Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economic

Analysis of Hefei commercial housing market

Name: Bc. JING HU

Supervisor: Tomas Maier

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

Bc. Jing Hu

Economics and Management
Economics and Management

Thesis title

Analysis of Hefei Commercial Housing Market

Objectives of thesis

The objectives of this paper are based on Hefei real estate industry data and macroeconomic annual data to evaluate the current situation and find problems in Hefei real estate market by using PEST analysis and ratio analysis, and then provide some suggestions according to the problems.

Methodology

(1). Literature research. Read the related literatures to know the information of Chinese real estate market, and different opinions of different scholars on Chinese real estate market will be summarized in order to understand Chinese real estate market and provide ideas for my diploma thesis.

(2). PEST analysis.Research the macro-environment of the commercial housing market in Hefei by using PEST analysis to analyze the impact of the macro environment on the commercial housing market in Hefei

(3). Ratio analysis. Ratio analysis method is based on 2004-2018 of Hefei real estate industry data and macroeconomic data in Hefei to calculate some indicators, for example prices-to-income ratio, and then summarize the problem.

The proposed extent of the thesis

60 – 80 pages

Keywords

Ratio analysis, PEST, real estate market, Hefei city, China

Recommended information sources

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The Diploma Thesis Supervisor

Ing. Tomáš Maier, Ph.D.

Supervising department

Department of Economics

Electronic approval: 1. 4. 2020

prof. Ing. Miroslav Svatoš, CSc.

Head of department

Electronic approval: 5. 4. 2020

Ing. Martin Pelikán, Ph.D.

Dean

Prague on 06. 04. 2020

Declaration

I declare that I have worked on my diploma thesis titled "Analysis of commercial housing market" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on 06.04.2020 _____

JING HU

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Analysis of Hefei commercial housing market

Abstract

The diploma thesis mainly analyzes the relevant information of the commercial housing market in Hefei to find its problems and put forward suggestions. The thesis divides into fifth parts. The first part introduces the background and introduction of the Hefei commercial housing market. The second part introduces the objectives and methodology of the paper. The third part introduces the literature theory of the commercial housing market. The fourth part introduces the theoretical basis of the commercial housing market. The fifth part introduces the history of the commercial housing market in Hefei, analyzes the relevant market indicators of the commercial housing market in Hefei from different perspectives, analyzes the existing problems according to the relevant analysis results of the commercial housing market in Hefei, and puts forward corresponding suggestions according to the problems.

Keywords: China, Hefei, PEST, Commercial Housing Market, Housing Prices

Analýza trhu komerčního bydlení Hefei

Abstrakt

Diplomová práce analyzuje zejména relevantní informace o komerčním trhu s bydlením v Hefei, aby zjistila jeho problémy a předložila návrhy. Tato teze je rozdělena do pěti částí. První část představí Hefei základům a prezentaci komerčního trhu s bydlením. Druhá část obsahuje cíle a metodiku práce. Třetí část se zaměřuje na literární teorii komerčního trhu s bydlením. Čtvrtá část popisuje jeho teoretický základ. Pátá část pojednává o historii komerčního trhu s bydlením v Hefei. Dále analyzuje relevantní tržní ukazatele trhu s komerčním bydlením ve vybraném místě z různých perspektiv, rozebírá stávající problémy podle podstatných výsledků analýzy a předkládá odpovídající návrhy.

Klíčová slova: Čína, Hefei, PEST, Trh komerčního bydlení, Ceny bydlení

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List of abbreviations

CNY----China Yuan

GDP…..Gross domestic product

1. **Introduction**

Housing is the primary material condition for the survival and development of human society, is one of the necessities in the development of human society. In 1978, the Chinese government carried out the Reform and Opening-up Policy, people's life is getting better and better. At the same time, Chinese government gradually implemented commercialization of housing. Until 1998, commercialization of housing was officially implemented. After 1998, Chinese government adopted a series of policies to encourage and promote the development of the real estate industry, real estate industry officially began to develop rapidly, especially commercial housing market. The rapid development of the real estate industry has a significant impact on economic development, investment, and domestic consumption. Not only has it become one of the pillars of the national economy, but it has also driven the development of related industries, such as construction, finance. Thereby, the real estate industry plays an essential role in the sustainable development of China's economy. However, while the rapid development of the real estate industry, it also brings a series of problems. First, the real estate industry is a high-profit industry. During its rapid development, the state did not carry out strict supervision, which led to more and more companies or individuals to engage in speculation. Although the Chinese government has stepped up regulation in recent years, real estate market is still unhealthy. Second, around 2010, some governments blindly invested in the real estate industry for the sake of economic benefits while ignoring the reality, which violated the law of the market and resulted in high vacancy rates in many places. Until now, the problem has not been solved. Third, with the development of real estate industry, the price of housing has been soaring. In China, most people are middle and lower class, and they do not have enough money to buy their own houses. However, due to the pressure of reality, many people must carry the debt to buy a house, with a heavy debt burden, it has severely affected people's lives. In a word, these problems

need our attention.

Hefei, as a central city, the development of the real estate industry in Hefei was relatively slow, and it was not until 2004 that the real estate industry officially began to develop. After then, the Hefei real estate industry developed rapidly. At the same time, Hefei, as a potential city in the pan-urban belt of the Yangtze River delta, has attracted many real estate speculators to speculate on real estate. On the one hand, it has led to the rapid development of the real estate market and the economy of Hefei, and on the other hand, it has also brought the real estate overheating, especially in 2016. In 2016, housing prices in Hefei rose sharply under the impetus of real estate speculators, Hefei's house prices rose first in the world, the commercial housing market overheated. Then the Hefei government implemented some policies to curb the overheating of the real estate market and cracked down on speculators, the real estate market has gradually returned to rationality, but there are still many problems.

2 Objectives and methodology

2.1 Objectives

The real estate market determined by the level of economic; in turn, the real estate market also plays a vital role in economic development. The real estate market and the economy are two-way relations. Therefore, a better understanding of the real estate development status and existing problems can better put forward opinions and suggestions for the future development of the real estate market, to promote better economic development.

This paper focuses on the analysis of the commercial housing market in Hefei. First, introduce the history of the Hefei commercial housing market in order better to know the background of Hefei real estate market. Then, Understand the macro environment of the Hefei commercial housing market through PEST analysis to understand the impact of the macro-environment on commercial housing. Third, analyze the current situation and related indicators of the Hefei commercial housing market to know the information of the Hefei commercial housing market and the current development trend of the commercial housing market. Finally, according to the current analyzed situation and development trend of the Hefei commercial housing market, put forward corresponding questions, and give suggestions.

Overall, the main objective of this paper is to analyze the current situation of the commercial housing market in Hefei from an economic perspective and to raise questions and give their suggestions.

Hypothesis 1: What's the dependency between sales prices (CNY/m^2) and GDP?

Hypothesis 2: What's the dependency between real estate investment and GDP?

2.2 Methodology

2.2.1 Comprehensive literature research

Research on Hefei commercial housing market must rely on all aspects of the

data and summarize and analyze the data to understand the Hefei commercial housing market. The information I need is that published papers and real estate related books, the data related Hefei commercial housing market from China National Bureau of Statistics and Hefei Statistical Yearbook, the website related Hefei real estate industry.

2.2.2 PEST analysis

PEST analysis is the analysis of macro-environment factors. For an industry or company, macro-environment factors play an essential role in the industry or company. In general, PEST analysis carried out from four aspects. They are political factors, economic factors, social and cultural factors, and technology factors.

Different countries have different social characteristics, and even there are different policies in different periods of the same country. Politics factors are not only the political system, the attitude of the government, law, and regulation, but also included tax policy, investment policy, environment protection, regional relations, the number of patents, level of defense spending, government subsidy level, etc. Different countries have different social characteristics, and even there are different policies in different periods of the same country.

Economic factors are a crucial factor in PEST analysis, which includes macro and micro-content. In the aspect of macro, it includes GDP and its changing, population and its trend, exchange rate, import and export, fiscal policy, etc. In the aspect of micro, it includes income levels, consumer preferences, savings, and employment levels of consumers in service areas. These factors determine the current or future development potential of the industry or company.

Social and cultural factors refer to the social environment and cultural background of a country or region. Among them, the social environment includes the proportion of population structure, number of marriages, number of divorces, birth and death rates, per capita income, way of life, cultural background includes education level, people's value, religion, etc.

Technology factors includes not only the invention, but also the emergence, development trend and application background of new technologies, new processes and new materials related to the enterprise market.

This article uses PEST analysis to analyze the macro environment of commercial housing in Hefei, to understand the impact of the macro-environment on commercial housing.

2.2.3 Quantitative and qualitative analysis

This paper studies and analyzes the commercial housing market in Hefei and collects relevant data of the commercial housing market in Hefei from 2004 to 2018 for analysis. Meanwhile, it uses ratio analysis to analyze prices-to-income ratio and uses econometric model to analyzes hypothesis and get the results in order to better understand the relationship among them. Finally, it analyzes the current situation of the commercial housing market in Hefei for summary and analysis, then obtains the existing problems and puts forward its own opinions and suggestions.

3. Literature Review

As an objective of physical form, real estate refers to the general term of house and estate, including land, permeant buildings on the land, and other rights derived from other forms. House means that buildings on the land, such as residences, factors, commodity houses. Estate refers to the land and its upper and lower space, including various underground infrastructures and surface roads. Real estate is also called immovable property in economics because of its characteristics – fixed and immobility. This paper focuses on commodity houses.

The development period of real estate in China is much shorter than in Western countries. Although the real estate market in China is recent boom years, and many companies join the competition, the price of real estate is too high to increase the people's burden decrease the life level of people. We need to learn from the experience of scholars to find the factors affecting real estate market. Of course, these factors affect the real estate market through real estate prices.

Joseph Gyourko, Richard Voith (1992) used a long time series (1971-1989) and a large cross-section (56 metro areas in the US) to analyzed how the national economy has an important role in housing prices and what factors can influence housing price. They found that the national economy can affect housing prices, and except the national economy, location, equipment, geography also have an influence on housing prices. Generally, the richer the place, the higher the house price. [1] Craig Swan (1995) used MWD and time-series estimate to analyze the demand for housing in order to test if Mankiw and Weil's (1989) 's conclusion about the demand for housing was correct. Meanwhile, he predicted future housing price and found the factors which are affected by housing price. He concluded that Mankiw and Weil's conclusion was incorrect. He predicted the housing price by combining with the cost and the future supply of house, he thought that housing price is related on income, geographic and real interest rates, the demand of house was determined by income, real interest

rate, etc. [2] Winston T.H. Koh, Roberto S. Mariano, etc. (2005) applied the model of investor optimism and bank lending to the Asian financial crisis by using data for five Asian countries (Thailand, Malaysia, and Indonesia. Hong Kong and Singapore) in order to examine the underpricing hypothesis for its impact on asset prices. They analyzed it from different aspects, such as macroeconomic, policy, etc. They compared with different four regions, and according to the case of these, government policy, currency, bank lending, etc. can affect the demand of house, then lead to the fluctuation of housing price. [3] Christopher Crowe, Giovanni Dell'Ariccia, etc. (2013) focused on analyzing some questions related to real estate, for example, what would be the policy tools at their disposal? etc. They explored these questions in many countries and aimed to provide some advice for the government in dealing with real estate booms and busts, encouraged scholars to analyze the real estate market, and improved a more comprehensive understanding of the real estate market. They analyzed these by different aspects, such as leverage, policy, illiquidity, opacity, and network, etc. Finally, they found that loan rates, monetary policy and GDP, CPI, property rates were influenced on real estate price, and then affected the demand of real estate market, they restrained real estate overheating.[4] Eugenio Cerutti, Jihad Dagher and Giovanni Dell'Ariccia (2017) analyzed the reasons why house prices fluctuate from the aspects of family credit and finance, they collected the data of household credit in 53 countries, and they set the control variables to include housing finance characteristics and other variables used in the house-price boom literature (the log of per-capita real GDP, the level of short-term interest rates, household indebtedness, the VIX, GDP growth, CPI inflation, and the current account balance in the per- cent of GDP) and used an econometric model to analyze the relationship between household credit and housing finance. They concluded that household credit and basic economic fundamentals affected house price and retrained the house boom. Meanwhile, the higher the level of household indebtedness, the higher the probability of a house-price boom ending in a recession.[5]

Of course, China's scholars also study the real estate market and real estate price. Yue Shen, Hongyu Liu (2004) collected the data about 14 cities from 1992-2005 that it included housing price and economic fundamental and used the Dummy Variable Regression Model in order to research the relationship between housing price and economic fundamentals. They set some variables, such as CPI, income, popular, unemployment rate, etc. They concluded that economic fundamentals have an important role in housing price and change of economic fundamentals caused the change of housing price, then led the change in demanding of real estate. [6] Jingkui Zhou(2005) examined the relationship between housing price and monetary policy by using housing price data and macroeconomic data, then they used single integration and co-integration test method and error correction model, analyzed the relevant data, they found that the level of housing price in each city was cointegrated with the investment amount, the sales amount and the price of the lagging period. Due to bank loans in most of investment and sales, it suggested that rising residential price were closely linked to loose monetary policy.[7] Yunfang Liu, Tiemei Gao(2007) divided 28 provinces into three regions-Western Region, Eastern Region and Middle Region and they used error correction model and panel data model to find what factors determine changes in real estate prices from the aspect of monetary policy. Monetary policy is contained interest rate policy and credit policy, and they found that the impact of monetary policy on housing prices in different regions was different, which in turn led to the demand of real estate, it related to the development of economic, finance, etc. [8] Hui An, Ruidong Wang (2013) used Vector Autoregressive (VAR) model to analyzed the factors that determined by real estate prices in China and examined the different influences with different policies. They set eight variables, including economic fundamentals and non-economic fundamentals and then they built the formula and analyzed it from aspects of demanding and suppling. They found that improving deposit reserve ratio can restrain the demand for investment purchase and it was the most effective monetary policy. [9]

George P. Parsons (1992) examined the impact of land restriction on housing price in Chesapeake Bay by observing the changes of housing price because Critical Areas Commission of the state of Maryland formulated a set of land use restriction for restraining real estate development. He used a repeat sale analysis to estimate policy effect. He found that the housing prices in the Chesapeake Bay had increased to varying degrees according to the distance from the city. The closer to the city, the higher housing price increased. Overall, land supply had an influence on housing price.[10] Edward L. Glaeser, Joseph Gyourko, Albert Saiz (2008) used a simple model to understand boom-bust housing cycles, and they thought that housing supply should incorporate. They collected the data that it contained annual house price and quantity data from 1982-2007, they divided some periods to booms and busts, and according to the data in different periods, they got the conclusion due to the results. They concluded that places with more elastic housing supply had fewer and bubbles, with smaller price increased. The place that it was more elastic housing supply decreased the housing bubble and prices increased lower. In a word, housing supply had effect on housing price and then housing price affected on housing bubble. [11] Andrew Paciorek (2013) researched the relationship between the fluctuation of housing price and the control of housing supply. They used a dynamic structural model of housing investment to examine the relationship. They collected the data and formulated the formula from the aspects of demanding and supply, and built the chart about mean house price, MSA Volatility vs Regulation, Housing investment. They found that the fluctuation of housing price existed delay in different cities with the control of housing supply implemented. A city with controlled housing supply was much difference than non-controlled city. Finally, they concluded that control increased the delay of many processed in housing supply and marginal costs, it led to huge differences in housing prices between cities. Meanwhile, geographic also limited the size of house, it also caused price differences. [12] Crocker H. Liu, Adam Nowak, Stuart S. Rosenthal (2016) developed a model to examine the possibility of within-

city heterogeneity in response to a bubble. They collected the data from Arizona Regional Multiple Listing Service, the data were proprietary and provided information on single-family homes listed, sold, or rented from January 2000 through September 2013. They found that real estate's booms and busts cycle caused the different situation in different period. On the side of boom in real estate market, the real estate companies adjusted their supply plan and tried to sustain the relative stable between low- and high-quality segments of the housing market; on the side of busts, the companies decreased their construction and increased the pressure of their credit and debt, and then the price was collapsed.[13]

Lin Liu, Hongyu Liu (2003) analyzed the relationship between land price and house price, then understand the interaction between land price and house price. They were analyzed their relationship from the perspective of economic from the aspects of causality and mathematical relationship. On the aspect of causality, they thought that land price was one of factors pushed up housing price; on the aspect of mathematical, they built the formula and set the variables, such as land price, tax, construction and installation cost of buildings. They concluded that land price was a positive correlation with housing price.[14] Jinming Wang, Tiemei Gao (2004) used a time-varying parameter model to analyze the real estate market from two aspects of supply and demand. As the aspect of supply, they set some variables, including investment, debt rate, housing sale price, etc. In the supply formula, they concluded that the elastic of interest rate is higher than other variables, it indicated that real estate companies were sensitive to changes in interest rates; also, the price was one of factors affecting whether real estate developers increase investment, and if companies enlarge their investment in real estate market due to high profits, the bubble will form.[15] Guangcan Cui(2009) used the panel data model to analyze the relationship between macroeconomic and housing price. They collected the data of 31 provinces from 1995-2006, set ten variables, such as population, income, GDP, CPI, interest, housing price, supply and social investment, consumption, housing investment, then used the

panel data model from two aspects of GMM and OLS. They concluded that the fluctuation of macroeconomic had effect on the fluctuation of housing price, especially interest rate and inflation. As the aspect of housing supply, the fluctuation of housing supply influenced social investment, and then stimulated housing investment.[16] Dong Yang, Yi Yang(2014) divided real estate supply to land supply, increment supply and inventory supply, they based on the housing supply in recently ten years to analyze the influence of housing price. They employed the formula from two aspects of demand and supply. Then they concluded that in the macro-environment, the housing price was determined by increment supply and inventory supply. Increment supply was significant at the 1% level, and inventory supply was significant at the 10% level, land supply wasn't significant for housing price. Overall, increment supply and inventory supply had affected the housing price.[17] Peng Zhang, Bo Gao (2018) used statistical data to calculate supply elasticity and then analyzed the relationship between housing supply elastic and housing price. They collected the housing price data and the data of housing supply from 35 cities in China, then examined the relationship between the elastic of housing supply and the fluctuation of housing price. They found that the elastic of housing supply was negative in 19 cities, others were positive in 16 cities. They concluded that the relationship between the elastic of housing supply and housing price existed negative. The elastic of land supply was all negative in first-tier cities, and it was less than average. The intervention in the real estate market should start from the source of land supply and strengthen the flexible management of land supply.[18]

In a word, although the research background and starting point of these theories were different, they were common in the following aspects: the real estate market is affected by many factors, and these factors affect the real estate price through supply and demand, and then affect the development of the whole real estate market.

4. Theoretical part

4.1 Definition of real estate and real estate prices

4.1.1 Real estate

Real estate is a comprehensive and complex concept, it not only mainly includes land, building, and other derivative interests, but includes physical form and other legal rights based on the physical rights, it is also named as immovable property.

Real estate is the general name of land property and housing property. Land property refers to all land and buildings within a certain space above and below it; housing property refers to all kinds of buildings built the land. Real estate can be divided into different types according to different standards.

4.1.2 Real estate prices

Commercial housing prices mean market prices, and it reflects the market value and the number of money people spend on commercial housing. It is a comprehensive reflection of the market value of each indicator. Commercial housing prices not only reflect the price of land and building but also reflect the wage, tax, management fee, etc.

4.2 Commercial housing market

4.2.1 Definition of commercial housing market

The real estate market is the market or field engaged in the sale, lease, mortgage, and other trading activities related to real estate. The commercial housing market is essential in the real estate market, and it is related to people's living. Real estate market is the foundation of real estate economic operation, is an essential part of the commercialization of real estate, it includes not only tangible goods, such as residential housing, commercial housing, etc. but also includes intangible goods, such as prices, different styles of the transaction, etc.

The commercial housing market is a part of the real estate market and plays a vital role in the real estate market. The commercial housing market is mainly commercial housing transactions between real estate companies and consumers, including forms, housing prices, supply and demand, option mechanisms of the commercial housing market, etc.

4.2.2 Characteristics of commercial housing market

1. Regional. Houses built on land, and the land is immovable, so one of the houses' characteristics is immovable. Immovable houses determine regional commercial houses market, and commercial houses market influence the local market and cannot spread to other places like other goods. Commercial houses market in different areas has differences according to the level of economic development, such as prices, supply, demand, and others.

2. Scarcity. In China, there are 1.4 billion people, and with the development of time, it will increase more and more; meanwhile, the number of houses fixed as land is nonrenewable resources, the supply of houses fixed, but the demand of houses is increasing with the growth of population, the supply of houses cannot meet the demand of people's living. Now, the contradiction between supply and demand is more and more growing.

3. Diversity of transaction forms. In the commercial housing market, there are different transaction forms, such as buying, lend, mortgage, pawn, etc.

4. Imperfectly competitive market. In China, the right to land ownership belongs to the government, companies, and people have only 70 years of land use rights. The government has its rights to control the supply of land, and then control the supply of houses. Meanwhile, the commercial housing market is a high cost and high-profit market, companies need enough capital to invest in the commercial housing market, and return in commercial housing market needs long-term time, so if companies want to enter or exit commercial housing market, it is very hard. At the same time, more

and more companies invest in the commercial housing market due to high profit, but sometimes many companies are an irrational investment and then lead to mergers or bankruptcy by other large companies due to information asymmetry. Information asymmetry makes the market mechanism challenging to adjust the supply and demand in the market, so the government should strengthen appropriate intervention and regulation to make the real estate industry usually develop. The government also can build some low-rent housing or affordable housing to ease the contradiction between supply and demand.[20]

5.Speculative. Houses not only have residential properties but also have value preservation, even have speculative. In China, Housing as a necessity, but with the prominent contradiction between supply and demand, the demand is over the supply, the commercial housing market is in the seller market. At this time, no matter how high the price is, someone will always buy it. Moreover, the value of housing is too high, and housing prices are unstable, many people buy houses with lower prices and sell them at higher prices. They get the profit from the transaction in the commercial housing market as speculators.

4.2.3 Operation mechanism of commercial housing market

In China, the commercial housing market is unique, and it is not just like general goods. First, the government has the ownership of land, and real estate companies can buy land use rights from the government. Second, real estate companies build commercial housing, and consumers buy houses according to the housing prices. Housing prices are a crucial factor in the commercial housing market, and the housing price level has an impact on consumers and real estate companies. Changes in prices will cause a series of changes in the entire real estate market. High housing prices can attract more and more companies to invest real estate market; the supply of commercial houses will increase; market resources will allocate. However, in general, more market resources are biased towards large enterprises. At the same time, as

housing supply increases, there will be a small drop in house prices, but because houses are a necessity, house prices will not fall too much, and if there is behavior that violates market rules, the government needs timely intervention. Low house prices do the opposite. Overall, the commercial housing market is a specialized market; the various links of the commercial housing market cooperate and interact with each other. On the one hand, it is the function of the market mechanism, and each indicator can influence the commercial housing market, such as supply, demand, housing prices, etc. On the other hand, the government should intervene in time when the market fails and promote the development of the commercial housing market.

5. Hefei real estate market

5.1 Introduction Hefei

Hefei city is the capital of Anhui province, Sub-center of Yangtze river delta city cluster, comprehensive national science center, "One Belt and One Road" and the Yangtze river economic belt strategic two-node city, National important scientific research and education base, modern manufacturing base and comprehensive transportation hub. Hefei city is in the middle of China, and the total area of Hefei is 11,445.1 square kilometers. In 2018, the population of Hefei is 7.58 million, of which 7.0796 million have household registration, the GDP is 782.29 billion Yuan.

5.2 History of Hefei commercial housing market

Since 1978, the development of real estate market was stable and after 2000, it has developed rapidly and fiercely with the reform of real estate marketization. Now, the real estate market is returning to rationality and is constantly developing under the influence of market laws. Overall, the development history of Hefei's real estate market is divided into different stages:

5.2.1 1978-1997: Hefei commercial housing market developed steadily

In 1980, China carried out the reform in real estate market. China defined real estate as a commodity. The reform of housing and land was implemented at the same time, China real estate market became an industry, and entered a stage of slow development. In 1987, Shenzhen introduced Hong Kong's land auction system and held state-owned land auction system for the first time in China, it urged real estate industry to accelerate its development. In 1988, the reform of housing began to full pilot, the land imprisonment was completely released. On February, 1988, China State Council issued "Implementation Plan of the State Council on the Reform of the Phased and Phased Urban Relocation Housing System" , it identified eight reform

measures: the method of rationally adjusting the rent of public housing and determining the subsidy coefficient of housing vouchers, benefiting from more housing, more rent and less housing, establishing housing funds, selling public housing, improving the housing financial system, tax incentives and strengthening market management. In 1991, the State Council carried out the housing reform in 24 provinces, real estate industry entered to a new phase. Since then, real estate industry was developed rapidly, especially in coastal cities.

However, in this phase, the rapid development of real estate industry is limited to coastal cities, Hefei as a central city, real estate industry was in its infancy, and it was developed slowly.

5.2.2 1998-2003: Housing marketization was gradually accelerated

In 1980, China carried out a reform in the real estate market. China defined real estate as a commodity. The reform of housing and land implemented at the same time, China's real estate market became an industry and entered a stage of slow development. In 1987, Shenzhen introduced Hong Kong's land auction system and held the state-owned land auction system for the first time in China, and it urged the real estate industry to accelerate its development. In 1988, the reform of housing began to full pilot, and the land imprisonment was released entirely. In February 1988, China State Council issued On July 3, 1998, China government-issued "Notice on Further Deepening the Reform of the Urban Housing System and Accelerating Housing Construction," it was an iconic event in the Chinese real estate market. From this moment, it marked the beginning of the full marketization of real estate. In 2003, the State Council issued "Notice on Promoting the Sustainable and Healthy Development of the Real Estate Market," it officially clarified the national economic pillar of the real estate industry. After then, the status of real estate in the national economy was rose rapidly and became a growth point in economic growth. In June 2004, China government carried out some measures in order to cope with real estate

overheating. Nevertheless, after the SARS outbreak, China's economy was severely affected; the growth of the economy slowed down rapidly. In order to stimulate the economy, the real estate industry once again ushering in recovery.

In this phase, Hefei started to develop the real estate industry, especially the commercial housing market. There were more and more real estate companies in Hefei, and different types of houses, such as commercial housing, common use of unit-funded housing, government housing projects (including affordable housing, etc.). Meanwhile, housing prices were generally lower.

5.2.3 2004 – 2014: Commercial housing industry was overheated

From 2004, Hefei's real estate industry entered a period of rapid development. Although in this phase, the government carried out many measures to regulate the real estate market, Hefei real estate market went up, the level of market development surged, and house prices were rose rapidly. In 2008, there were economic crises in the world; real estate industry was a downturn. In December 2008, the State Council developed a series of measures to stimulate the real estate market, such as cut interest rates, relax real estate credit, etc., real estate market exploded, housing prices, and volume were rose rapidly. The real estate market was overheated. In order to curb real estate overheating, the State Council promulgated a series of measures within a few years, real estate overheating was suppressed, but real estate prices were still high.

In this phase, Hefei Commercial housing prices had risen from "￥2270" to "￥6917", and commercial housing sales have risen from "3.09 million m^2" to "13.26 million m^2". Prices were rose and prospered. In the meantime, large-scale real estate companies of various brands entered the Hefei market, and Hefei's real estate development had steadily improved.

5.2.4 2015 - Now: Commercial housing market is gradually returning to rationality

On August 2, 2014, Hefei officially canceled the purchase restriction policy. In

2015, the central bank cut interest rates several times, set a low-interest record rate. Meanwhile, Hefei continued to relax commercial housing loans, decreased the down payment ratios for the first and second homes reduced, etc. These measures alleviated the pressure on Hefei's inventory to varying degrees and promoted a new round of rising in real estate prices. From the end of 2015, Hefei's real estate market began to explode. Commercial housing prices increased sharply, even rose first in cities across the country, and commercial housing prices in China rose sharply, it seriously damaged the stability of society and people's living standards. In order to curb overheating in real estate, on October 2016, China government implemented strict macro-control over real estate market, Hefei commercial housing market went down, and commercial housing market is gradually returning to rationality. In 2018, China continued to adhere to the leading tone of "do not speculate on real estate," established a sound long-term mechanism, and promoted the stable and healthy development of the real estate market. Now, Hefei's commercial housing prices are stable, and speculation behavior slows down, the commercial housing market is gradually returning to rationality.

5.3 PEST analysis in commercial housing market

5.3.1 Politics factors

In recent years, the price of commercial housing was on the rise rapidly. The central government formulated many policies to curb rising house prices, and Hefei government implemented the policies according to the actual situation of Hefei and the instructions of the central government, the policies had a great impact on commercial housing.

1. Credit policy.

In 2013, the State Council issued *The Guiding Opinions of the General Office of the State Council on Financial Support for Economic Structural Adjustment and Transformation and Upgrading*. The guiding opinion required that local government

should continue to adhere to the principle of "holding pressure and keeping pressure" on the real estate industry, implemented differentiated credit policies, and further curbed investment demand and promoted the healthy development of the real estate market. Then the People's Bank of China and China Banking Regulatory Commission issued *The Notice on Issues Relevant to Improving Differential Housing Credit Policy* according to the guiding opinion, and it required that local commercial banks should restrict commercial mortgages while cracking down on speculative commercial loans. In 2016, the Hefei government began to implement strict loan restriction policies and has continued to the present. At present, the first home loan interest rates of major banks in Hefei have basically floated 10-15%, and the second home loan interest rates have generally risen 15-20%.

Table 1   Limit loan policy in Hefei

Property	Loan	Down payment
No property	No loan	30%
	One loan record, cleared	40%
	One loan record, outstanding	50%
	Two or more loan record, cleared	60%
	Two or more loan record, outstanding	Stop loan
A property	No loan	40%
	One loan record, cleared	40%
	One loan record, outstanding	50%
	Two or more loan record, cleared	60%
	Two or more loan record, outstanding	Stop loan
Two or more properties	Stop loan	

Source: https://new.qq.com/omn/20200122/20200122A0GG3F00.html

2. Land policy

In 2016, China government proposed that "houses are used for living, not for speculation." in order to curb the overheating of the real estate market and prevent

fluctuations in the real estate market. Meanwhile, the Hefei government carried out some policies to implement central government policies. In the aspect of land supply, the Hefei government further increased the supply of residential land. Meanwhile, the Hefei government adjusted and controlled the proportion of commercial land and increased the proportion of residential land in commercial land. Among them, the proportion of small and medium-sized commercial housing around 90 square meters must be above 50%, and it can ensure the housing needs of the people and meet the improvement needs of others.

Strengthen supervision and review of residential land and residential land companies. The Hefei municipal government set up a special supervision team to supervise all aspects of the agreed land supply contract, managed all aspects of the contract approval, and corrected the existing problems. If the company intentionally leaves the land idle and does not carry out illegal construction according to the land contract, the supervision team will thoroughly investigate.

3. Purchase restriction policy

In 2016, the Hefei government implemented a purchase restriction policy, and now, it still implements. Hefei government stipulated that if Hefei urban household registered residents have two and more houses in Hefei urban area, real estate companies should suspend the sale of new commercial housing to them; if Hefei non-urban household registered resident has one and more houses or cannot provide the proof of income tax or social insurance that has been continuously paid for more than one year in Hefei urban area every month within two years before the date of purchase, real estate companies should suspend the sale of new commercial housing to them. Among them, new commercial housing is subject to the contract filing time, and existing housing is subject to tax payment time. Meanwhile, Hefei government required that real estate companies and real estate transaction agency cannot sell commercial housing to non-compliant buyers. If they sell commercial housing to them, the government department has the right to refuse to go through related

procedures.

4. Settlement policy

In China, every province has a different settlement policy, and the settlement policies of different provinces have different attractiveness to talents, which in turn has different effects on the demand of the real estate market. Of course, the Hefei government has also formulated a corresponding talent settlement policy. First, reasonable relaxation of the city settled policy. If persons have legal and stable employment for two consecutive years and residence, including lease, meanwhile, they should participate in urban social insurance by China for one year; their family including their spouse and children, can apply for permanent residence registration in their place of employment. If some persons rent houses, they register in collective households.

In order to attract talents and investment, the Hefei settlement policy also has preferential policies. First, for high-level innovative entrepreneurial talents or the people that education degree is above the master, their family can choose the area to settle directly. Meanwhile, if students graduate and employ in Hefei, they can apply for permanent residence registration in their place of employment. Second, for the people who employ in Hefei city, if they get the award above the county, their family can apply for permanent residence registration in their place of employment. Third, if people who invest industry in Hefei or start their own business in Hefei, their family can apply for permanent residence registration in their place of employment. At the same time, Hefei government relax the registration policy of parents, spouse, and children.

In a word, in the aspect of land policy, Hefei government strengthened control of the land market, severely cracked down on illegal land use and regulated land use in the commercial housing market; in the aspect of credit policy, Hefei government requested that commercial banks in Hefei strengthen loan control in the commercial, residential market and implement different loan policies for lenders that meet different

requirements; in the aspect of purchase restriction policy, Hefei government implements a purchase restriction policy, and implements different purchase restriction policies for people with different conditions; in the aspect of settlement policy, Hefei government relaxed the settlement policy in order to attract the talents and investment.

5.3.2 Economic factors

1. GDP

Table 2 Hefei's GDP and its growth rate from 2004-2018

Year	GDP (Billion CNY)	Growth rate of GDP (%)
2004	58.97	---
2005	85.36	44.75
2006	107.38	25.80
2007	133.46	24.29
2008	166.48	24.74
2009	210.20	26.26
2010	270.16	28.53
2011	363.66	34.61
2012	416.43	14.51
2013	467.29	12.21
2014	515.80	10.38
2015	566.03	9.74
2016	627.44	10.85
2017	721.35	14.97
2018	782.29	8.45

Source: China National Bureau of Statistics; own computed

Gross domestic product (GDP) refers to the results of the production activities of all resident units in a country (or region) calculated at the national market price in a certain period. It is often recognized as the best indicator to measure the economic

situation of the country or region.

According to table 2, Hefei's GDP showed a growing trend from 2004 to 2018. In 15 years, Hefei's GDP has increased 13-fold. However, with the economic transformation, the Hefei government changed the economic development model, and the GDP growth rate fluctuated slightly and gradually slowed down.

Figure 1: Hefei's GDP and annual growth rate from 2004-2018
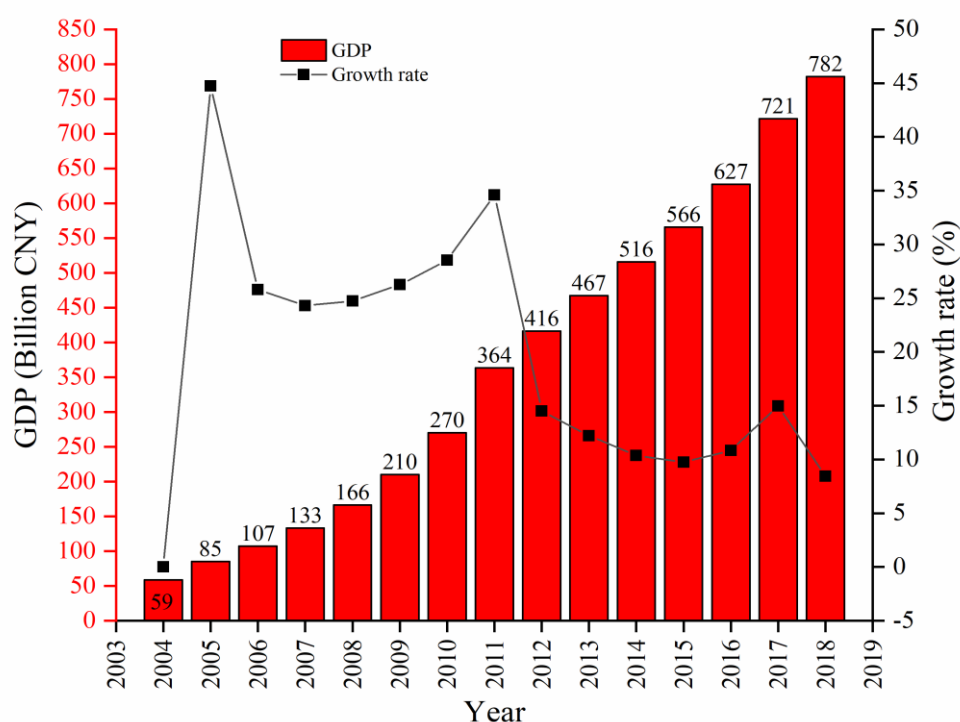
Source: China National Bureau of Statistics; own computed

Figure 1 shows the change of Hefei GDP in 15 years more intuitively. In 2004, Hefei's GDP was 58.97 billion CNY; in 2005, because Hefei government implemented reform in economic and social fields, Hefei's GDP increased rapidly, and annual growth rate of GDP was 44.75%; after 2006, the Hefei government changed its development direction and implemented the strategy of "rejuvenating the city through science and education." Currently, the total GDP was relatively low, and the real estate market was strong, so the annual GDP growth rate was relatively high from

2006 to 2011; after 2011, Hefei government carried out some policies to restrict the development of real estate industry and ensure the living of people, so Hefei government lost a point of economic growth and the strategy of "revitalizing the city through science and education" did not achieve, the annual growth rate decreased sharply in 2012. Meanwhile, with the increase in the total GDP in Hefei city, the annual growth rate of Hefei's GDP increased slowly from 2012 to 2018. In 2018, Hefei's GDP was 782.29 billion CNY; the average annual growth rate of GDP was 20.72% from 2004 to 2018.

In 15 years, Hefei's GDP has been rising, and it meant that Hefei's economic level continues to rise, and people's living standards are getting better and better. As people's living standards are getting better and better, more and more people are not satisfied with the status quo of life, especially housing. Living is the basic living needs of people. Under the conditions of the right economic conditions, people's demand for house purchases is becoming more durable and more reliable. It is one of the factors to improve the commercial housing market.

2. Average disposable income

In 2004, the per capita disposable income of urban residents in Hefei was 8610 CNY, and from 2004 to 2018, the per capita disposable income of urban residents in Hefei continued to increase, the per capita disposable income in 2018 was 41484 CNY. In 15 years, the per capita disposable income of urban residents in Hefei has increased by 4.8 times, and the average growth rate of the per capita disposable income was 12%, it represented that people in Hefei are richer and richer. With the growth of the economy and the increase in per capita disposable income, people's living standard is getting higher and higher. People begin to have the ability to change the status quo, change the existing living environment, to buy their first house or buy a bigger house. Meanwhile, the main objectives of real estate companies are to sell housing and earn a profit, and rising disposable income is good news for them. In a word, the increase of people's disposable income can not only improve their housing

demand, but also promote the development of the commercial housing market.

Figure 2 Hefei's per capita disposable income of urban residents from 2004 to 2018
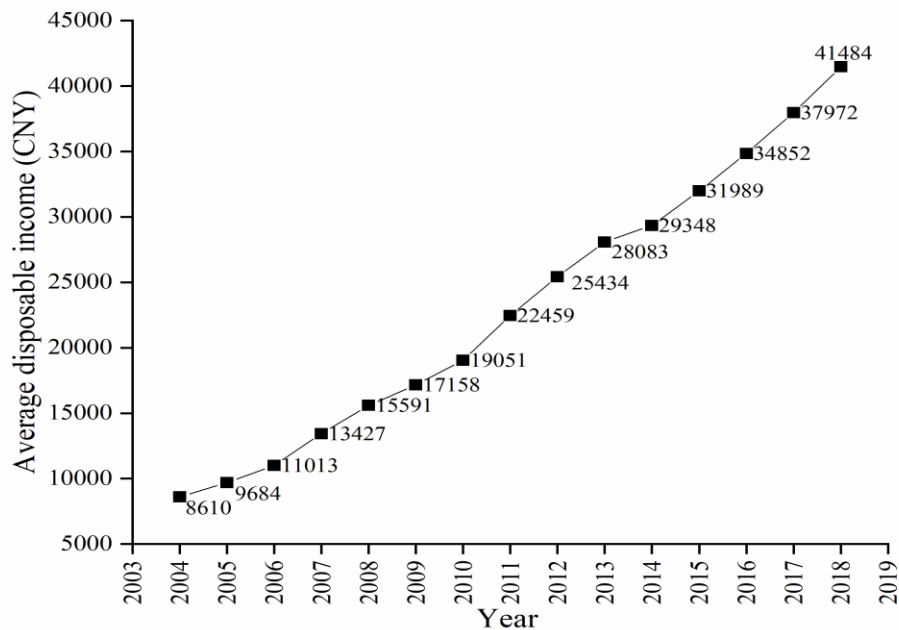
Source: China National Bureau of Statistics

According to the analysis of economic factors, Hefei's economic level and average disposable incomes of urban residents were increased from 2004 to 2018, and real estate companies can have more funds to grow. People have more and more money to change their lives. In general, the improvement of economic level and average disposable income can promote the development of the real estate market.

5.3.3 Social and culture factors

1. Population

The population is one of the main factors constituting the market, and the population environment has a significant impact on the market. The formation of a market must first have a considerable number of buyer groups, that is, refers to a certain amount of population. For the commercial housing market, the increase in population can increase the demand for commercial housing in Hefei.

Table 3: Hefei's population and its growth rate from 2004-2018

Year	Population (million)	Growth rate of population (%)
2004	4.45	---
2005	4.56	2.48
2006	4.70	3.11
2007	4.79	1.93
2008	4.87	1.64
2009	4.91	0.96
2010	4.93	0.40
2011	7.06	43.11
2012	7.11	0.62
2013	7.12	0.14
2014	7.13	0.18
2015	7.18	0.69
2016	7.30	1.69
2017	7.43	1.77
2018	7.58	2.05

Source: China National Bureau of Statistics; own computed

The total population of Hefei increased from 4.45 million in 2004 to 8.09 million in 2018, and the average annual population growth rate was 4.34% in 15 years, the population showed a steady upward trend. From the figure 3, from 2004 to 2010, Hefei's population growth rate was slow, because Hefei's economic development level was not high and people in other cities of Anhui Province came to Hefei, but people were small; from 2010 to 2011, Hefei's population increased 2.13 million, the annual growth rate was 43.11%, because Hefei city merged some cities and counties; after then, Hefei's economic gradually went up, and the aim of "Science and Education city" were sufficient, more and more people came to Hefei city, including people of other cities, especially from 2017 to 2018, the annual growth rate was 2.05%.

Figure 3: Hefei's population and annual growth rate from 2004-2018
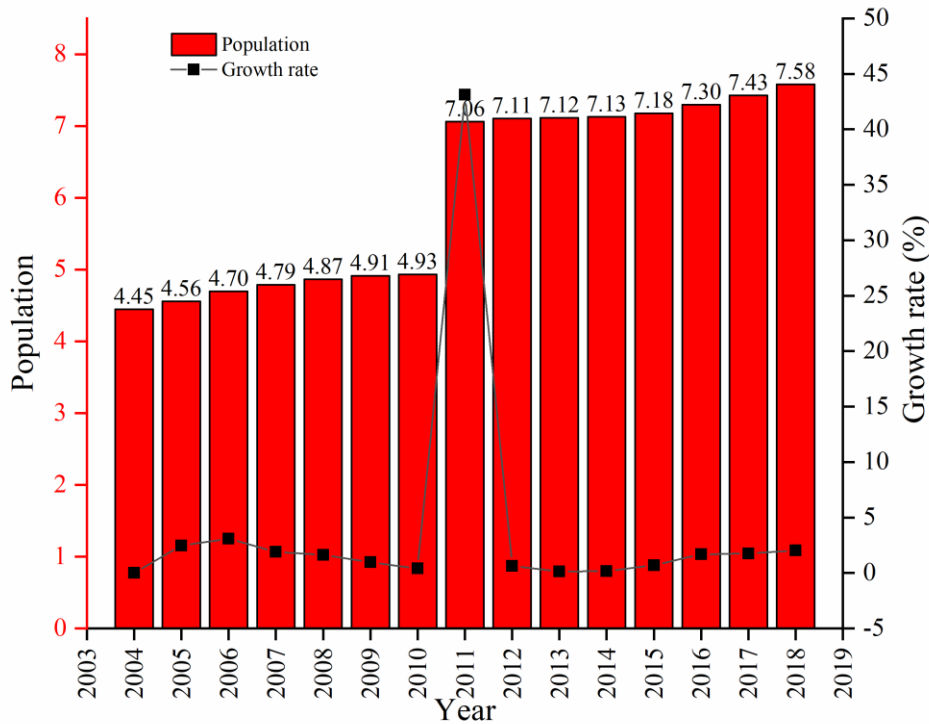
Source: China National Bureau of Statistics; own computed

In a word, the essence of commercial housing is for the living of the people. The increase of Hefei's population can provide more and more potential demand for commercial housing and can promote the development of the Hefei real estate market.

2. Family structure

Since the implementation of the family planning policy in China, the per-capita size of Hefei's urban and rural households has been decreasing. From 2004 to 2018, the per-capita size of Hefei's urban and rural households has gradually stabilized at about three people, and the family size has become smaller. The miniaturization of family size has become one of the essential characteristics of the structural change of urban and rural families in Hefei. In 2016, the Chinese government opened the "Second-Child policy"; the per-capita size of Hefei's urban and rural households will increase in the future. The liberalization of the second child policy will prompt more and more families to consider changing to a larger house.

At the same time, with the development of economic and social progress, people's ideas are becoming more and more open, especially young people. Because of this, the contradictions between young people and their parents have become increasingly prominent. Young people do not want to live with their parents after marriage, it increases the demand for housing.

3. Urbanization

Table 4 Hefei urbanization from 2004 to 2018

Year	Population (million)	Urban population (million)	Urbanization (%)
2004	444.68	168.96	38.00
2005	455.70	184.91	40.58
2006	469.85	196.16	41.75
2007	478.90	203.73	42.54
2008	486.74	210	43.14
2009	491.43	213.7	43.49
2010	493.42	215.84	43.74
2011	706.13	259.86	36.80
2012	710.53	264.23	37.19
2013	711.50	267.75	37.63
2014	712.81	271.37	38.07
2015	717.72	306.81	42.75
2016	729.83	329.82	45.19
2017	742.76	353.48	47.59
2018	757.96	379.28	50.04

Source: Hefei Statistical Yearbook; own computed

According to figure 4, the level of urbanization in Hefei was on the rise in general. From 2004 to 2009, Hefei's urbanization level developed slowly. Hefei's urbanization level rose by 5.74% within six years; from 2009 to 2010, Hefei's urbanization level decreased rapidly, because Hefei expanded its city in 2010,

surrounding counties and cities became part of Hefei city. Of course, the population of Hefei city increased rapidly, Hefei urbanization decreased; after then, with the development of economic, more and more people went to Hefei to work and slowly settle in Hefei, Hefei urbanization increased rapidly. In 2018, Hefei's urbanization was 50.04%. Currently, the urbanization level of Hefei belongs to the high-speed development stage. With the improvement of urbanization, more and more people come to Hefei and plan to settle there. The arrival of these people stimulated the potential demand for commercial housing, it can promote the development of commercial housing market.

*Figure 4 Hefei urbanization from 2004 to 2018*
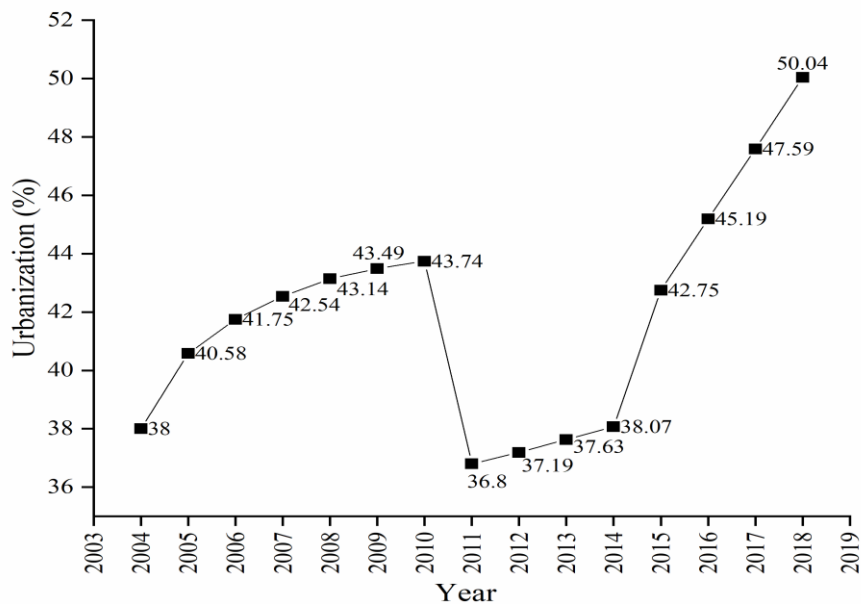
Source: Hefei Statistical Yearbook; own computed

5.3.4 Technology

1. Internet technology

In today's increasingly competitive real estate market, each real estate company uses its methods to solicit customers. However, with the rise of the Internet, the traditional media used by real estate companies in the past can no longer adapt to the

development of the times, and the role of the Internet in marketing has become increasingly apparent, and its role in the real estate market has become more and more apparent.

First, the Internet makes commercial housing more in line with market needs. For real estate companies, real estate market information not only includes the sufficient demand of the future market, the consumer preferences of buyers, the composition of the target purchase group, the information of the raw material market, the famous architectural style, but also the situation of competitors, analysis of competitive real estate, etc., which can help real estate companies better analyze market conditions and improve their market competitiveness. At the start of a real estate business, the Internet can help real estate companies get better market information, implement different marketing strategies for different consumers, and enable real estate companies to take the lead in market competition; in the middle of real estate business, consumers can also monitor real-time purchases of houses through the Internet and learn about construction details. At the same time, consumers can communicate with real estate developers through the Internet and exchange opinions and suggestions during the construction process. Real estate developers and consumers can communicate in both directions.

Second, Internet can reduce the cost of real estate production to a certain extent. On the one hand, real estate companies can use the Internet to obtain raw material price information of different manufacturers, and select the most suitable raw materials compared with the different manufacturers in order to reduce production costs; on the other hand, real estate companies can use Internet to form industry alliances to form economies of scale to reduce costs.

2. Construction technology

In recent years, the real estate industry has used more and more new technologies, and the real estate industry has become increasingly dependent on new technologies to promote development. On the one hand, real estate companies can use

new wall materials, new thermal insulation materials, new decoration materials, etc. In the production process to continuously improve the quality of commercial housing, thereby enhancing the competitiveness of the real estate industry; on the other hand, real estate companies can build the smart building to improve the convenience of people's lives. Overall, the development of construction technology has strongly promoted the development of the real estate industry.

3. Other technology

The commercial housing market is not only affected by the development of construction technology, but also by the development of other technologies. First, with the development of transportation, the level of transportation is getting higher and higher, and it significantly shortens the distance between people at home and the workplace. Thereby, as transportation technology and conditions improve, people are becoming more willing to buy suburban houses, and it makes Hefei commercial housing market evolve from the central area to the suburbs. Second, the improvement of communication technology has made housing not only a place of residence but also a place of work at home. As a word, advances in technology can promote the development of the real estate market in Hefei.

Based on the macro environment analysis of the commercial housing market in Hefei by PEST analysis, the overall advantages of the commercial housing market in Hefei outweigh the disadvantages. In terms of politics, on the one hand, the Hefei government strengthens the crackdown on speculation in the commercial housing market; on the other hand, it regulates the commercial housing market, guarantees the supply of commercial housing and guarantees the healthy development of the commercial housing market. In terms of economy, the increase of GDP and per capita disposable income in Hefei has provided conditions for the development of the commercial housing market. In terms of social culture, with the acceleration of urbanization, the population of Hefei keeps increasing, and the change of ideas, the demand for commercial housing keeps increasing. In terms of technology, with the

progress of technology, Hefei commercial housing market can also continue to progress.

5.5 Current situation of Hefei commercial housing market

5.5.1 Analysis of purchased land area

Figure 5 Purchased land area in Hefei real estate market from 2004 to 2018
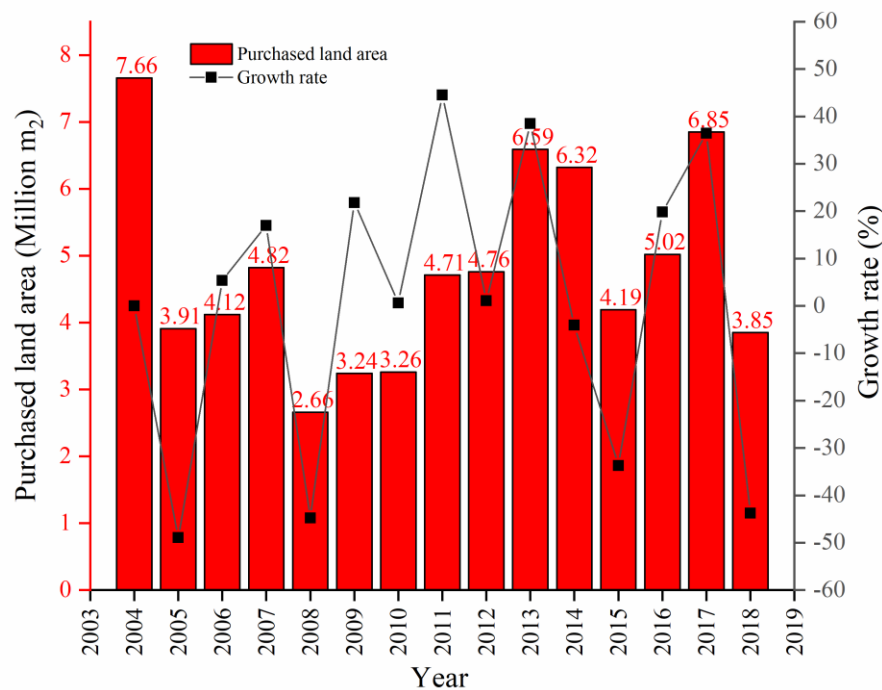
Source: Hefei Statistical Yearbook

The land resource is the essential factor of production for the real estate market. If real estate companies do not have land, their business will not succeed. According to figure 5, the purchased land area fluctuated from 2004 to 2018. In 2004, Hefei government implemented illegal construction demolition and built more affordable housing, etc., so the volume of purchased land area was 7.66 million square meters; in 2005, the volume of purchased land area returned to normal, it was 3.91 million square meters and its growth rate was 48.96%; from 2005 to 2007, the volume of

purchased land area was relatively stable and it was increased 0.91 million square meters, because government tightened restrictions on land supply and it was more rational for property companies to buy land; in 2008, the volume of purchased land area was decreased rapidly, it was 2.66 million square meters and its growth rate was 44.81%; the volume of purchased land area was increased slowly from 2008 to 2012, because real estate companies recovered after financial crisis in 2008; in 2013, Chinese government increased the supply of ordinary commercial housing and land, accelerated the planning and construction of government-subsidized housing and other measures to curb speculation in real estate market, so the volume of purchased land area was increased rapidly, it was 6.59 million square meters and its growth rate was 38.45% ; in 2015, the volume of purchased land area was decreased rapidly, it was 4.19 million square meters and its growth rate was -33.70%, because Hefei government restricted the land supply according to the policy of destocking; after then, as land supply increased, the volume of purchased land area was increased, it was 6.85 million square meters and its growth rate was 36.45%; in 2018, the volume of purchased land area was 3.85 million square meters, its growth rate was 43.80%, because the Hefei government strengthened the supervision of the land market, so that the land market continued to run smoothly, and the area of land purchased also decreased.

5.5.2 Analysis of real estate investment

1. Real estate investment and commercial housing investment

Real estate investment is an investment in land, real estate development, real estate operation, and real estate purchase in order to obtain expected benefits. Generally, the expected benefits of real estate investment vary with different investment subjects. Government investment should focus on economic, social, and environmental benefits, while enterprise investment should focus on economic benefits. Also, commercial housing investment is the main body of real estate

investment

Table 5 Hefei real estate investment and commercial housing investment

Year	Real estate investment (Billion CNY)	Growth rate (%)	Commercial housing investment (Billion CNY)	Growth rate (%)
2004	13.83	---	10.31	---
2005	19.13	38.32	14.29	38.71
2006	28.18	47.31	22.46	57.11
2007	38.75	37.51	29.86	32.97
2008	56.72	46.37	43.63	46.12
2009	67.04	18.19	46.82	7.30
2010	81.9	22.17	56.16	19.96
2011	70.32	-14.14	62.56	11.39
2012	91.38	29.95	57.85	-7.53
2013	110.58	21.01	67.44	16.57
2014	112.74	1.95	71.50	6.03
2015	125.91	11.68	77.87	8.91
2016	135.26	7.43	86.10	10.57
2017	155.74	15.14	109.55	27.23
2018	152.72	-1.94	116.59	6.43

Source: China National Bureau of Statistics; own computed

Since 2004, China's real estate investment was generally on the rise. However, its growth rate fluctuated. According to the table 5, the growth rate of Hefei's real estate investment had four sharp declines: in 2009, the growth rate of Hefei's real estate investment was 18.20%, because there was the financial crisis in the world and Hefei's economic was downturned; in 2011, its growth rate was -14.14%, because after the financial crisis, China's real estate market overheated, the Chinese government implemented macro-controls in the real estate market to limit excessive investment by real estate companies, many small and medium companies were

merged or went bankrupt, so the growth rate was minus; in 2014, its growth rate was 1.95%, because Hefei government carried out "two-way regulation." On the one hand, the government provided underlying housing security; on the other hand, the government curbed the excessive rise in house prices caused by excessive speculation; in 2018, its growth rate was -1.94%, because Chinese government continued to implement macro-control to curb real estate speculation. Commercial housing investment as a part of real estate investment, it was generally on the rise. From 2008 to 2009, the growth rate of commercial housing investment was 7.3%; from 2013 to 2014, its growth rate was 6.03%; from 2017 to 2018, its growth rate was 6.43%, because the financial crisis in 2008 and macro-control in real estate market in 2014 and 2018; but compared with real estate investment from 2011 to 2013, the growth rate of commercial housing investment was opposite to that of real estate investment. In 2012, commercial housing investment was -7.53%, because Hefei government curbed commercial housing investment, in 2013, its growth rate was 16.57%, because consumers increased the demand of commercial housing.

2. Commercial housing investment in the proportion of real estate investment

According to table 6, the proportion of commercial housing investment in real estate investment in Hefei fluctuated greatly from 2004 to 2018, but it was always above 60%, because commercial housing, as a rigid demand of the people, has great market potential in Hefei. On the one hand, the government invests in the commercial housing market in order to ease the housing contradictions and obtain fiscal revenue; on the other hand, real estate companies invest in commercial housing in order to obtain the huge profits. At the same time, the fluctuation of the ratio of commercial housing investment to real estate investment changed with the tightening of policies, because the policy affected the financing channel of real estate companies and change of house price.

Table 6 Hefei commercial housing investment accounts for real estate investment

Year	Commercial housing investment / Real estate investment (%)
2004	74.51
2005	74.72
2006	79.69
2007	77.06
2008	76.93
2009	69.84
2010	68.57
2011	70.32
2012	63.31
2013	60.98
2014	63.42
2015	61.85
2016	63.66
2017	70.34
2018	76.34

Source: China National Bureau of Statistics; own computed

From figure 6, the proportion of Hefei's commercial housing investment in real estate investment fluctuated. From 2004 to 2007, the proportion was fluctuated around 77% due to Hefei's government's macro-control; from 2008 to 2010, the proportion decreased and it was 68.57% in 2010 because there was the financial crisis in 2008, people worried real estate bubble; in 2011, the proportion increased 1.75%, it was 70.32%, because as the economy recovered, people had confidence in the commercial housing market and some speculators invested in the commercial housing market in order to get the profit; meanwhile, in 2012, the proportion was decreased 7.01%, because the commercial housing market was overheated, the government carried out strict macro-control to regulate the commercial housing market and combat speculation; after 2012, as the commercial housing market became regulated,

commercial housing was used for people's housing needs, the proportion was fluctuated around 62% from 2012 to 2016 and increased rapidly from 2016 to 2018 because the economy was developing and the policy relaxed a bit. People had more money to buy their own house.

Figure 6 Hefei commercial housing investment accounts for real estate investment
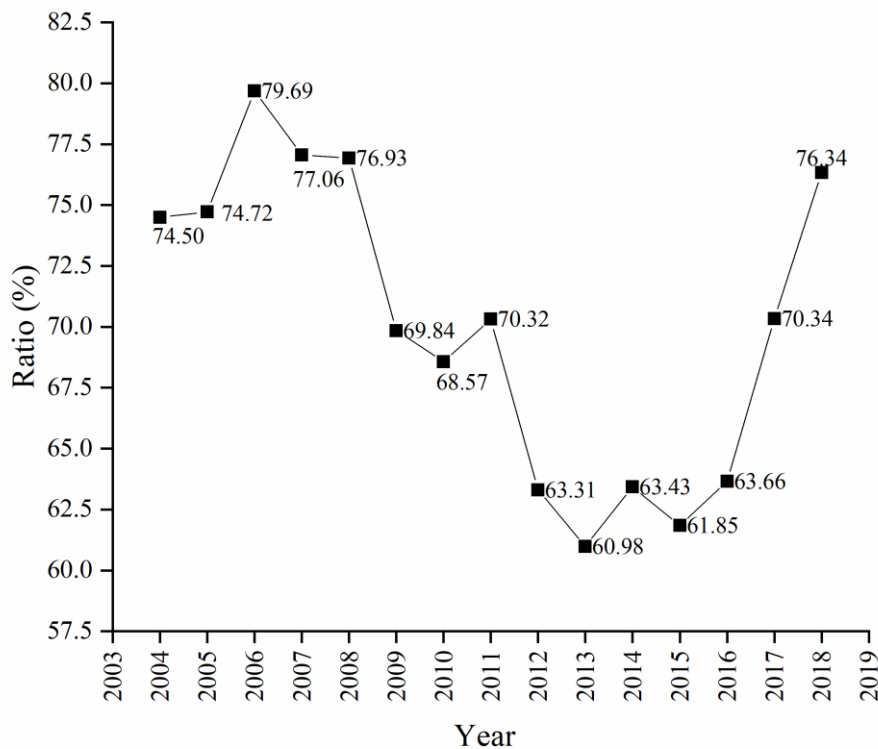
Source: China National Bureau of Statistics; own computed

Overall, the average proportion of Hefei's commercial housing investment in real estate investment was 70.10% that it was over 70%, commercial housing investment took a large proportion in real estate investment, it meant that with the development of economy, Hefei's real estate market was improved continuously and people had a significant demand to have their own housing, it promoted the increase of real estate investment.

3. Real estate investment in the proportion of GDP

Table 7 Hefei's real estate investment in proportion of GDP from 2004 to 2018

Year	GDP (Billion CNY)	Real estate investment (Billion CNY)	Real estate investment / GDP (%)
2004	58.97	13.83	23.45
2005	85.357	19.13	22.41
2006	107.376	28.18	26.24
2007	133.461	38.75	29.03
2008	166.484	56.72	34.07
2009	210.2	67.04	31.89
2010	270.16	81.9	30.32
2011	363.66	70.32	19.34
2012	416.43	91.38	21.94
2013	467.291	110.58	23.66
2014	515.797	112.74	21.86
2015	566.027	125.91	22.24
2016	627.438	135.26	21.56
2017	721.345	155.74	21.59
2018	782.29	152.72	19.52

Source: China National Bureau of Statistics; own computed

From figure 7, the proportion of Hefei's real estate investment in GDP fluctuated. From 2005 to 2008, the proportion increased. In 2008, it was 34.07% that it was the most significant proportion from 2004 to 2018 due to financial crisis; then, as the economic crisis eased, economic development not only depended on real estate market but depended on other factors, such as consumer, export, etc. so the proportion was decreased and then fluctuated around 21%. Meanwhile, the average proportion of Hefei's real estate investment in GDP from 2004 to 2018 was 24.61% that it was high, it meant that real estate market developed well and real estate companies had a better expectation on Hefei city, it was conducive to the development of Hefei, but real estate industry was a low-tech industry, real estate investment had a high proportion in

GDP, it meant that Hefei's economy level and economy mobility were not too high, and if real estate industry goes down, Hefei's economy will be severely affected.

Hefei's real estate investment had a significant role in promoting Hefei's economic development. However, it was not a decisive factor affecting Hefei's economy, because the real estate market, as a whole industry, cannot affect the economic development for a long time like the environmental industry and commerce, but only played a short-term driving role; on the other hand, the rise in GDP can also drive the development of the real estate industry in Hefei, because with the development of the economy, Hefei real estate enterprises have sufficient funds to invest in the real estate industry, thereby further driving the development of real estate enterprises.

Figure 7 Hefei's real estate investment in proportion of GDP from 2004 to 2018
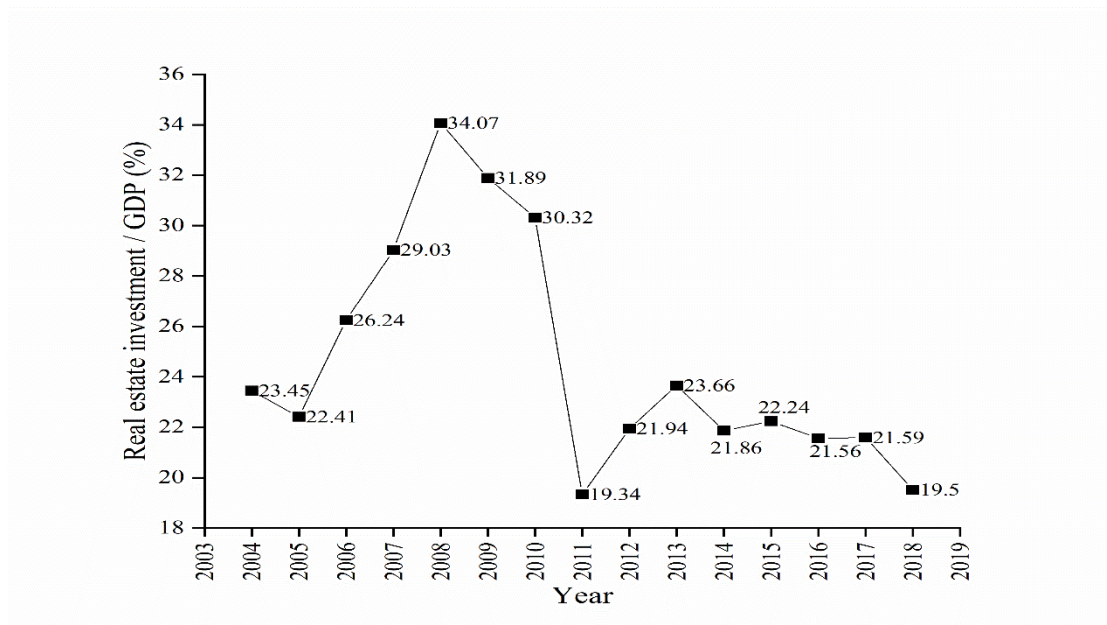
Source: China National Bureau of Statistics; own computed

5.5.3 Analysis of commercial housing development scale

Figure 8 Hefei commercial housing construction area and completed area
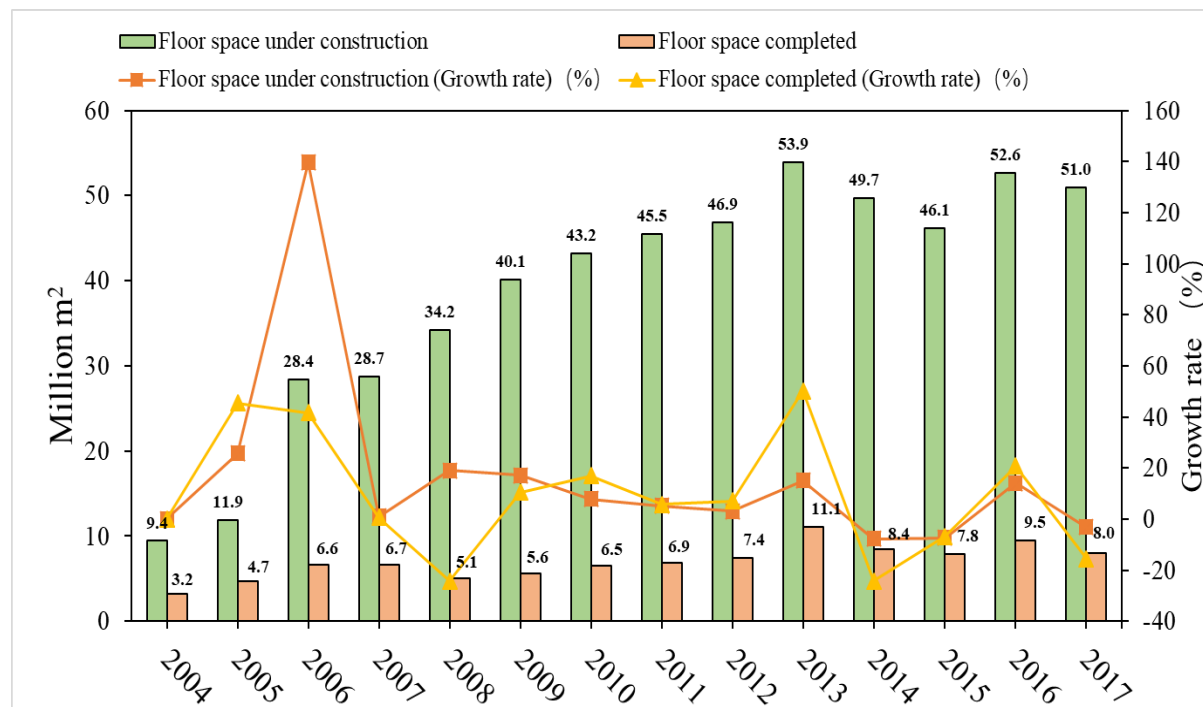
Source: China National Bureau of Statistics

According to figure 8, the construction area of commercial housing increased from 9.43 million square meters in 2004 to 51 million square meters in 2017. In the 14 years, the construction area increased by 5.4 times. However, its growth rate fluctuated. From 2005 to 2006, commercial housing construction area increased 16.57 million square meters, and its growth rate was 139.62%, because in 2005, Hefei government demolished illegal buildings, renovated urban environment and built low-income housing; but in 2007, the growth rate decreased 138.59%, because in 2006, there was much low-income housing in Hefei, and Hefei was not attractive for real estate companies due to Hefei's economy; in 2008, its growth rate increased 18.09%, because there was the financial crisis in 2008, Hefei government subsided real estate companies in order to save the development of real estate market; after 2009, the growth rate of commercial housing construction area fluctuated due to macro-control,

especially in 2014 and 2015, its growth rate abounded -7% because Chinese government carried out the policy of destocking and restrained real estate companies from building new commercial housing.

The completed area of commercial housing increased from 3.22 million square meters in 2004 to 8 million square meters in 2017. In the 14 years, the completed area increased by 2.5 times. According to the figure 8, there were three growth periods: from 2004 to 2006, completed area of commercial housing increased 3.41 million square meters due to the demand of government; from 2012 to 2013, completed area increased 3.71 million square meters, and its growth rate was 50.11% because Chinese government increased real estate taxes, consumers wanted to buy their own houses before the policy carried out in Hefei, and it improved real estate companies to increase the amount of commercial housing; from 2014 to 2016, completed area was increased 1.62 million square meters due to the policy of destocking, real estate companies had to increase their completed area in order to sale houses. Meanwhile, there were three periods of decline: from 2006 to 2008, completed area was decreased 1.57 million square meters due to financial crisis in 2008; from 2013 to 2014, completed area was decreased 2.7 million square meters because Hefei's economy went down and people kept a wait-and-see attitude to the commercial housing market; from 2016 to 2017, completed area was decreased 1.46 million square meters, and its growth rate was -15.44% due to the policy of destocking.

5.5.4 Analysis of commercial housing sales area

The commercial housing sales area is the area of the house which has formally delivered to the buyer or has signed the contract of purchase in the area of the completed house within the reporting period. It does not include the area of buildings under construction that have signed with pre-sale contracts. However, it includes the area of buildings completed within the reporting period that have signed with presale contract during or before the reporting period.

Table 8 Hefei's commercial housing sales area from 2004 to 2018

Year	Sales area (Million m$_2$)	Growth rate (%)
2004	3.09	---
2005	5.37	74.08
2006	5.83	8.53
2007	9.53	63.41
2008	8.67	-9.00
2009	11.80	36.08
2010	8.64	-26.83
2011	10.58	22.55
2012	11.17	5.57
2013	14.52	29.92
2014	13.26	-8.64
2015	12.86	-3.04
2016	17.06	32.65
2017	9.60	-43.69
2018	11.04	14.93

Source: Hefei Statistical Yearbook; own computed

From 2004 to 2007, the volume of sales area was increased 6.44 million square meters, because Chinese government formulated policies to stabilize housing prices and real estate market and commercial housing price was low, commercial housing sales area was on the rise; in 2008, commercial housing sales area's growth rate was -9%, the main reason was that listing of commercial housing is relatively small and it can't meet the demand of buyers and financial crisis; in 2009, commercial housing sales area was increased 3.13 million square meters and its growth rate was 36.08%, because there were loose home purchase policy and taxes benefits, it attractive more buyers to buy commercial houses; in 2010, because Hefei government tightened mortgage policy and many buyers didn't qualify for loan, commercial housing sales area was decreased 3.16 million square meters and its growth rate was -26.83%; from

2011 to 2013, the sales area was increased relatively slowly and in this period; in 2014, the overall real estate market was in a slump and sales were down; In 2016, Hefei government implemented restricted purchase policy, restricted credit policy and curbed commercial housing speculation because real estate market was overheated and the policy of destocking was effective. However, it took time for the policy to be effective, many buyers seized this space to buy their own house in order to save the cost, it overheated in the commercial housing market in 2016. In 2016, the commercial housing sales area was 17.06 million square meters, and its growth rate was 32.65%; in 2017, with the effect of the policy, the commercial housing market returned to rationality. The sales area decreased sharply, the sales area was 9.60 million square meters, and its growth rate was -43.69%. In 2018, the sales area was 11.04 million square meters.

Figure 9 Hefei's commercial housing sales area from 2004 to 2018
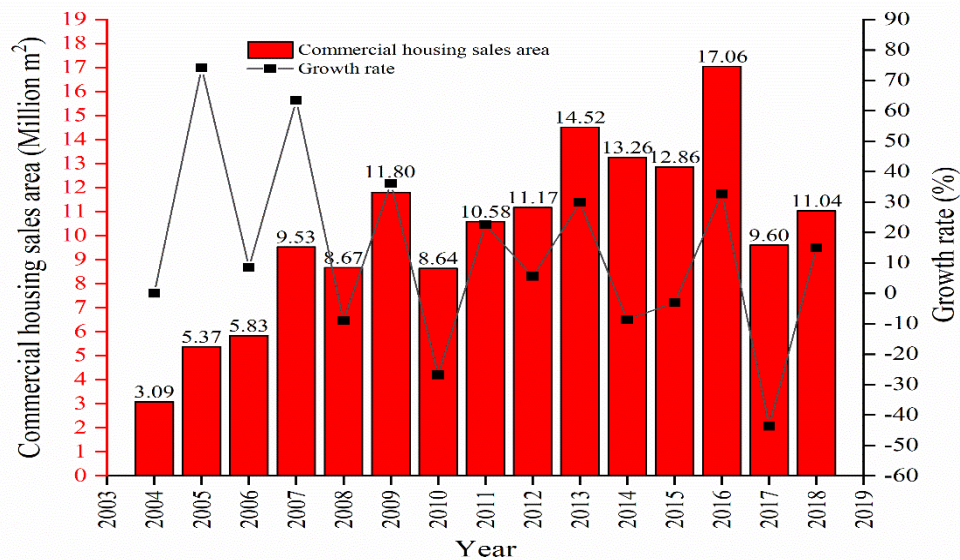
Source: Hefei Statistical Yearbook; own computed

5.5.5 Analysis of commercial housing prices

Table 9 Hefei commercial housing prices from 2004-2018

Year	Commercial housing prices (CNY/m^2)	Growth rate (%)
2004	2270.55	---
2005	2799.45	23.29
2006	2873.78	2.66
2007	3153.8	9.74
2008	3425	8.60
2009	4095	19.56
2010	5502	34.36
2011	5607.55	1.92
2012	5754.31	2.62
2013	6084	5.73
2014	6917	13.69
2015	7512	8.60
2016	9312	23.96
2017	11442	22.87
2018	13068.63	14.22

Source: Hefei Statistical Yearbook; own computed

According to figure 10, Hefei's commercial housing prices showed an upward trend. Hefei's house price rose from 2227.55 yuan in 2004 to 13068.63 yuan in 2018. During this period, house prices rose 5.7 times. Meanwhile, Hefei's wholesale house prices had three significant rises: from 2004 to 2005, commercial housing prices increased 528.9 CNY, and its growth rate was 23.29%; from 2008 to 2010, commercial housing prices increased 2077 CNY, its growth rate was 34.36%; from 2015 to 2017, commercial housing prices increased 3930 CNY and its average growth rate in this period was 18.48%.

Figure 10 Hefei's commercial housing prices from 2004 to 2018
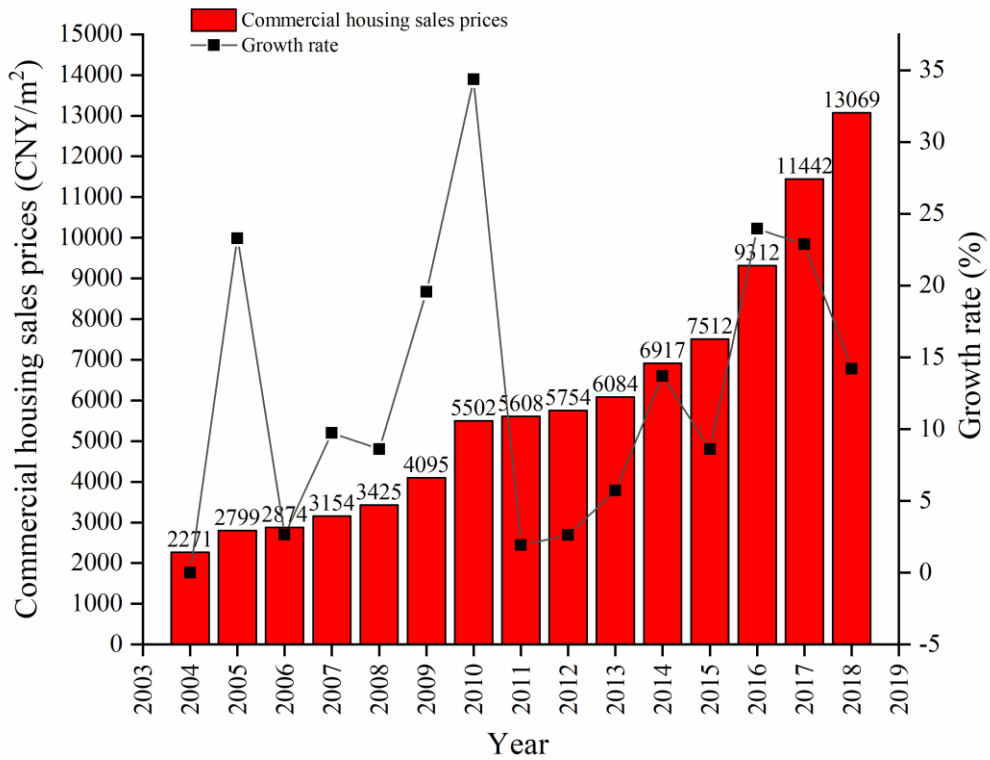
Source: Hefei Statistical Yearbook; own computed

5.5.6 Analysis of real estate companies

1. Real estate companies

According to figure 11, the number of real estate companies was increased from 2004 to 2008 and then decreased from 2008 to 2017. From 2004 to 2008, real estate market in Hefei showed a stage of rapid development, it attracted many people to invest the real estate market and created their own companies, so the number of real estate companies was increased from 576 to 786 in 5 years; after 2008, as the overheated of real estate market, Chinese government strengthened management of real estate market and adopted policies to limit the overheating of real estate market, many medium and small companies were bankrupt or merged by other companies, so the number of real estate's companies was decreased from 786 to 567 in eleven years.

Figure 11 The number of real estate companies in Hefei from 2004 to 2018
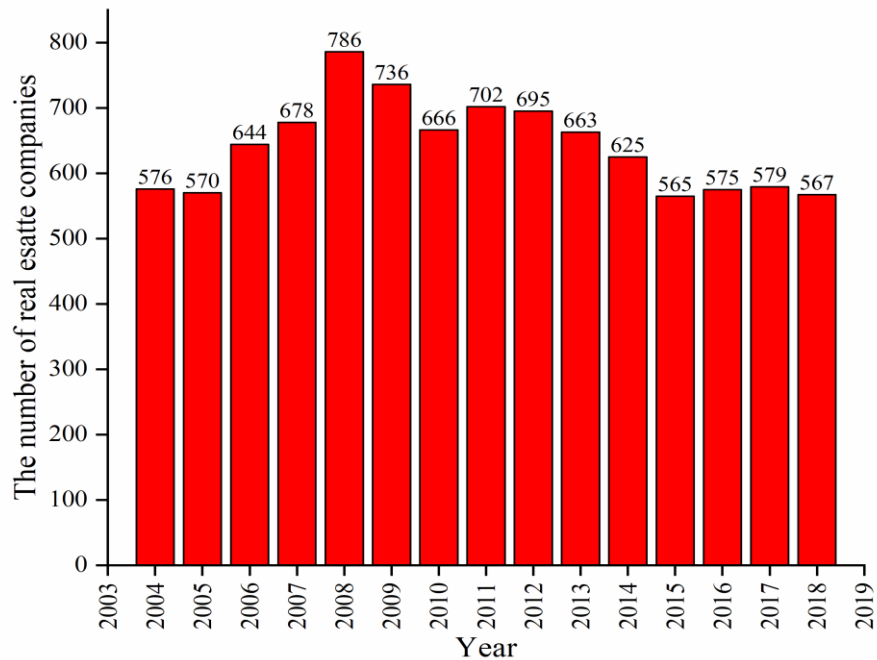
Source: Hefei Statistical Yearbook

2. Average employees per company

According to figure 12, the average employee per company was on the rise generally. In 2008 and 2009, the number of real estate companies was decreased because the financial crisis in 2008; after 2009, with the development of economic, real estate companies needed to hire more and more people; meanwhile, the number of real estate companies , so the average employee per company was increased. However, the average employee per company was increased slowly.

Meanwhile, according to the figure 12, in 2017, average employees per company in Hefei city was 35. For a real estate company, the number of employees was too small, it meant that most of real estate companies in Hefei was medium and small size companies.
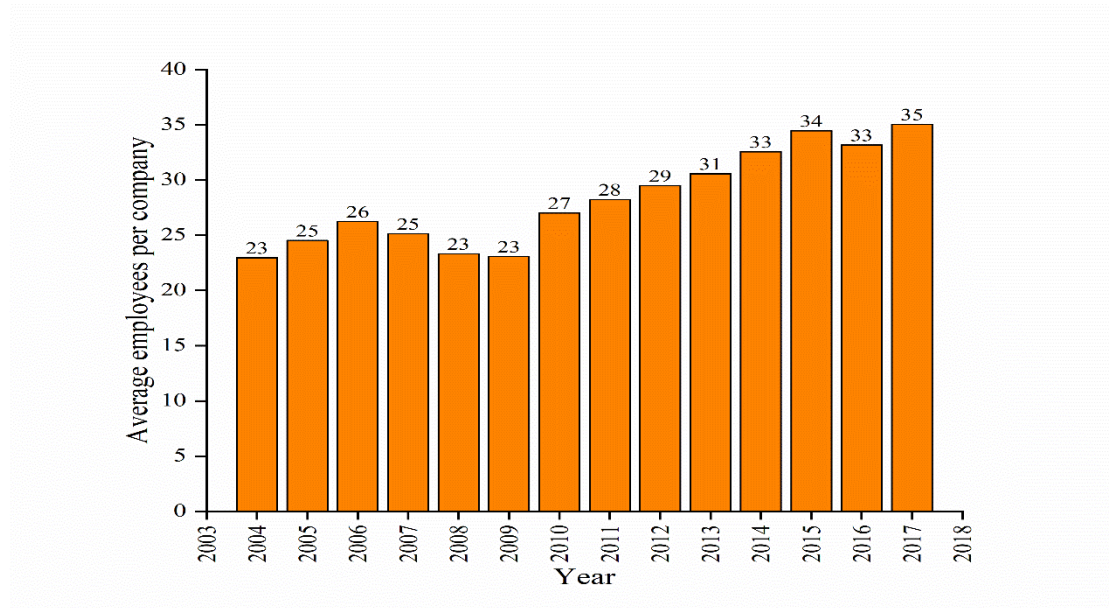
Source: Hefei Statistical Yearbook; own computed

5.6 Analysis of related indicators in commercial housing market

5.6.1 Price-to-income ratio

The price-to-income ratio refers to the ratio of housing price to the annual income of urban households, and it is used to measure the actual purchasing power of consumers for the commercial housing market. The higher the price-to-income ratio, the greater the divergence between house prices and incomes. Conversely, the closer house prices are to incomes. In general, this key statistic reflects how easy it is to buy a home in a city. The World Bank proposed that the normal house price-to-income ratio in developed countries is generally between 1.8 and 5.5, while the reasonable house-to-income ratio in developing countries is between 3 and 6. There are many factors affecting the ratio of housing price to income, among which the most important one is the influence and regulation of government housing policy, housing industry policy and land use policy.

Now, I will try to compute the prices-to-income ratio in Hefei. Assume that the ratio of housing price to income is R, the per capita living area is C (m²), the average

price of commercial housing is P (CNY/m^2), and the per capita disposable income of urban residents is I (CNY).

Equation 1 Prices-to-income ratio

$$R = \frac{C \times P}{I}$$

Table 10 Hefei prices-to-income ratio from 2004 to 2018

Year	Living area per capita (m^2)	Per capita disposable income of urban residents (CNY)	Sales prices (CNY/m^2)	Prices-to-income ratio
2004	17.01	9378	2270.55	4.12
2005	18.39	10625	2799.45	4.85
2006	18.9	12005	2873.78	4.52
2007	19.33	14758	3153.80	4.13
2008	19.36	17276	3425.00	3.84
2009	19.58	18925	4095.00	4.24
2010	26.3	21125	5502.00	6.85
2011	28.47	24828	5607.55	6.43
2012	28.8	27885	5754.31	5.94
2013	30.85	30401	6084.00	6.17
2014	35.2	31394	6917.00	7.76
2015	35.3	34174	7512.00	7.76
2016	35.8	37218	9312.00	8.96
2017	35.9	40698	11442.00	10.09
2018	35.2	41484	13068.63	11.09

Source: Hefei Statistical Yearbook; own computed

According to figure 13, price-to-income in Hefei was on the rise rapidly after 2004. From 2004 to 2009, the prices-to-income ratio was normal, and it meant that Hefei's commercial housing prices were relatively normal and the burden of housing

on people was relatively low; however, after 2009, the prices-to-income ratio was increased rapidly, especially in 2010, the prices-to-income ratio reached the highest 11.09 in 2018. The ratio was too high, and it exceeded the general international standard, it meant that Hefei's commercial housing prices were high, and Hefei's commercial housing market existed bubble, which needed the attention of the Hefei government.

Figure 13 Hefei prices-to-income ratio from 2004 to 2018
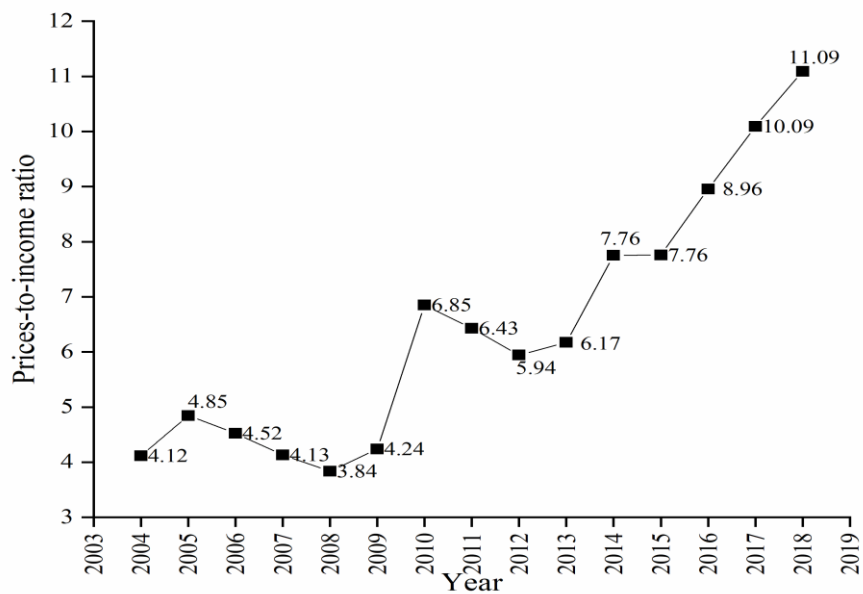
Source: Hefei Statistical Yearbook; own computed

Meanwhile, as the prices-to-incomes increased, so did the burden on people. In 2018, the prices-to-income ratio was 11.09; it meant that a family does not eat or drink for 11 years to buy their house. However, the price-to-income ratio is just the average price-to-income ratio in Hefei; people in the middle and lower classes have a more significant price-to-income ratio than the rich. At the same time, in recent years, the gap between rich and poor in Hefei has widened, with wealth increasingly concentrated in the hands of a few rich people. In recent years, the gap between rich and poor in Hefei has widened, with wealth increasingly concentrated in the hands of

a few rich people. For real estate commercial housing, just a few wealthy people's demands are a large number. Some real estate developers say they build houses for the rich. Although many people criticize them, they are right to a certain extent. A few rich people have enough money to buy houses. At the same time, due to the particularity of the real estate market, the national policy did not achieve the expected effect, the housing price is still high. The middle and lower classes need more housing than the minority. Although they do not have enough capital at present, it is still a huge consumption potential for real estate developers. In the case of relatively stable housing supply, high consumer demand has pushed up the price of housing, which has remained high. In a word, although the housing price is related to people's income, the increase of income promotes the housing price rise to some extent, but the impact is limited, and one of the main reasons for the housing price rise is the high demand.

5.6.2 Supply and demand analysis

According to table 11, the contradiction between supply and demand of the Hefei commercial housing market was not prominent between 2004 and 2006, and it fluctuated around 0; after 2006, the gap between supply and demand in Hefei commercial housing market was on the rise, especially in 2009 and 2016. In 2009, the gap between supply and demand was 6.21 million square meters because the Hefei government gave many subsidies policies into the real estate market and saved the cost of buying a house for buyers, it attracted more and more buyers to buy their own house. Meanwhile, many real estate companies were in recovery due to the financial crisis in 2008, and real estate market is hysteresis, the gap was enormous; in 2016, although the Hefei government implemented some policies to curb real estate overheated, including restricting land supply, stinting bank credit, etc. However, it took time for the policy to be effective, and many buyers bought their own house before the policy went into effect, the sales of the house increased. Meanwhile, since 2014, the Chinese government carried out the policy of destocking and limited real

estate companies to build new houses unless documents were available, the supply was limited, the gap was huge. In 2017, the policy was the effect, and the commercial housing market returned to rationality, the demand was decreased rapidly with relatively stable supply, so the gap was decreased rapidly.

Table 11 Supply and Demand in commercial housing market from 2004 to 2018

Year	Sales area (Million m^2)	Commercial housing completed area (Million m^2)	Difference (Million m^2)
2004	3.09	3.22	-0.13
2005	5.37	4.68	0.69
2006	5.83	6.64	-0.80
2007	9.53	6.68	2.85
2008	8.67	5.06	3.61
2009	11.80	5.59	6.21
2010	8.64	6.54	2.09
2011	10.58	6.92	3.67
2012	11.17	7.40	3.77
2013	14.52	11.11	3.41
2014	13.26	8.41	4.86
2015	12.86	7.84	5.02
2016	17.06	9.46	7.59
2017	9.60	8.00	1.60
2018	11.04	9.09	1.95

Source: Hefei Statistical Yearbook; own computed

From the aspects of demand and supply, the sales area of commercial housing market in Hefei is larger than the completed area, which indicates that the demand of commercial housing market in Hefei is far greater than the supply quantity, the commercial housing market is in short supply and the structure of the housing market

is out of balance. In this situation, it drove up commercial house prices.

5.6.3 The relationship between GDP and real estate investment

In order to better understand the relationship between real estate investment and GDP in Hefei, real estate investment is chosen as the explained variable and GDP as the explanatory variable, the time series is from 2004 to 2018. By analyzing the scatter diagram between explanatory variables and explained variables, there is a linear relationship between real estate investment and GDP. Therefore, the formula establishes as:

$$I = C + \alpha G$$

Among them, assume that real estate investment in Hefei is I, Hefei's GDP is G, α is the correlation coefficient of Hefei's GDP. In this model, the explanatory variable is one, the sample size is fifteen.

Then, use ordinary least squares estimation through gretl software, the results are as follows:

Table 12 Real estate investment regression model results

Model 1: OLS, using observations 2004-2018 (T = 15)

Dependent variable: I

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	14.67	4.33743	3.382	0.00491	***
G	0.192778	0.010001	19.28	<0.00001	***

Mean dependent var	85.25593	S.D. dependent var	47.18648
Sum squared resid	1053.763	S.E. of regression	9.003261
R-squared	0.966195	Adjusted R-squared	0.963595
F (1, 13)	371.5596	P-value(F)	6.05e-11
Log-likelihood	-53.17462	Akaike criterion	110.3492
Schwarz criterion	111.7653	Hannan-Quinn	110.3342
Rho	0.578056	Durbin-Watson	0.726626

Source: Hefei Statistical Yearbook; own computed

According to the results, there is a regression equation:

$$I = 14.67 + 0.192778G$$

The statistical test index value is: $R^2 = 0.966195$, F = 371.5596, t-value are 3.382, 19.28, P-value are 0.0049, 6.05e-001, DW = 0.726626. The explanatory variable K=1, the number of samples n=15, and the degree of freedom n-K-1=13.

The statistic R^2 is close to 1, indicating that the model has good goodness of fit and explanatory strength, which is over 95%. Under the condition of 5% confidence level, according to the model degrees of freedom (1, 13), check the F distribution table to get $F_{0.05}(1,13) = 4.67$, F=371.5596 > $F_{0.05}(1,13)$, it shows that this model is significant under the condition of 5%, so the variables cannot be 0 at the same time. When the p-test value is under the condition of 5% confidence, the coefficients of C and G are less than 0.05, indicating that the coefficients are significant. When the test value is under the condition of 5% confidence level, the critical value $t_{0.05}(13) = 1.771$, G passes the significance test of the variable. DW = 0.7266, however, under the condition of 5% confidence level, k=1, t = 15, check the DW test critical value table to get $d_L = 1.08$, $d_U = 1.36$, it means there is a first order autocorrelation

In order to solve the problem of high autocorrelation, the residual lag variable phase 1 R-1 was introduced. The corrected model results are as follows:

Table 13 Real estate investment corrected regression model results

Model 2: OLS, using observations 2005-2018 (T = 14)
Dependent variable: I

	Coefficient	Std. Error	t-ratio	p-value	
Const	19.8014	3.67396	5.39	0.00022	***
G	0.180213	0.00838732	21.49	<0.00001	***
R_1	0.0676452	0.0238221	2.84	0.01609	**

Mean dependent var	90.35764	S.D. dependent var	44.46791
Sum squared resid	502.8077	S.E. of regression	6.760902
R-squared	0.980440	Adjusted R-squared	0.976884
F (2, 11)	275.6885	P-value(F)	4.00e-10
Log-likelihood	-44.93319	Akaike criterion	95.86639
Schwarz criterion	97.78356	Hannan-Quinn	95.68892
Rho	-0.235842	Durbin-Watson	2.090844

According to the results, there is a regression equation:

$$I = 19.8041 + 0.180213G + 0.0676452R\text{-}1$$

The statistical test index value is: $R^2 = 0.980440$, F = 275.6885, t-value are 5.39, 21.49, 2.84. P-value are 0.00022, 2.47e-010, 0.01609. DW = 2.090844. The explanatory variable K=2, the number of samples n=14, and the degree of freedom n-K-1=11.

The statistic R^2 is close to 1, indicating that the model has good goodness of fit and explanatory strength, which is over 95%. Under the condition of 5% confidence level, according to the model degrees of freedom (2, 11), check the F distribution table to get $F_{0.05}$ (2,11) = 3.98, F=275.6885 > $F_{0.05}$ (2,11), it shows that this model is significant under the condition of 5%, so the variables cannot be 0 at the same time. When the p-test value is under the condition of 5% confidence, the coefficients of C, G and R-1are less than 0.05, indicating that the coefficients are significant. When the test value is under the condition of 5% confidence level, the critical value $t_{0.05}$ (11) = 2.201, all passes the significance test of the variable.

Therefore, the regression equation of Hefei real estate investment is obtained through regression analysis, the positive coefficient of GDP indicates that real estate investment will increase with the increase of GDP, which is consistent with the economic theory. It means that if GDP is increased by 1 billion CNY, then real estate investment will be increased by 0.180213 billion CNY.

At the same time, the average growth rate of real estate investment in Hefei from 2005 to 2018 was 19.75%, the average growth rate of GDP in Hefei from 2005 to 2018 was 20.72%. Then calculate the following results: contribution rate of GDP: 0.180213 *(20.72% / 19.75%) * 100 = 18.91%. It means that the contribution rate of GDP to real estate investment is 18.91%, which means that GDP only promotes the increase of real estate investment, rather than plays a decisive role. The increase in real estate investment is influenced by many factors, the increase of real estate

investment is influenced by many factors, among which GDP, as a macro factor, inevitably plays a promoting role. However, the increase of real estate investment is still dominated by the market.

5.6.4 The relationship between GDP and housing sales price

In order to better understand the relationship between commercial housing sales prices and GDP in Hefei, commercial housing sales prices is chosen as the explained variable and GDP as the explanatory variable, the time series is from 2004 to 2018. By analyzing the scatter diagram between explanatory variables and explained variables, there is a linear relationship between commercial housing sales prices and GDP. Therefore, the formula establishes as:

$$P = C + \beta G$$

Among them, assume that commercial housing sales prices in Hefei is P, Hefei's GDP is G, β is the correlation coefficient of Hefei's GDP. In this model, the explanatory variable is one, the sample size is fifteen.

Then, use ordinary least squares estimation through gretl software, the results are as follows:

Table 14 Commercial housing sales prices model regression results

Model 3: OLS, using observations 2004-2018 (T = 15)

Dependent variable: P

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	1220.83	402.306	3.0346	0.00958	***
G	13.0191	0.927611	14.0351	<0.00001	***

Mean dependent var	5987.805	S.D. dependent var	3234.088
Sum squared resid	9065481	S.E. of regression	835.0717
R-squared	0.938090	Adjusted R-squared	0.933328
F (1, 13)	196.9830	P-value(F)	3.13e-09
Log-likelihood	-121.1236	Akaike criterion	246.2472
Schwarz criterion	247.6633	Hannan-Quinn	246.2321
Rho	0.839247	Durbin-Watson	0.519743

According to the results, there is a regression equation:

$$P = 1220.83 + 13.0191G$$

The statistical test index value is: $R^2 = 0.938090$, $F = 196.9830$, t-value are 3.035, 14.04, P-value are 0.0096, 3.13e-09. The explanatory variable K=1, the number of samples n=15, and the degree of freedom n-K-1=13.

The statistic R^2 is close to 1, indicating that the model has good goodness of fit and explanatory strength, which is over 90%. Under the condition of 5% confidence level, according to the model degrees of freedom (1, 13), check the F distribution table to get $F_{0.05}$ (1,13) = 4.67, F=196.9830 > $F_{0.05}$ (1,13), it shows that this model is significant under the condition of 5%, so the variables cannot be 0 at the same time. When the p-test value is under the condition of 5% confidence, the coefficients of C and G are less than 0.05, indicating that the coefficients are significant. When the test value is under the condition of 5% confidence level, the critical value $t_{0.05}$ (13) = 1.771, all passes the significance test of the variable. DW = 0.5197, however, under the condition of 5% confidence level, k=1, t = 15, check the DW test critical value table to get d_L = 1.08, d_U = 1.36, it means there is a first order autocorrelation

In order to solve the problem of high autocorrelation, the residual lag variable phase 1 R-1 was introduced. The corrected model results are as follows:

Table 15 Commercial housing sales price corrected regression model
Model 4: OLS, using observations 2005-2018 (T = 14)
Dependent variable: P

	Coefficient	Std. Error	t-ratio	p-value	
const	862.563	312.758	2.7579	0.01862	**
G	14.1976	0.726513	19.5422	<0.00001	***
R_1	1.00391	0.247702	4.0529	0.00191	***

Mean dependent var	6253.323	S.D. dependent var	3181.987
Sum squared resid	3596958	S.E. of regression	571.8358
R-squared	0.972673	Adjusted R-squared	0.967704
F (2, 11)	195.7647	P-value(F)	2.52e-09
Log-likelihood	-107.0609	Akaike criterion	220.1219
Schwarz criterion	222.0390	Hannan-Quinn	219.9444
rho	0.195734	Durbin-Watson	1.542240

Source: Hefei Statistical Yearbook; own computed

According to the results, there is a regression equation:

$$P = 862.563 + 14.1976G + 1.00391R\text{-}1$$

The statistical test index value is: $R^2 = 0.972673$, F = 195.7647, t-value are 2.7579, 19.5422, 4.0529. P-value are 0.01862, 6.85e-010, 0.0019. DW = 1.542240. The explanatory variable K=2, the number of samples n=14, and the degree of freedom n-K-1=11.

The statistic R^2 is close to 1, indicating that the model has good goodness of fit and explanatory strength, which is over 95%. Under the condition of 5% confidence level, according to the model degrees of freedom (2, 11), check the F distribution table to get $F_{0.05}$ (2,11) = 3.98, F=195.7647 > $F_{0.05}$ (2,11), it shows that this model is significant under the condition of 5%, so the variables cannot be 0 at the same time. When the p-test value is under the condition of 5% confidence, the coefficients of C, G and R-1are less than 0.05, indicating that the coefficients are significant. When the test value is under the condition of 5% confidence level, the critical value $t_{0.05}$ (11) = 2.201, all passes the significance test of the variable.

Therefore, the regression equation of Hefei real estate investment is obtained through regression analysis, the positive coefficient of GDP indicates that commercial housing sales prices will increase with the increase of GDP, which is consistent with the economic theory. It means that if GDP is increased by 1 billion CNY, then commercial housing sales prices will be increased by 14.1976 CNY / m^2.

According to the results, as one of the macro factors, GDP affects the housing prices of commercial houses, mainly at a secondary level. With the increase of GDP, on the one hand, it will bring about the improvement of people's living standards and

indirectly increase people's housing demand; on the other hand, it will also promote the development of real estate companies to a certain extent, and thus increase the supply of commercial housing. GDP indirectly affects the price of commercial housing from both supply and demand. However, the factors that affect the price of commercial housing are many, not only affected by GDP but also include people's disposable income, land supply, policies, etc. GDP can only play a specific role in promoting the commercial housing prices.

5.7 The problems in Hefei commercial housing market

5.7.1 High average commercial housing prices

In 2018, the per capita disposable income of Hefei urban residents was 41484 CNY, and the housing sales price was 13068.63 CNY/m2, and the price-to-income ratio was 10.09, it meant that Hefei family could buy their own house in 10.09 years. However, most of Hefei urban residents are middle class and weak; they do not have enough money to bear the pressure of housing. For ordinary people, their wages have not increased significantly, job opportunities have decreased, and rent cost has increased. It is necessary to cut back on clothing and food to restrain daily consumption. The consumption of light luxury products favored by the middle class and white-collar workers is the first choice. Three meals a day will also cause a reduction in food or cooking to reduce expenses, and activities such as gatherings, dinners, and travel will reduce. The market is susceptible to the economic environment and affects the consumption level of residents. The high housing sale prices have severely affected the lives of ordinary people and seriously affected social stability.

5.7.2 The obvious contradiction between supply and demand

In 2017, commercial housing floor space completed was 8 million square meters, commercial housing sales were 9.60 million square meters, the difference between

demand and supply was 1.6 million square meters, the commercial housing market is in short supply, although it was decreased compared with previous years. Meanwhile, most of Hefei's commercial housing market demand comes from the middle class and poor, especially after "Second Child Policy." Of course, with the development of economic, people's requirements for the housing environment are getting higher and higher. People start to pay attention to all aspects of housing, not only the comfort of housing, the completeness of supporting facilities and environment, but also the cultural atmosphere and appreciation space, etc. However, Hefei commercial housing market planning and quality problems are more common: the commercial housing market has the highest level of modernization, and there is a significant gap with the development level of other big cities; the greening level of the community is not high, and there is less space for residents to move; the level of housing science and technology is not high, and new technologies and new energy used, etc.

In addition, many real estate developers have irregular development practices. First, many real estate developers changed their design plans, reduced the construction of supporting facilities, and harmed the interests of the people; second, the developer sold the commodity house in violation of the regulations, and the property certificate handed over to the buyer in a timely manner; third, after the housing was delivered to consumers for a period of time, problems such as cracked walls, water leakage, and poor sound insulation occurred, etc. The supply of commercial housing cannot meet people's increasing housing demand.

5.7.3 The concentration of real estate companies is not high

In 2017, there were 579 real estate companies in Hefei city, and it was decreased compared with previous years, the number of employees was 20285, and the average employee per company was 35. Meanwhile, real estate companies are mainly medium and small companies, they do not have enough budget to expand their operations. They cannot attract more talent to operate, so the real estate companies have the

shortages of human resources, low management levels weak operating capabilities and high asset-liability ratios, etc. The competitiveness of Hefei real estate companies is generally not high, and they can only rely on small-scale operations to survive. In this situation, Hefei real estate companies can only develop in Hefei, do not have enough competitiveness in other cities and lack cooperation with other companies, it causes that the industrialization level of the real estate market in Hefei is relatively low, and the technical content of the product is low.

5.7.4 People's wrong concept of consumer housing

In China, there is a traditional concept of housing: "a house, a home. "Many people buy houses without enough money, leaving them in debt for the rest of their lives. Among them, there are two wrong consumption concepts: first, many people want to enjoy life in advance, they are the one-sided pursuit of a big house, regardless of their economic level, massive debt early on; Second, there are still some people who are influenced by the traditional idea that owning a house is a real home. This concept leads some low- and middle-income families to become a part of the housing purchase group, and they faced with the pressure of mortgage under the condition of life pressure, and the pressure of life is increasing.

5.8 Suggestions

5.8.1 In the aspect of Hefei government

1. Rational use of land resources, strengthen land market regulation.

The land is an essential factor affecting the commercial housing market. The commercial housing market operated based on land. Without land, the commercial housing market will not be able to operate normally. Although the land auction policy implemented in the Hefei land market, which has increased the transparency of the Hefei land market to some extent, there are still some problems, especially in land planning. According to the analysis of the supply and demand of the Hefei

commercial housing market, the contradiction between supply and demand of the Hefei commercial housing market is prominent. Therefore, the government should divide the land reasonably and increase the residential land to alleviate the contradiction between supply and demand. At the same time, we will strengthen the supervision of the land market and the crackdown on violations in the land market.

2. Strengthen the housing supply security system and ease housing pressure.

Housing supply system mainly includes three aspects: first, high-end commodity housing supply; Second, low - priced commercial housing; Third, affordable housing and low-rent housing—the supply of high-end commercial housing aimed at high-end people. On the one hand, because the middle and high-end people themselves have enough financial strength to buy a house; On the other hand, high-end real estate housing can promote economic improvement without affecting people's lives. Still, the supply of high-end commercial housing should not be too much. Otherwise, it will affect people's lives. In terms of the supply of middle and low-end commercial housing, the supply of middle and low-end commercial housing aimed at the middle and lower classes. At the same time, the government should also strengthen supervision, the crackdown on speculation, promote the steady development of the commercial housing market. In terms of low-rent housing, the government can build low-rent housing in densely populated areas to help the poor who cannot afford to buy low - and medium-end commercial housing.

3. Strengthen monitoring and regulation of housing prices

In recent years, the rising housing prices in Hefei have severely affected people's lives, especially those in the middle and lower classes. Therefore, the government should strengthen the supervision and management of each link. In the land auction, the government should further improve the way of land transfer, severely crackdown on the phenomenon of land hoarding and the behavior of bidding up the price of land, and severely punish developers who violate the contract. In the sales stage, the government should check and verify the basic selling price of houses according to the

actual situation and crackdown on speculation in some real estate markets. At the same time, the government should also regulate the market order of the real estate market and prohibit illegal publicity and sales in some real estate markets.

5.8.2 In the aspect of company

1. Follow the changing of market

Since 2016, after the Hefei Municipal Government implemented a strict purchase and loan restriction policy, the golden age of real estate companies has passed, especially some real estate companies are also facing financial pressure. In this case, real estate companies should change their previous market position and change their previous blind investment behavior. First, enterprises should find their market positioning according to their financial strength. Secondly, under the circumstance that the Hefei government restricts the purchase of commercial housing, there is still a shortage of commercial housing, which means that the market demand for commercial housing is still very high, especially Low-end commercial housing. Real estate companies can launch appropriate small and medium-sized commercial housing on time to attract consumers. Finally, for consumers, commercial housing is no longer satisfied with housing needs, and the environment and quality are already an important factor affecting consumers' choice of housing. At this time, real estate companies should put quality first and use quality to build their reputation.

2. Building brand awareness

Although the number of real estate enterprises in Hefei is large, most of them are small and medium-sized enterprises. For the blind pursuit of economic benefits, most small and medium-sized enterprises are engaged in architectural design, engineering construction, property management, housing sales, and other industries, resulting in a wide range of enterprise operations, competitiveness is not healthy, the enterprise brand awareness is also relatively small.

In order to improve the brand awareness of real estate enterprises, first of all, real

estate enterprises must make a correct market positioning according to their reality, the development of the commodity housing type, layout, targeted at the market subject to make a correct market planning; Secondly, real estate enterprises should also focus on quality. If a brand wants to do a big job, it must ensure the quality of goods, and housing is closely related to people's lives. The real estate should be managed from the early stage of construction to the after-sale service. Finally, with the improvement of people's living standard, people's demand for commercial housing is not only satisfied with the living requirements. Therefore, under the premise of quality first, real estate enterprises should also strengthen the construction of the environment and supporting facilities to create an excellent living atmosphere for people's life.

3. Improve the scientific and technological content of commercial housing

After more than ten years of development, Hefei real estate market has gradually perfect and mature, Hefei real estate enterprise mechanism of management and construction is becoming more and more perfect. However, for Hefei real estate enterprise, they did not keep up with the progress of technology, they still use the original technology and materials in the process of housing construction and make Hefei commodity residential market progress slowly.

Thereby, if real estate companies want to improve the whole quality of commercial housing, they need to notice the new opinion of the real estate market.

Hefei real estate companies should actively use new technologies and raw materials in the construction while ensuring the housing area, but also strengthen the planning of greening and supporting facilities. At the same time, in order to ensure people's health and safety, real estate enterprises should use environmental protection materials in the construction process, instead of the original harmful materials; Increase the use of sound insulation, sound insulation materials, to protect people's privacy.

5.8.3 In the aspect of consumers

1. Change housing concept

With the sharp rise in the price of commercial housing in Hefei, people are facing more and more pressure on housing, but many people still buy houses regardless of the actual situation. There are three reasons for this phenomenon: first, the traditional concept of housing, people are eager to own their own house; Second, the housing market reform, the government encourages people to buy housing; Third, the influence of excessive consumption consciousness, especially among young people. In recent years, the consciousness of excessive consumption has been rising in society. Many young people squander money on the things they like, regardless of the actual situation, and the pursuit of big houses has saddled them with massive debts.

In this case, consumers should timely change the concept of housing, and choose the right way of housing according to their actual situation. Besides buying houses, consumers can also choose other ways, such as renting. Establishing a scientific concept of housing can help consumers get rid of the heavy burden.

2. Pursuit of the right housing area

In general, everyone likes big houses, and one-sided pursuit of big houses, ignoring their actual situation, leading them to bear a heavy debt burden early. Under the pressure of the debt burden, they dare not pursue other entertainment activities and trapped in housing debt.

Therefore, consumers should avoid comparison consumption and pursue rational consumption. When consumers buy a house, they should consider their income level and family situation, and purchase a house of suitable size with enough income.

Conclusion

In recent years, with the economic development of second - and third-tier cities, the commercial housing market also develops rapidly. As the capital of Anhui province, Hefei's economy is developing rapidly, so is the real estate industry. However, with the overheating of the real estate market, the government has carried out a new round of regulation on the real estate industry, which has caused a significant impact on the real estate market in Hefei. This paper first introduces the development background and history of the commercial housing market in Hefei, and then uses PEST analysis to understand the macro environment of the commercial housing market in Hefei; Besides, through the analysis of the current situation of the commercial housing market in Hefei and related indicators, and used econometric model to find the relationship between GDP and real estate investment, GDP and commercial housing sales prices, the current situation of commercial housing in Hefei is understood, and problems in the commercial housing market in Hefei found. Finally, according to the problems of the Hefei commercial housing market to put forward corresponding solutions.

The conclusions of this paper are as follows:

1. Introduce the development history of the commercial housing market in Hefei from 1978 to the present.

2. Summarize the macro environment of the Hefei commercial housing market from four aspects of politics, economy, social culture, and technology through PEST analysis. In terms of politics, the Hefei municipal government has adopted policies of purchase restriction, loan restriction, land restriction, and settlement to curb speculation in commercial housing and moderately develop high-grade housing under the condition of ensuring the demand of residents. In terms of economy, with the development of the economy and the increase of per capita income, the demand for commercial housing in Hefei is increasing. In terms of social culture, with the

increase of population and the improvement of urbanization level, the demand for commercial housing is increasing. In terms of technology, the progress of technology can promote the development of the commercial housing market in Hefei.

3. Analyze the status quo and relevant indicators of commercial housing in Hefei. Through the analysis of land purchase, housing investment, real estate price, and other relevant indicators of the commercial housing market in Hefei, the current situation of the commercial housing industry in Hefei understood, and the current situation of commercial housing in Hefei found.

4. According to the problems, Suggestions are put forward for the commercial housing market in Hefei. For Hefei government, strengthen the supervision of the land market and commercial housing market, and timely regulate the price of commercial housing; For real estate enterprises, they should follow the market changes, strengthen the brand building and continuously improve the scientific and technological content of commercial housing; For consumers, change housing concept and pursue suitable housing area.

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Appendix

Year	GDP (Billion CNY)	Population (Million)	Real estate investment (Billion CNY)	Commercial housing investment (Billion CNY)
2004	58.97	4.45	13.83	10.31
2005	85.36	4.56	19.13	14.29
2006	107.38	4.70	28.18	22.46
2007	133.46	4.79	38.75	29.86
2008	166.48	4.87	56.72	43.63
2009	210.20	4.91	67.04	46.82
2010	270.16	4.93	81.90	56.16
2011	363.66	7.06	88.96	62.56
2012	416.43	7.11	91.38	57.85
2013	467.29	7.12	110.58	67.44
2014	515.80	7.13	112.74	71.50
2015	566.03	7.18	125.91	77.87
2016	627.44	7.30	135.26	86.10
2017	721.35	7.43	155.74	109.55
2018	782.29	7.58	152.72	116.59

Year	Floor space under construction (Million m^2)	Floor space completed (Million m^2)	Commercial housing sales area (Million m^2)	Purchased land area (Million m^2)
2004	9.43	3.22	3.09	7.66
2005	11.86	4.68	5.37	3.91
2006	28.43	6.64	5.83	4.12
2007	28.72	6.68	9.53	4.82
2008	34.21	5.06	8.67	2.66
2009	40.09	5.59	11.80	3.24
2010	43.23	6.54	8.64	3.26
2011	45.46	6.92	10.58	4.71
2012	46.87	7.40	11.17	4.76
2013	53.93	11.11	14.52	6.59
2014	49.74	8.41	13.26	6.32
2015	46.13	7.84	12.86	4.19
2016	52.64	9.46	17.06	5.02
2017	51.00	8.00	9.60	6.85
2018	---	9.09	11.04	3.85

Year	Sales prices (CNY/m^2)	Average disposable income (CNY)	The number of real estate companies	Number of employees
2004	2270.55	8610.00	576	13225
2005	2799.45	9684.00	570	13976
2006	2873.78	11013.00	644	16903
2007	3153.80	13427.00	678	17044
2008	3425.00	15591.00	786	18334
2009	4095.00	17158.00	736	16980
2010	5502.00	19051.00	666	17988
2011	5607.55	22459.00	702	19813
2012	5754.31	25434.00	695	20491
2013	6084.00	28083.00	663	20260
2014	6917.00	29348.00	625	20343
2015	7512.00	31989.00	565	19461
2016	9312.00	34852.00	575	19062
2017	11442.00	37972.00	579	20285
2018	13068.63	41484.00	567	---