequent home price growth, while restrictive monetary policy tends to decelerate the subsequent home price growth (Xiaoqing Eleanor Xu, Tao Chen, 2010).

Interest Rates

Interest rates also have a major impact on the real estate markets. Changes in interest rate can greatly influence a person's ability to purchase a residential property. This is because as the interest rates fall, the cost to obtain a mortgage to buy a home decreases, which creates a higher demand for real estate, which pushes prices up. Conversely, as interest rates rise, the cost to obtain a mortgage increases, thus lowering demand and prices of real estate.

3.4 Evaluation of main factors influencing on real estate in Beijing

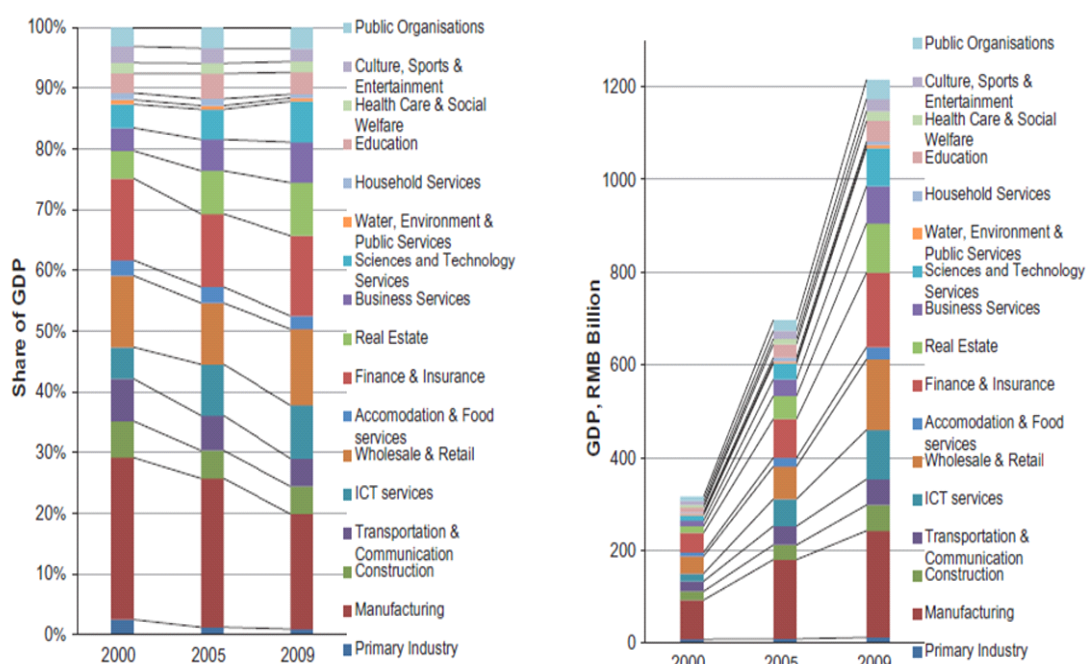
3.41 Evaluation of economic factors

Beijing's economy really started to grow from 1980th, and since then Beijing has experienced an extraordinary economic growth. A very important indicator of economy is Gross Domestic Product (GDP). In 1991, the Beijing Municipal Bureau statistics show that the Gross domestic product of Beijing is 59.89 billion Yuan³. In 2010, Beijing's Gross domestic product is 1411.36 billion Yuan, at an average annual growth rate of 18% during 1990-2010. Per capita GDP was 5494 Yuan in 1991, and increased to 75943 Yuan in 2010.

³ Yuan is the unit of Chinese currency. At the current rate of exchange, US\$1=6.3Yuan approximately

⁴Since the mid-1990s, services have become the dominant economic sector both in output and employment. After 1995, almost all major service industries increased in importance. During 2005-2009, the most significant growth was in wholesale and retail, real estate, business services, science and technology services, with an annual growth rate between 21% and 24%. Finance and insurance grew at 18% and ICT services at 16%. Although the share of manufacturing in total GDP was still 19% in 2009, its yearly growth rate was only 8% during 2005-2009. Health care is also well developed in Beijing with many highly reputed hospitals and the whole social welfare sector accounting for 16% of the total GDP.(fig.1.)

Figure.1. Share of GDP in Beijing in 2000, 2005, 2009.



Source: Derived from (Beijing): Beijing Statistic Year Book 2001,2005,2009

The most important economic development is the privatization process. This can be seen in the changes in the ownership status of economic activities, in terms of employment and

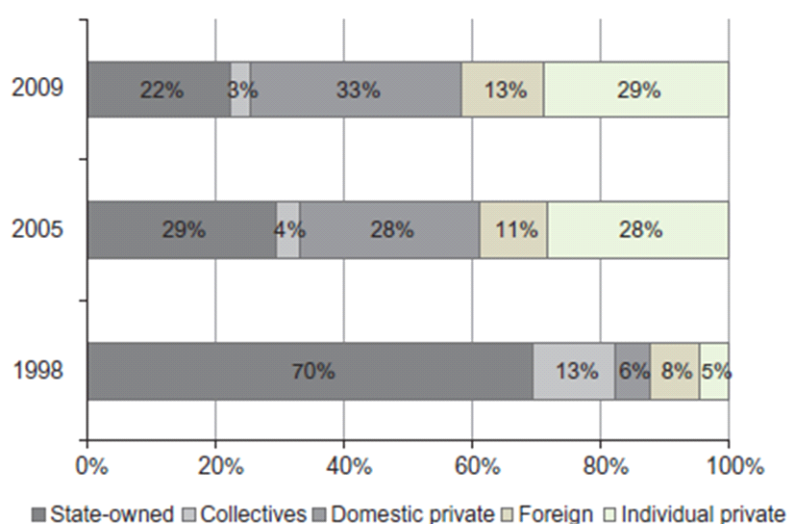
⁴ Zhenshan Yang, jian ming Cai, henk F.L. Ottens, Richard Sliuzas, BEIJING Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, 11A Datun Road, Anwai, Chaoyao District, Beijing 100101, China

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investment. The companies provide a large proportion of total employment, and this share of investments in fixed assets that comes from the private sector is at a high level: 64% during 2001-2005 and 61% during 2006-2009. Given the fact that total investment in fixed assets strongly increased after 2000, Beijing's economic restructuring is indeed dramatic in terms of ownership. On the other hand, the government is still the major owner and controller of social and public services.

Figure.2. Employment by ownership



Source: Derived from (Beijing).

Table.1. Increase of Fiscal revenue, 1987-2009

	Fiscal revenue, RMB billion	% of GDP	Increase coefficients ^a
1981-1985	23	25	0.6
1986-1990	34	17	0.7
1991-1995	46	9	0.6
1996-2000	135	11	1.5
2001-2005	361	14	1.1
2006-2009	808	20	1.5

^a Elasticity coefficients equal the relative growth rate of fiscal revenue compared to that of GDP.

Source: Derived from (Beijing). Beijing statistical year book, 1998, 2003, 2008 and 2010; Beijing 50

years: 1949-1998.

In their paper (Song tao wang, Zan Yang, hong yu Liu 2011), they say we have empirically found that for every 1% increase in urban economic openness, urban real estate price will increase significantly by 0.282%, after controlling for other demand-supply factors. Urban economic openness alone accounted for about 15.90% of the appreciations of Chinese real estate prices during the same period, which is not negligible. This result implies that urban real estate price fluctuations are potentially affected by international economic factors (Song tao Wang, zan Yang, hongyu Liu 2011).

3.4.2 Evaluation of demographic factors

The most important factor in demographic factors is population.

One child policy in China⁵

In 1979, three years after Mao's death, a one-child policy was introduced to reduce China's burgeoning population. According to the policy as it was most commonly enforced, a couple was allowed to have one child. If that child turned out to be a girl, they were allowed to have a second child. After the second child, they were not allowed to have any more children. In some places, though, couples were only allowed to have one child regardless of whether it is a boy or a girl. This policy is still in effect today. It is unusual for a family to have two sons.

Rewards for one child

The National Population and Family Planning Commission runs the one-child policy and monitors the child bearing habits of the Chinese masses. Couples are supposed to get a permit before they even conceive a child. To be eligible, couples must have a marriage certificate and have their residency permits in order. Women must be at least 20 and men, 24. Chinese women have to obtain a permit to have a child. If a woman is pregnant and she already has children

⁵ One child Policy in China: <http://factsanddetails.com/china.php?itemid=128&catid=4&subcatid=15>
[25/02/2012]

she is often pressured into having an abortion. Special bonuses are given to men and women that have had sterilization procedures, which means to get their tubes tied.

Parents who have only one child get a "one-child glory certificate," which entitles them to economic benefits such as an extra month's salary every year until the child is 14. Among the other benefits for one child families are higher wages, interest-free loans, retirement funds, cheap fertilizer, better housing, better health care, and priority in school enrollment. Women who delay marriage until after they are 25 receive benefits such as an extended maternity leave when they finally get pregnant. These privileges are taken away if the couple decides to have an extra child.

Punishment for extra Children

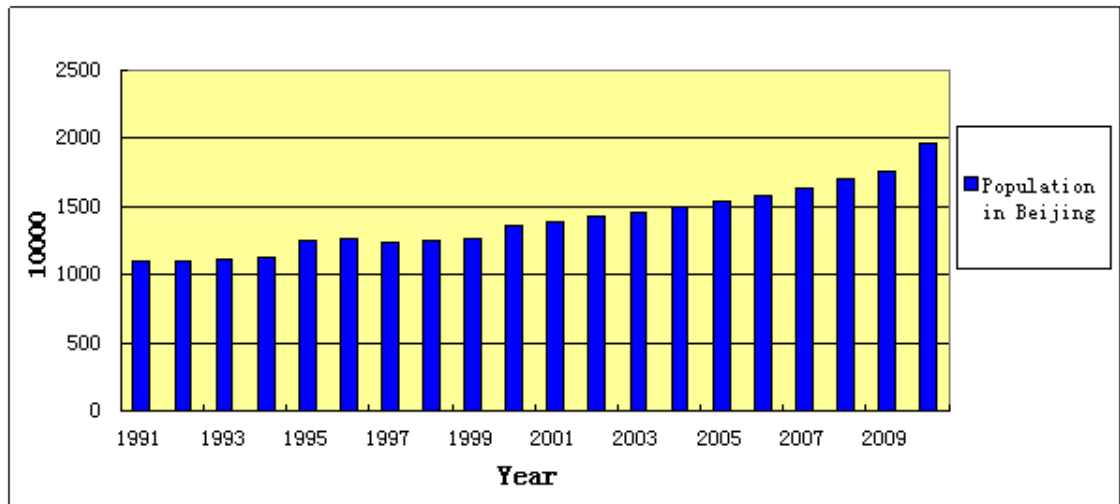
The one-child program theoretically is voluntary, but the government imposes punishments and heavy fines on people who don't follow the rules. Parents with extra children can be fined, depending on the region, from \$370 to \$12,800 (many times the average annual income for many ordinary Chinese). If the fine is not paid sometimes the couples' land is taken away, their house is destroyed, they lose their jobs, or the child is not allowed to attend school.

Success of one child policy in China

The one-child policy has been spectacularly successful in reducing population growth, particularly in the cities. In 1970 the average woman in China had almost six (5.8) children, now she has about two. The most dramatic changes took place between 1970 and 1980 when the birthrate dropped from 44 per 1000 to 18 per 1,000. Demographers have stated that the ideal average birthrate rate for China is 16.7 per 1,000, or 1.7 children per family.

Even with the one child policy, the total population in Beijing still increased from 10.94 million in 1991 to 19.619 million in 2010, according to the latest census (Beijing Statistic Bureau, 2011). See figure.3. Besides, Beijing also accommodated over 6 million migrants during the period; and those migrants came to the city for better economic opportunities and other possible welfare.

Figure.3. Population in Beijing between 1991-2010



Source: Beijing municipal bureau of statistics. graph by author

3.4.3 Evaluation of Governmental policies

The most important policy for real estate development is land policy and land taxation.

Land policy

Land is the main factor affecting the real estate market, due to the scarcity of land. The state has adopted a more strict land policy, including land in the standardized procedures for land monitoring. The land policy's legitimate purpose is to use each inch of land, to strengthen national ownership of land regulation and supervision of central and local government, according to the impact of policies on land prices can be divided.

Land policy reform

⁶ Land in China is either owned by the state or by collectives. Most of the land is held by the State, the "owners" only holding rights to use the land.

⁶ Chengri Ding , Land policy reform in China: assessment and prospects Urban Studies and Planning Program, University of Maryland, College Park, Maryland, USA
Received 18 April 2001; received in revised form 12 March 2002; accepted 3 April 2002

All the Real estate land is approved by the government by public auction, and the land use rights are granted to the bidder with the highest bid. The successful bidder will be asked to enter into a written contract, and then they will issue the land use right certificate. This land use right allows land to be used for a fixed period of 70 years⁷

China has launched a series of land policy reforms to improve land-use efficiency, to rationalize land allocation, to enhance land management, and coordinate urban and rural development. These land policy reforms have yielded positive impacts on urban land use as well as negative socioeconomic consequences. On the positive side, they have contributed to emerging land markets, increased government revenue for the financing of massive infrastructure projects and provision of public goods, and improved the rationalization of land use. On the negative side, problems such as loss of social equity, socioeconomic conflicts, and government corruption have emerged.

Land policy system before 1978

Before 1949, private land owner excision and land transactions were quite frequent. A household's wealth was directly correlated with the amount of the land it possessed.

After 1949, land reform (which is called Tu Gai) was launched in a bid to reduce social inequality by confiscating land reform from rich land lords and then redistributing it to the poor. By 1958, all land was either state owned or collectively owned. Urban land was state-owned whereas farmland was collectively owned with a few exceptions. This type of land ownership structure remains to the present day and continues to play an important role in the urban development of the pro-reform period.

Land policy reform after 1978

The land use system in China has gradually evolved over the last two decades. Changes included the adoption of the land leasehold system - Land use rights, land taxation and use fees, farmland protection, land administration, and regulations on land markets. We will

⁷ China industrial Real estate: land use rights, Registration and pricing by China Primer <http://www.chinaprimer.com/china-real-estate-market/land-use-rights-in-china.html> 24/10/2011

concentrate on land- use rights.

The adoption of the land-use rights system in China has had a remarkably positive impact on land development, government finance, real estate and housing development, infrastructure provision, and urban growth. For the first time in modern Chinese history, land now has value and can produce economic wealth. Land sales slowly increased from 5 lots in 1987 to 55 in 1991. Land markets too received a boost from 1992 to 1994. The total number of transactions jumped from 2800 in 1992 to 42,076 in 1993, and 97,405 in 1994. Since 1994, the number of land transactions has fluctuated at around 100,000 per year.

Land taxation

China's tax laws and policies are made by the National People's Congress and its standing committee, State Council, the Ministry of Finance, State Bureau of Taxation, State Council Customs Duty Regulation Commission, and General Administration of Customs.

⁸In January 2011, China launched a property tax trial in two cities, Chongqing and Shanghai, in the hope of controlling skyrocketing housing prices and stabilizing the local government's fiscal revenue.

Since 1956, the rural land had been the property of the collective, while the urban land has belonged to the state. The 1994 tax reform recentralized the revenue assignment, leaving expenditure assignments largely untouched, creating a substantial fiscal gap at local levels. In 2008, sub-national governments accounted for more than 78.68 percent of total public expenditure, while receiving 46.71 percent of total government revenue (China Statistical Yearbook, 2009)

The land is one of the key factors of production along with labor and capital; failure of proper land management has historically led to popular uprisings and erosion of the legitimacy of governments; and land provides revenue directly through land taxation or serves as the basis for claims to other revenue sources (e.g. Personal income tax).

According to Article 5 of the law, the income tax on enterprises with foreign investment and

⁸ Denis Nitikin, Chunli Shen, Qian Wang, Hengfu Zou LAND TAXATION IN CHINA: Assessment of Prospects for Politically and Economically Sustainable Reform [2012]

the income tax, which shall be paid by foreign enterprises on the income of their establishments or places set up in China to engage in production or business operations, shall be computed on taxable income at a rate of 30%. Local income tax shall be computed on taxable income at a rate of 3%.

Land taxation requires a cadaster with the size, value and ownership status of each parcel of land and its productive capacity, as well as information on the costs of input and output. Land taxes can be based on area occupied, appraised value of property or self-assessed property value. The value may refer to the land alone or to improvements to the land and buildings. Tax on land value would be less distortionary and approximate a benefit tax.

Taxation of land value, excluding buildings and improvements, in theory has the merit of stimulating more productive use of the land. Additionally, in the case of China where the real estate market has been growing extremely fast, value - based taxes would significantly improve revenue recovery. Implementation of land value taxation almost immediately increased local revenues, despite the fact that property taxes are criticized for their lack of elasticity and inability to increase revenue from taxes on property quickly or by a substantial margin.

3.4.4 Evaluation of interest rate factor

(Glenn R. Mueller Keith R. Pauley 1995) With real estate prices and interest rates having low and negative correlations during both rising and falling interest-rate periods we must accept the hypothesis that REIT price movement cannot be adequately explained by interest-rate movements. While real estate had stronger negative correlations with interest rates in a falling environment, it had minor negative correlations during rising interest-rate periods. Possibly, real estate prices behave in a bond-like fashion when interest rates go down (as the bond-like cash flow of real estate allows prices to move up). The low negative correlations during rising interest rate time periods lends support to the premise that un-leveraged real estate is not affected greatly by interest-rate movements and is thus a good diversifier in a portfolio of stocks and bonds. Rising interest rates may have little impact on real estate and may be more

of a coincidence that is better explained by general economic and real estate fundamentals associated with the supply and absorption of property at the time interest rates are moving.

The impact of higher interest rates on the REIT sector may depend on the magnitude of the increase in rates and should vary significantly from company to company, based on portfolio composition and capital structure. Higher interest rates do not cause a corresponding increase in direct property capitalization rates; rising interest rates will also impact the ability of the companies to acquire properties at a positive spread to their cost of capital.

The relationship and property prices have come under intense scrutiny since the housing boom of the mid-2000s, and the ensuing financial crisis of 2007-2009. Historically, interest rate declines do tend to proceed periods of house price appreciation, and that was certainly true over the last decade.

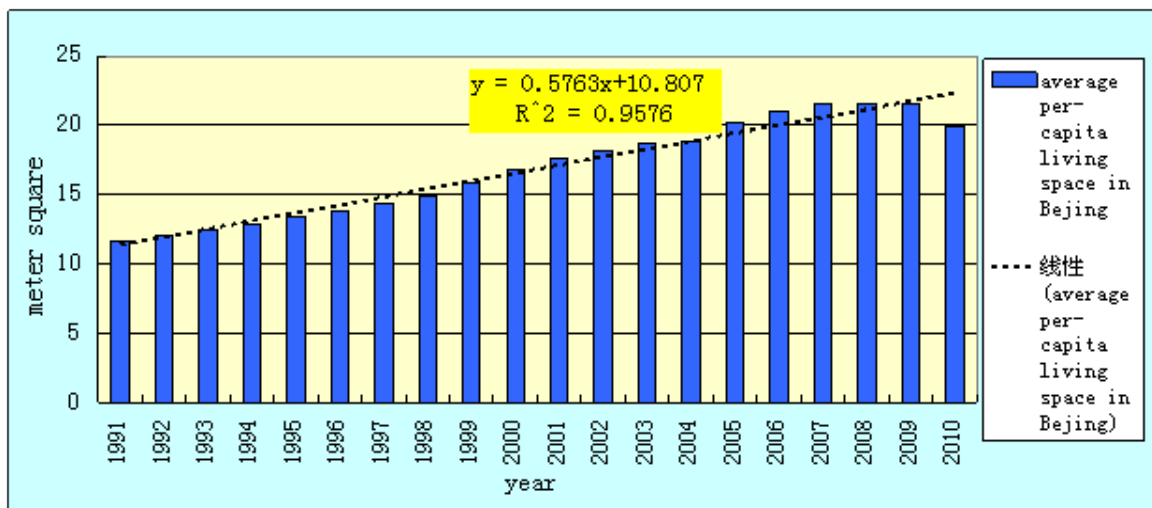
A link between low interest rates and house price bubbles is especially tenuous. Standard theory says that low interest rates should increase house values. Consequently, the observation that house prices rise when interest's rates fall is not by itself evidence that low interest rates cause bubbles. To make this case, one would have to argue house prices tend to overreact to interest rate reductions, i.e., that appreciations are larger than warranted by fundamentals. The generally muted response observed in the data suggests this is not the case (Kenneth N. Kuttner 01.2012).

Chapter-4 Analysis of real estate in Beijing

4.1 Housing conditions

In 1985, the first household survey on housing conditions was carried out in urban China, which revealed that the majority of urban residents experienced very poor living conditions at that time. Since the late 1980s, radical changes in the political and economic policies have established the private property rights system, and encouraged the privatization of residential housing, which gives rooms for the private property developers to invest in building construction that is financially viable and attractive (Stephen W.K. 2007). During the 1991-2010 period, due to the economic and housing reforms, per-capita living space in Beijing approached more than 20m² from 11.64m² in 1991. See figure.4.

Figure.4. Average per-capita living space in Beijing from 1991 to 2010.



Source: Beijing municipal bureau of statistics. Graph by author

The average per-capita living space in Beijing has increased steadily during the last 20 years. As figure 4 shows, the living conditions have also increased. The dotted line shows the trend function of average per-capita living space in Beijing during 1991 to 2010. The trend function is also showing in the graph. R^2 is equal to 0.9576, so the data for average per-capita living space function is 95.8% reliable.

Using trend function forecast for 2011, 2012 and 2013

Equation: $Y=0.5763X+10.807$

◆ When $X = 21$ (year 2011)

$$Y_{21}=0.5763*21+10.807$$

$Y_{21}=22.909 \text{ m}^2$ in Year 21 (2011) the average per-capita living space predicted is 22.909 m^2 .

◆ When $X=22$ (year 2012)

$$Y_{22}=0.5763*22+10.807$$

$Y_{22}=23.486 \text{ m}^2$ in Year 22 (2012) the average per-capita living space predicted is 23.86 m^2 .

◆ When $X=23$ (year 2013)

$$Y_{23}=0.5763*23+10.907$$

$Y_{23}=24.162 \text{ m}^2$ in Year 23(2013) the average per-capita living space predicted is 24.162 m^2 .

The prediction is that, for the following 3 years, all per-capita living space will be increasing.

4.2 Analysis of real estate development in Beijing

To evaluate the development of real estate in Beijing, we first obtain the total investment of real estate and also the total sales of residential property (unit 100million Yuan)⁹ in Beijing. Also, the base index and chain index will be computed. The data will be collected from 1991 to 2010 through the Beijing Municipal Bureau of Statistics.

Table.2. Development of real estate in Total investment and Sales of residential property (unit 100 million Yuan) 1991-2010.

⁹ The unit is translated from Chinese 'Yi', one 'Yi' is equal to 100 million

Year	TI	BI	CI	TSRB	BI	CI
1991	24	1.000		21.6	1.000	
1992	33.7	1.404	1.404	24.7	1.144	1.144
1993	58.4	2.433	1.733	41	1.898	1.660
1994	99.5	4.146	1.704	40.8	1.889	0.995
1995	352.8	14.700	3.546	63.1	2.921	1.547
1996	328.2	13.675	0.930	70.8	3.278	1.122
1997	330.3	13.763	1.006	140.4	6.500	1.983
1998	377.4	15.725	1.143	179.8	8.324	1.281
1999	421.5	17.563	1.117	232	10.741	1.290
2000	522.1	21.754	1.239	409.3	18.949	1.764
2001	783.8	32.658	1.501	531.7	24.616	1.299
2002	989.4	41.225	1.262	716.7	33.181	1.348
2003	1202.5	50.104	1.215	789.2	36.537	1.101
2004	1473.3	61.388	1.225	1085.1	50.236	1.375
2005	1525	63.542	1.035	1501.8	69.528	1.384
2006	1719.9	71.663	1.128	1626.3	75.292	1.083
2007	1995.8	83.158	1.160	1846	85.463	1.135
2008	1908.7	79.529	0.956	1201.4	55.620	0.651
2009	2337.7	97.404	1.225	2486.8	115.130	2.070
2010	2901.1	120.879	1.241	2060.5	95.394	0.829

Source: Beijing municipal bureau of statistics. Table by author

TI- Total Investment

TSRB - Total sales of residential building

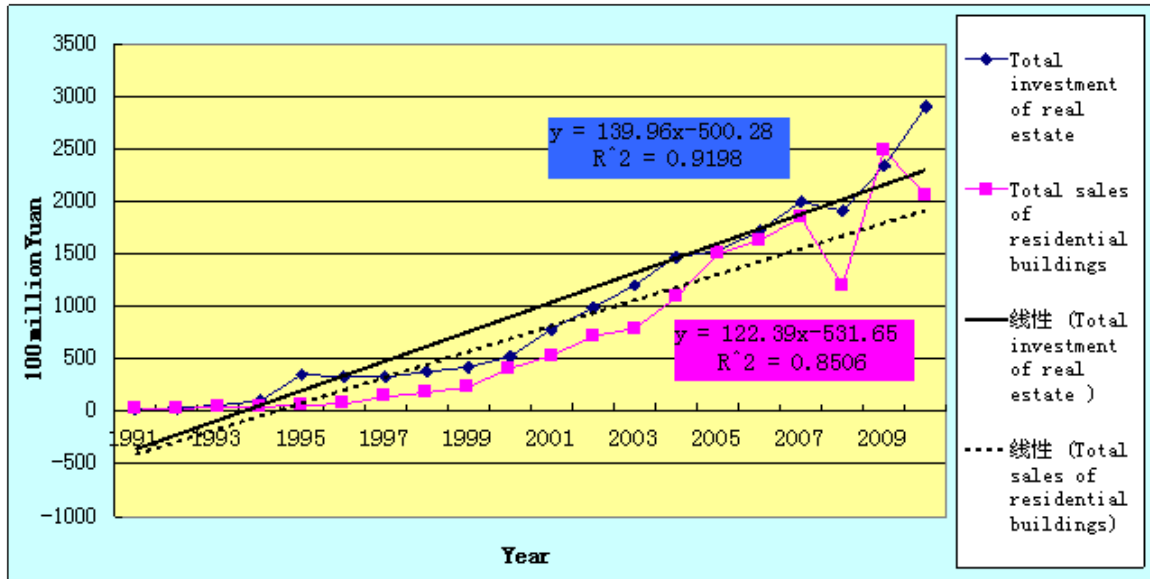
BI - Base Index

CI - Chain Index

In the table.2. the first vertical column is from the years 1991-2010, and the second vertical is the total investment of real estate in Beijing. Following the two vertical columns, are the base index and chain indexes of the total investment. The total investment of real estate increased from 2400 million Yuan in 1991 to 35280 million Yuan in 1995. During these four years, the total investment increased by 254.6%. In 1996, the total investment dropped to 32820 million Yuan, falling by 7%. From 1997 to 2007, total investment had been increasing sharply from 33030 million to 199580 million Yuan, followed by a drop in 2008 to 190870 million Yuan. In 2008, the real estate price growth began to decelerate due to the ongoing global financial crisis and the highly restrictive monetary policy (XiaoQing Eleanor Xu, Tao Chen, 2010). Followed by a very sharp increase from 233770 million Yuan to 290110 million Yuan from 2009 to 2010, this is also the highest investment in the past twenty years. During this period, the total investment in real estate increased 11988%.

The 5th column is the total sales of residential property (in 100 million Yuan), the following two columns are the base index and chain index of total sales. From 1991 to 1993 the total sales increased from 2160 million Yuan to 4100 million Yuan, but from 1993 to 1994 there was a slight fall of total sales to 4080 million Yuan. From 1995 to 2007, with a rapidly increasing per capita income, the total sales of residential property steadily increased from 6310 million Yuan to 184600 million Yuan. But in the following year, there was a dramatic decrease to 120140 million Yuan, this is due to a global financial crisis and a highly restrictive monetary policy in China (XiaoQing Eleanor Xu, Tao Chen, 2010). In 2009 this situation got better, and the total sales of residential property increased to 248680 million Yuan, because from September 2008 to December 2009, there was an expansionary monetary policy to cope with the global financial crisis (XiaoQing Eleanor Xu, Tao Chen, 2010). In order to control the ever-increasing home price and reduce the risk of a real estate bubble, the Chinese State Council has proclaimed many critical measures since the beginning of 2010. For instance, the minimum down payment for a second home has been raised gradually to 50%, the mortgage rate for the second home has been raised to 110% of the bench mark bank loan rate. And for the third home, restrictions are even tighter, in an attempt to tighten the monetary policy to control the real estate bubble. (XiaoQing Eleanor Xu, Tao Chen, 2010) Consequently, in 2010, the total sales decreased to 206050 million Yuan.

Figure.5. Graph for development of real estate in total investment and sales of commodity buildings (unit 100 million Yuan), 1991-2010.



Source: Beijing municipal bureau of statistics. Graph by author

The graph used to display total investment of real estate and total sales of residential buildings develop trend, above two paragraphs has already described the development of the trend. The black line is the total investment of real estate (100 million Yuan) trend function and also shows the coefficient of determination is 0.9198, this figure shows the trend function is 92% reliable. The dotted line is the total sales of residential buildings trend function (in 100 million Yuan) and the coefficient of determination is 0.8506, a number that shows that, the trend function for total sales of residential buildings is highly reliable.

By using the trend function forecast for the following three years:

Total investment in real estate (100 million yuan).

Equation: $Y=139.96X-500.28$

◆ when $X=21$ (year 2011)

$$Y_{21}=139.96*21-500.28$$

$Y_{21}=2438.88$ (100 million Yuan). In year 21 (2011), the predicted value for the total investment of real estate is 243888 million Yuan.

◆ When $X=22$ (Year 2012)

$$Y_{22}=139.96*22-500.28$$

$Y_{22}=2578.24$ (100 million Yuan). In year 22 (2012), the predicted value for the total investment of real estate is 257824 million Yuan.

◆ When $X=23$ (year 2013)

$$Y_{23}=139.96*23-500.28$$

$Y_{23}=2718.8$ (100 million Yuan). In year 23, (2013) the predicted value for the total investment of real estate is 271880 million Yuan.

Total sales of residential buildings (100 million Yuan).

Equation: $Y=122.39X-531.65$

◆ When $X=21$ (year 2011)

$$Y_{21}=122.39*21-531.65$$

$Y_{21}=2038.54$ (100 million Yuan). In year 21 (2011) the predicted value for the total sales of residential buildings is 203854 million Yuan.

◆ When $X=22$ (year 2012)

$$Y_{22}=122.39*22-531.65$$

$Y_{22}=2160.93$ (100 million Yuan). In year 22 (2012), the predicted value for the total sales of residential buildings is 216093 million Yuan.

◆ When X=23 (year 2013)

$$Y_{23}=122.39 \times 23 - 531.65$$

$Y_{23}=2283.32$ (100 million Yuan). In year 23 (2013), the predicted value for the total sales of residential buildings is 228332 million Yuan.

Table.3. Real estate development in space of residential building sold and floor space of residential building completed (unit 10000 sq.m), 1991-2010.

Year	TSRBS	BI	CI	FSRBC	BI	CI
1991	152.5	1.000		240.4	1.000	
1992	153	1.003	1.003	300.8	1.251	1.251
1993	182	1.193	1.190	280.6	1.167	0.933
1994	149	0.977	0.819	385.6	1.604	1.374
1995	180	1.180	1.208	506.3	2.106	1.313
1996	183.1	1.201	1.017	470.8	1.958	0.930
1997	256.2	1.680	1.399	478.3	1.990	1.016
1998	377	2.472	1.472	588.7	2.449	1.231
1999	484.7	3.178	1.286	908.3	3.778	1.543
2000	898.2	5.890	1.853	1013.7	4.217	1.116
2001	1127.5	7.393	1.255	1393.4	5.796	1.375
2002	1604.4	10.521	1.423	1926.2	8.012	1.382
2003	1771.1	11.614	1.104	2080.8	8.656	1.080
2004	2285.8	14.989	1.291	2593.7	9.550	1.088
2005	2566	16.826	1.123	3067	11.292	1.182
2006	2205	14.459	0.859	3770.9	13.884	1.230
2007	1731.5	11.354	0.785	3193.9	11.760	0.847
2008	1031.4	6.763	0.596	2891.7	10.647	0.905
2009	1880.5	12.331	1.823	2558	9.418	0.885

2010	1201.4	7.878	0.639	2678.6	9.862	1.047
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Source: Beijing municipal bureau of statistics. Table by author

TSRBS - Total Sales of Residential Building

FSRBC - Floor Space of Residential Building Completed

BI - Base Index

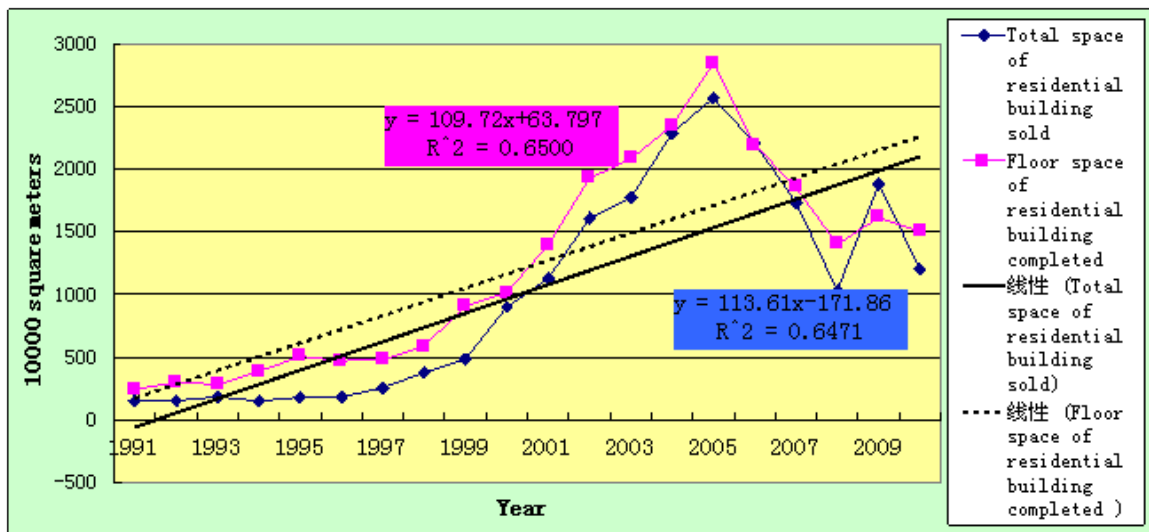
CI - Chain Index

Table.3. Shows the development of real estate in the amount of residential building space sold and floor space of residential building completed. The first column shows the years from 1991 to 2010, and the second column is the total space of residential building sold each year, following two columns are the base index and chain index of the total space residential building sold.

In the first three years, there was a gradual increase of total space of residential building sold. The following year, in 1994, there was a slight decrease from 1.82 million sq.m to 1.49 million sq.m , compared with a decreased of 18.1% in 1993. From 1995 to 2005, total space of residential buildings sold increasing sharply from 1.8 million sq.m to 25.66 million sq.m, and in 2005 it reached a peak. The high increase during these 10 years is due to the increasing of income per household and slow increase of residential prices per m², which have led to reasonable affordability for the residents. Since 2005, because per m² of selling price of residential building increased sharply and per capita income did not increase as fast as residential price so the affordability was low, the total space residential building sold decreased from 25.66 million sq.m in 2005 to 10.314 million sq.m in 2008. The amount of total space of residential building sold increased dramatically to 18.805 million sq.m because of the extraordinary expansionary monetary policy employed to cope with the global financial crisis (XiaoQing Eleanor Xu, Tao Chen, 2010). The decrease in total space of residential building sold is due to the tightening monetary policy in order to control the real estate bubble, which fell from 18.805 million sq.m in 2009 to 12.014 million sq.m in 2010.

Column 5 is the floor space of residential building completed, and column 6 and 7 are the base and chain index. From 1991 to 2006, this 15 year period saw the total floor space of residential building completed increase steadily from 2.4 million sq.m to 37.709 million sq.m. From 2007 to 2009 it decreased from 31.93 million sq.m to 25.58 million sq.m per year, and the next year, it increased to 26.78 million sq.m.

Figure.6. real estate development in space of residential building sales and floor space of residential building completed.



Source: Beijing municipal bureau of statistics. Graph by author

The two paragraphs above have already described the development of the trend depicted in the graph, which displays trend of the total space of residential building sold and floor space of residential building completed. The black line is the total space of residential building sold trend function and also shows the coefficient of determination to be 0.65, and this figure shows the trend function is 65% reliable. The dotted line shows that the coefficient of determination for the floor space of residential building completed trend function is 0.6471. This number shows that the trend function for total sales of residential buildings is reliable.

By using the trend function forecast for the following three years, we can calculate that:

Total space of residential building sold

Equation: $Y=113.61X-171.86$

◆ When $X=21$ (year 2011)

$$Y_{21}=113.61*21-171.86$$

$Y_{21}=2213.95$ (10000 sq.m). In the year 2011, the predicted value for the total space of residential building sold is 22139500 sq.m.

◆ When $X=22$ (year 2012)

$$Y_{22}=113.61*22-171.86$$

$Y_{22}=2327.56$ (10000 sq.m). In the year 2012, the predicted value for the total space of residential building sold is 23275600 sq.m.

◆ When $X=23$ (year 2013)

$$Y_{23}=113.61*23-171.86$$

$Y_{23}=2441.17$ (10000 sq.m). In the year 2013, the predicted value for the total space of residential building sold is 24411700 sq.m.

Floor space of residential building completed

Equation: $Y=109.72X+63.797$

◆ When $X=21$ (year 2011)

$$Y_{21}=109.72*21+63.80$$

$Y_{21}=2358.47$ (10000 sq.m). In the year 2011, the predicted value for the floor space of residential building completed is 23584700 sq.m.

◆ When $X=22$ (year 2012)

$$Y_{22}=109.72*22+63.80$$

$Y_{22}=2403.94$ (10000 sq.m) In the year 2012, the predicted value for the floor space of

residential building completed is 24039400 sq.m.

◆ When $X=23$ (year 2013)

$$Y_{23}=109.72*23+63.80$$

$Y_{23}=2513.21$ (10000 sq.m) In the year 2013, the predicted value for the floor space of residential building completed is 25132100 sq.m.

Table 2 and Table 3 show the general development trend of Beijing real estate, and that the floor space of newly completed housing has exceeded the housing sold each year from 1991 to 2005 but the gap has decreased significantly. In 2006, more units of floor space were sold than completed. This gap might reflect strategic or speculative behavior among developers (Yongzhou Hou 2009).

4.3 Housing Affordability in Beijing

Since the early 1990s, the housing affordability issues have aroused intensive discussion in China. The urban Chinese traditionally benefited from the welfare housing system and paid only nominal rents, and they were unaccustomed to purchasing homes. Urban Chinese today need to decide whether they have the ability to pay for the shelter, especially in big cities like Beijing (Ka Man Lau, Si-Ming Li, 2006). The term housing affordability has been used to summarize the difficulties individual households face in accessing decent and adequate housing (Hulchanski, 1995, p.471).

For individual households, the price-to-income ratio (PIR) may be defined as the ratio of the current market value of the housing unit that the household occupies to the total annual income of the household (Ka Man Lau, Si-Ming Li, 2006). The price-to-income ratio is used to measure housing affordability.

$$\mathbf{PIR = HP/Y}$$

When HP is the current market value of a single housing unit, and the Y is total annual income of the family, according to the Beijing Statistical Yearbooks (Beijing Municipal Statistic Bureau 1991-2011) data availability. We use Total Sales of Residential Buildings (100 million Yuan) and Total Space of Residential Building Sales (10000 square meters) to find the mean selling price of gross floor space (per m²). And the mean per-capita annual household disposable income is used as the base of the Beijing housing affordability computation. So we can rewrite the formula:

$$\mathbf{PIR=AP*FA/AY*nP}$$

AP is the mean selling price of residential buildings (yuan/m²).

FA¹⁰ is the Pre-specified gross floor area per housing unit (m²).

AY¹¹ is the per capita annual disposable income per urban household (Yuan).

nP is the average number of persons per urban household.

Table.4. Computing of the price-to-income ratio in Beijing, 1991-2010

Year	AY	nP	AY* nP	AP	AP*FA	PIR
1991	2040.4	3.3	6733.32	1416.39	84983.61	12.62
1992	2363.7	3.3	7800.21	1614.38	96862.75	12.42

¹⁰ Gross floor area in China means the usable floor area (UFA) and public floor area(PFA) in the whole building. UFA includes the foyer, lobby, footpath, corridor, public toilet, elevator or stair hall, staircase, elevator shaft, elevator machine room, garbage chute, piping shaft, fire control room, water pump house, water tank room, refrigerator room, fire fighting access, switch room or substation, gas pressure regulating room, satellite television receiving room, air conditioner room, water boiler room, swing room for liftman, on-duty guardroom, room for real estate administrator, and all of the rooms for serving the households in the building. Besides the outside walls (including the gable), the walls separating UFA and PFA are also counted, which are measured by half of their floor area. PFA means the total floor are (TFA) of the whole building subtracting the total UFA, sales and hired independent basements, and garages. The coefficient of PFA shared by all households is the division of PFA over the summation of the total UFA of the whole building. In most of the cases, the coefficient of PFA is roughly 0.4 therefore, FA=UFA*0.4+UFA (Ka Man Lau, Si-Ming Li,2006).

¹¹ Per-capita disposable income= per-capita total income - income tax

1993	3296	3.2	10547.2	2252.75	135164.84	12.82
1994	4731.2	3.2	15139.84	2738.26	164295.30	10.85
1995	5858.4	3.1	18161.04	3505.56	210333.33	11.58
1996	6885.5	3.1	21345.05	3866.74	232004.37	10.87
1997	7813.1	3	23439.3	5480.09	328805.62	14.03
1998	8472	3	25416	4769.23	286153.85	11.26
1999	9182.8	3.1	28466.68	4786.47	287187.95	10.09
2000	10349.7	2.9	30014.13	4556.89	273413.49	9.11
2001	11577.8	2.9	33575.62	4715.74	282944.57	8.43
2002	12463.9	2.9	36145.31	4467.09	268025.43	7.42
2003	13992.6	2.9	40578.54	4455.99	267359.27	6.59
2004	15637.8	2.9	45349.62	4747.13	284828.07	6.28
2005	17653	2.9	51193.7	5852.69	351161.34	6.86
2006	19978	2.9	57936.2	7375.51	442530.61	7.64
2007	21989	2.8	61569.2	10661.28	639676.58	10.39
2008	24725	2.8	69230	11648.25	698894.71	10.10
2009	26738	2.8	74866.4	13224.14	793448.55	10.60
2010	29072	2.5	72680	17150.82	1029049.44	14.16

Source: Beijing Municipal statistics Bureau, 1992-2011. AP is calculated by using Total sales of residential building divided by Floor space of residential building sold. The values are in Table.2. and Table.3.

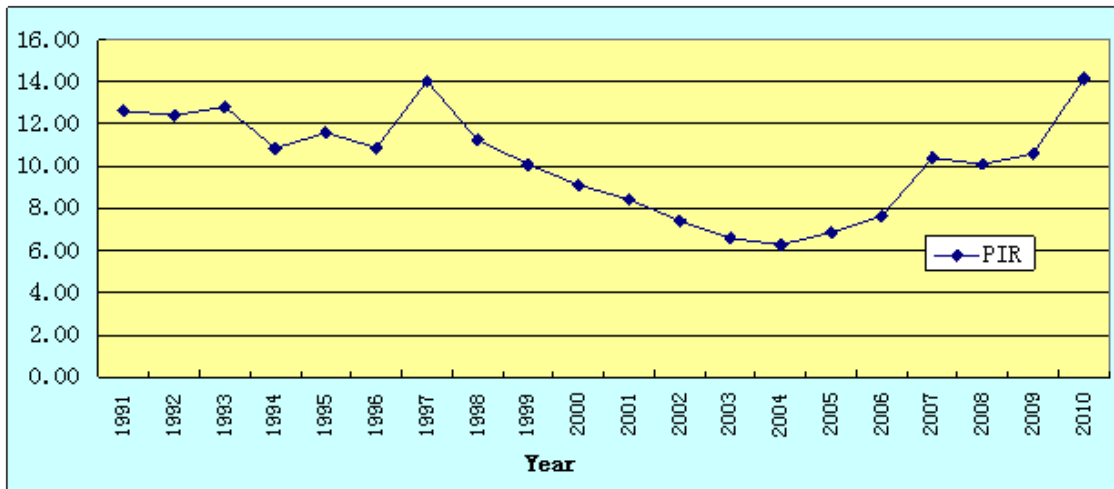
The FA is the generally accepted area of majority of residential properties in Beijing, which is between 50m² to 70m². Therefore 60m² was the average residential property size analyzed. Also note that the average per-capita living space in Beijing is about 20m² (Beijing Bureau of statistics, 2010), so the typical floor area of an average household (three people) is

around 60m².

Results for price-to-income ratio computation

The results of PIR computation are given in the last column of Table.4. In the first three years PIR had been moving steadily and then fell from 12.82 to 10.85 between 1993 to 1994, mainly as a result of rapidly rising incomes. For the next three years, the income continued to rise but because the residential price per m² rose even faster, in 1997 the PIR reached a peak at 14.03. This may also be because the Asian Financial Crisis struck in 1997 (Ka Man Lau, Si-Ming Li, 2006). For the next seven years the PIR trend started to decrease from 14.03 to 6.28 between 1997 to 2004, and this is due to the rise of personal income and the nearly flat price trend per m² of residential property. 6.28 is the lowest PIR of this study. During the six years from 2005 to 2010, the PIR had been increasing sharply, as per capita income continued to increase but the price of residential buildings rose even faster. As a result, the PIR reached a second peak of 14.16 in 2010. Especially in 2009 and 2010, the PIR increased 33.6% from 10.60 to 14.16. The higher the Price-to-income ratio, the lower the affordability. Hence we witnessed the much sharper increase of PIR in the later year of the study period.

Figure.7. Price-to-income ratio of urban household in Beijing, 1991-2010.



Source: Original numbers from Beijing Municipal Statistics Bureau, PIR is Own computation from table.4.

This graph has been computed by using the price-to-income ratio, and it shows the general trend of price-to-income ratio. The higher the Price-to-income ratio, the lower the affordability for citizens.

Chapter-5 Discussions

Based on the result from the previous chapter, the total population in Beijing is growing very fast and per-capita living space is also increasing due to the development of real estate.

Total investment in real estate is still increasing each year, showing that the demand of real estate is still high. The total space of real estate property sold reached a peak in 2006, and now the trend is coming down because of the low affordability.

The general trend of Beijing real estate development is still increasing. Real estate properties are mainly built for residents, but the price is so high that people cannot afford to buy it, so the residential price should lower. The government can take control of this situation, and they can propose land and housing policies. The government can implement tighter control of the land supply, monetary supply, and have stricter bank lending policies and can lessen the property tax. The most important thing is to provide affordable housing. The other reason why the property is so expensive, is because developers want to make a very high profit, and if they lower their profit, the residential price will also be lower.

(Hou 2009) Says in China, deeply influenced by traditional lifestyle or culture for thousands of years, people prefer to buy housing rather than rent when a new family is formed. Usually a household is not regarded as having settled down by close relations or friends until they have their own housing.

With high price of residential real estate and low affordability, people should just rent housings instead of buying properties even with new formed family, traditional habit should be changed over time.

In Beijing government should also regulate the housing prices, by tightening monetary policy or other methods. On other hand government should provide more affordable housing for high-income or mid-income families to buy the house. For the low income families government should provide low-cost rental houses. This way all the citizens will have a shelter

to live.

China is developing very fast, most of the cities in China are developing not only in Beijing. Beijing citizens and a lot of the immigrants should move to the surrounding cities, which is not far away from Beijing. With the same amount of money the life quality is higher and the living standard is also higher. And they will have a better opportunity to get a job.

Chapter-6 Conclusions

This bachelor thesis analyzed Beijing residential real estate development in the period from 1991 to 2010. A review theoretical literatures to the topic has been presented. Analysis of real estate market shows a strong influence by government monetary policies, economy factors, demographic factors and interest rate factors.

Method used in this bachelor thesis is based on time-series analysis, which are mainly Base index, Chain index, trend function and coefficient of determination. Base index illustrated the percentage changes of development based on 1991. Chain index showed us the percentage changes based on previous year figures. Using trend function and coefficient of determination we can see the general development trend and to forecast for the future.

Beijing real estate has developed very fast, rapid economic growth, population increase, and now there are several signs that illustrate Beijing's residential real estate is in a stage of boom. First is that the total investments are still in an increasing trend, in 1991 total investment is 2400 million Yuan and in 2010 it increased to 290110 million Yuan. It increased 11988% over last twenty years. Secondly total sales of residential property are also increased from 2160 million Yuan to 206050 million Yuan from 1991 to 2010. Thirdly the space of residential building sold and floor space of residential building completed are also in an increasing trend. And lastly the average price per m² of residential property is also increasing, from 1416.39 Yuan in 1991 to 17150.82 Yuan in 2010.

Forecast in the area of total investment, total sales of residential property, total floor space area sold and space area residential building completed are all in an increasing trend for 2011, 2012 and 2013. Forecast for living space per-capita is also increasing.

Housing affordability in Beijing is low, by using price-to-income ratio, shows that in Beijing 60m² residential property with low affordability. Residents income increased each year, but the housing price is even increased faster than income, and also with increasing population and immigrants, so the residential properties affordability is very low.

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