Risk Evaluation, Analysis and Development Strategy of Real Estate Enterprises: Under the Background of New Normal Economy

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Risk Evaluation, Analysis and Development Strategy of Real Estate Enterprises: Under the Background of New Normal Economy

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by

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Abstract

After more than 40 years of reform and opening up, China's GDP has become the second highest in the world. China's economic growth rate has changed from high-speed growth to medium high-speed growth. The mode of economic development has changed from extensive growth based on scale speed to intensive growth based on quality and efficiency. The economic structure has changed from focusing on incremental capacity expansion to in-depth adjustment based on stock adjustment and optimization of both. The driving force of economic development From tradition to information growth. At the same time, the fourth information technology revolution, represented by big data, artificial intelligence, blockchain and other information technologies, has come. All countries in the world have begun to seek to occupy the commanding heights in this field, so as to obtain the dominant position in a new round of technological revolution.

China's economy has entered a new normal, "medium and high speed, excellent structure, new power and multiple challenges" will become the main features of economic operation in the next five years. In the next five years, the three major driving forces of China's economic growth, namely, foreign demand, manufacturing industry and real estate, will be gradually exhausted. In particular, the downward risk of asset prices represented by real estate will increase, which will bring greater uncertainty to the judgment of China's external environment in the future.

In this context, China's economy has entered the new normal stage. The state has successively issued a series of laws to limit the overheated real estate investment, and vigorously supports the development of high-tech industries. The extensive growth of the real estate industry driven by investment in the past has been unsustainable, and major real estate enterprises and local investment groups have also begun to face debt risk and liquidity crisis. Therefore, the risk assessment, analysis and development strategy research of real estate enterprises under the background of new normal economy has become an important topic for further research.

Based on the current situation of China's real estate industry, China's future economic development trend, and China's population structure, this paper analyzes the factors that affect the real estate risk based on DEMATEL to identify and analyze the influencing factors of China's urban real estate risk, and explores its internal risk factors. Further use fn-chk method to measure and analyze real estate zombie enterprises in China, and identify the crisis in the industry as early as possible. On this basis, the risk assessment method of urban real estate market based on multiple

regression contingency scoring method (MRWS) is adopted. According to the basic principles of market economy, the risk of China's real estate market is comprehensively assessed from the perspective of market, providing theoretical basis for the local government to put forward corresponding risk control strategies.

Finally, based on the comprehensive consideration of national policy, social situation, population structure and other factors, and according to the above risk assessment and analysis of China's real estate enterprises and industries, this paper puts forward a set of corresponding risk control and sustainable and orderly development strategies, in order to provide theoretical basis and strategies for the sound and orderly development of the real estate industry in the context of the new normal of China's economy Guidance.

Key words: New normal of economy; Real estate risk; Zombie enterprise; Risk assessment.

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Chapter 1: Introduction

1.1 Background

China's economy has entered a new normal, and "medium and high speed, excellent structure, new power, and multiple challenges" will become the main features of economic operation in the next five years. In the next five years, the three major driving forces driving China's economic growth, external demand, manufacturing and real estate, will gradually fade. In particular, the downward risk of asset prices represented by real estate will increase, which will bring more uncertainty to the future judgment of China's external environment.

China's real estate has become a pillar industry of the national economy, and it is an essential way for Chinese government to invest and boost the economy. In 2018, China's GDP increased by 6.6%, which is directly related to real estate. As of the first half of 2018, real estate investment accounted for about 10% of China's GDP, and the contribution rate of real estate and related industries exceeded 30% of the GDP.

The increasing value of the entire real estate industry in 2018 was 5,984.6 billion yuan, about 6.6% of the national GDP. Compared with 5% in 2008, China's real estate's share of GDP has increased significantly. The proportion of real estate development investment in GDP is an indicator of economic growth's dependence on real estate. According to data from the National Bureau of Statistics, investment in real estate land development nationwide was 12 trillion yuan in 2018, an increase of 2.5% over the same period of the previous year. Real estate land development investment accounts for 13.36% of GDP. In the first half of 2019, the national fixed asset investment (excluding rural households) was 299.11 trillion yuan, and the real estate development investment was 6.1609 trillion yuan, accounting for 20% of the national fixed asset investment. By the end of 2018, the balance of personal housing loans reached 25.75 trillion yuan, accounting for about 54% of the total residents' loans.

1.1.1 China’s Current Economic Analysis Outlook

1.1.1.1 China’s Current Economic Development Characteristics

First, from a micro-level, the balance sheets of Chinese companies are currently facing recession, and insufficient financial flexibility has inhibited companies from increasing their capital expenditures. After 2008, due to a rebound in fiscal stimulus, companies again increased their capital expenditures significantly. However, due to excess capacity and insufficient demand,

the operating profit margin of the company continued to decline. After 2012, it remained at only about 5.5%. The stock of debt is high and the operating cash is high. Insufficient flow causes companies to passively "add leverage", which increases the economic downside risk.

Second, from a meso-level, the lack of a credit culture makes the process of clearing unreasonable production capacity slower. China's banking and enterprise relations are relatively close, and relational marketing in the financing field is greater than market-oriented operations. When corporate loans cannot be paid off, banks choose to extend rather than terminate loans, and companies with low operating efficiency take up more credit resources. In addition, the downward pressure on the economy is increasing, and the regulators also tend to maintain liquidity easing from the perspective of maintaining financial stability, which increases the adverse selection behavior of the market. In a nutshell, in a market that lacks a market-based exit mechanism and where implicit guarantees are prevalent, companies' exit of inefficient production capacity will be slow.

Third, from a macro perspective, there are three main points:

First, the lack of constrained local debt management systems will make the government more hesitant in using fiscal policies. After investing 4 trillion yuan in 2008, local officials pushed up local debts in the process of chasing the "political titular" of GDP growth. At this stage, if the economy rebounds, it does not rule out the possibility that the central government will once again control local property rights, which may increase economic volatility.

Secondly, the pressure of the population structure will also exert downward pressure on the economy in the next five years. On the one hand, the one child policy introduced in 1978 led to the current decline in the supply of young labor, which has lowered the economic growth center of China; on the other hand, due to historical reasons, the lack of commercial pension insurance, the rapid population aging increased government Expenditures on social and old-age security have increased fiscal pressure.

In addition, the Chinese government is currently accelerating the reform of the financial system, including promoting the construction of multi-level capital markets at home, enriching financial instrument transactions, etc., and promoting RMB internationalization and capital account convertibility abroad, but the reform itself is also a "double-edged sword." The pace of reform and stability needs to be grasped.

1.1.1.2 China's Economic Growth Forecast for the Next Five Years

First, China's economy will still achieve medium to high-speed growth. We expect China to maintain an average annual economic growth rate of about 6.5% in the next five years. This will complete the goal of doubling the size of the economy in 2020 compared with 2010. From the perspective of the factors driving economic growth, it is expected that the ratio of investment to GDP has peaked, and future growth will be driven by consumption. In addition, if the "Belt and Road" strategy can be carried forward smoothly, it will bring momentum to economic growth from both export and investment.

Second, real estate is the main risk point for economic growth that may exceed expectations in the next five years. The important economic downside risks in the next five years will still come from real estate. From the perspective of the large cycle, the higher population structure and higher per capita living area have both restricted housing prices. In addition, from the perspective of cyclical factors, high inventory in third- and fourth-tier cities and continued population outflows also increase the risk of house price adjustments. If the current situation of real estate cannot be alleviated, the risk of future economic stalls will not disappear.

1.1.2 Development Background of China's Real Estate Market

In the post-epidemic era, the probability of housing prices is steadily decreasing. From the three dimensions of population, income growth, and debt level, residents' demand and ability to pay for housing are declining; if both the current housing price bubble level and the market's expectations of future housing prices are taken into account, in the post-epidemic era, the probability of housing prices is stable drop.

1.1.2.1 Urban Housing Bubble

In the past ten years, due to rising prices, real estate is not only an important means of asset allocation for residents, but also a loan collateral generally accepted by credit institutions represented by commercial banks. Since the expansion of the Chinese economy is debt-led, the society's investment preference for real estate is constantly rising.

This investment preference has significantly increased housing prices in first-tier cities. In 2019, most first-tier cities have housing price-income ratios higher than 10 times, much higher than the reasonable range[11] (between 4.38-6.78 times). Among them, Beijing, Shanghai, the rates in Guangzhou are 34 times, 25 times and 23 times respectively. At the same time, the rise in property prices is also much higher than the growth rate of local per capita income.

1.1.2.2 Real Estate Industry Capital Pressure Is Increasing

From the supply side, since 2017, financing policies have continued to tighten. In order to prevent and resolve financial systemic risks, financial regulatory authorities do not allow cross-regional use of funds, restrict housing companies to continue to increase leverage, strictly regulate violations and leverage, and only allow "borrowing new and returning old" to guide real estate companies to rely more on funds and sales rebates to achieve endogenous growth. Under such a policy environment, various financing channels such as bank loans, real estate trusts, and overseas ABS have shrunk in succession.

[1] Reasonable range —— The ratio of the total purchase price of each household in a place or city to the annual income of the household, which is used to describe the affordability of the residents in a region. There is a popular saying that the ratio of house price to income is 4-7 times, which is a reasonable range. If housing loan is considered, the proportion of housing consumption in residents' income should be less than 30%.

From the perspective of the balance of real estate loans, at the end of 2019, the growth rate of real estate loan development loans of major financial institutions nationwide dropped to about 11% year-on-year, while the proportion of real estate trust balances increased correspondingly during the same period. Changes in financing channels have caused real estate companies to raise financing costs. Prompting real estate companies to increase inventory destocking efforts, speed up payment, and reduce pressure on the capital chain.

In addition, the inventory-to-sales ratio of the real estate industry is constantly expanding. In December 2019, the inventory-to-sales ratio in first-tier cities was 184.43, an increase of 9.9% year-on-year; the inventory-to-sales ratio in second-tier cities was 40.28, an increase of 15% year-on-year. From the total point of view, the ratio of urban housing units to housing is 1.09. Such a level of housing vacancy means that if housing prices are not expected to continue, sales shrinkage is inevitable. The interaction between the rise in the inventory-to-sales ratio and the tightening of financing channels will promote the destocking of the real estate sector, increase the speed of payment collection, and reduce debt pressure.

1.1.2.3 The Slowdown in Economic Growth and the Outbreak of the Epidemic Have Hampered the Ability of Urban Residents to Pay for Housing

From the demand side, since 2015, the per capita disposable income of residents has bid farewell to double-digit growth and has been hovering between 8%-9%. In 2019, the disposable income of residents was 30,733 yuan, a year-on-year increase of 8.87%. From the perspective of the debt ratio, from 2008 to 2019, China's resident leverage ratio increased from 17.8% to 53.2%, which is higher than the average level of resident debt in emerging markets. Revenue growth has slowed, and the rapid increase in debt scale has made residents borrow money to buy houses. Leverage is limited.

1.1.2.4 Demographic Changes Make the Long-term Motivation for Housing Purchases Increasingly Declining

The marketization process of China's real estate is also a process of rapid urbanization. Since the 1990s, with the transformation of the economic structure, a large number of people have moved from rural areas to cities, and from agriculture to manufacturing and service industries. The influx of large numbers of people has continued to increase the demand for urban housing, which has become one of the important factors supporting housing prices.

Since 2013, with the emergence of the Lewis turning point, the declining birthrate combined with the aging has brought about a decline in the natural growth rate of the urban population, which has reduced the demand for growing housing for the marriage and childbearing population. The increase in the urbanization rate and the aging of the rural population have reduced

the size of the rural to urban population. Since 2010, the rate of net inflow of population in economically developed areas has slowed, especially in the first-tier cities where the size of the floating population has decreased.

In the medium and long term, population growth is the main source of rigid housing demand. The aging population and the reduction in net inflow of foreign population have slowed or even reduced the growth rate of the urban marriage and childbearing population, and the housing demand has also been declining.

1.1.2.5 Expected Decline in Housing Prices Drives Investment Demand Down

The continued rise in housing prices and the expected decline in psychology have also reduced investment demand for home purchases to some extent. The continuous rise in house prices over the past two decades has allowed investors to enjoy a huge investment premium, thereby attracting urban residents to concentrate a large amount of wealth on this special asset. Real estate has become the most important wealth storage tool for residents, which has caused house prices to seriously deviate from the basic value determined by usage demand, forming a huge price bubble. The investment property of "increasing and buying" dominates the demand side of real estate.

In the future, as housing price growth narrows, and some regions even have price inflection points, people have divergent expectations about the future trend of housing prices. This disagreement has reduced investment purchase demand to some extent.

1.1.3 Analysis of Talent Flow Among Cities in China

Talent is the foundation of all economic and social activities, and talent is the first resource. In the previous series of reports, we put forward the logic of "people follow the industry and people walk high", pointing out that talents are continuing to gather in big cities and metropolitan areas. The accumulation of talents is also an intrinsic driving force for the development of real estate in the region. It can provide a glimpse of the future supply and demand relationship and development trend of real estate in the region. The analysis of the flow of talents is of great value in predicting the future research of regional real estate risk in China.

1.1.3.1 Top 100 Most Attractive Cities in China: Shanghai, Shenzhen and Beijing Rank in the Top Three

To measure the attractiveness of talents in different cities, the talent attractiveness index is defined as the weighted result of the proportion of talent inflow, the proportion of net talent inflow, the proportion of fresh talent inflow, and the proportion of returnees' talent inflow. Among them, the proportion of inflow of talents and the proportion of net inflow of talents reflect the ability of

the city to attract and retain, respectively, the proportion of fresh talents inflow and the proportion of returnees' inflows reflect the city's impact on young and highly educated talents and returnees. Attractive. Judging from the results, Shanghai, Shenzhen and Beijing are in the top three in 2019, Shanghai has been the first in three consecutive years since 2017, and Guangzhou, Hangzhou, Nanjing, Chengdu, Jinan, Suzhou and Tianjin are in the top ten. In 2019, the proportion of fresh students and returnees to north, north and Shenzhen and Guangzhou accounted for 24.5% and 28.7%, respectively, which were higher than the proportion of mobile talent to north, east, south and Guangzhou, and 20.2%. Fresh students and returnees were more inclined to go to first- and second-tier cities.2) Talent mobility trends: Talent accumulation in the Pearl River Delta of the Yangtze River Delta and talent outflow from Beijing, Tianjin and Hebei. In terms of regions, the proportion of net inflows of talents in the eastern, central, western and northeastern regions in 2019 was 5.8%, -2.4%, -0.2% and -3.2%, respectively. The talents in the east continued to accumulate, while the outflows from the central and western regions continued but narrowed. Northeast China continued its outflow and expanded. In terms of cities by line, the proportion of net inflows of first-tier, second-tier, third-tier, and fourth-tier talents in 2019 was -2.7%, 1.1%, 1.8%, and -0.3% respectively, and in 2018 were -0.9%, 4.9%, and -0.3%, -2.3%; combined with the data observation of the past 4 years, the first-line due to the continuous outflow of Beijing and Shanghai control personnel, the second-line talent continued to gather, the third-line is more balanced, and the fourth-line continues to flow. In terms of urban agglomerations, over 60% of the talents flow to the five major urban agglomerations. In 2019, the proportion of talent inflows in the Yangtze River Delta, the Pearl River Delta, Beijing-Tianjin-Hebei, Chengdu-Chongqing, and the middle reaches of the Yangtze River was 23%, 14%, 13%, and 7%, respectively. 7%, and the net inflows accounted for 5.0%, 2.8%, -4.0%, 0.0%, and -0.5%, respectively. The Yangtze River Delta and the Pearl River Delta have concentrated talents. Beijing, Tianjin and Hebei are affected by Beijing's controllers. The middle reaches of the Yangtze River are basically balanced.

1.1.3.2 First-Tier Cities: The Proportion of Net Inflows of Talents from North to North Has Been Declining Year by Year, and the Trend of Shenzhen-Guangzhou is Increasing.

The proportion of net talent inflows in Beijing from 2016 to 2019 was -0.7%, -2.3%, -2.7%, and -3.9%, which continued to be negative and the decline was increasing. The main reason is that Beijing and Shanghai control each other's talents because of strict population control and industry thinning. The first target city for outflows, the proportion of talent outflows from Beijing to Shanghai and Shanghai to Beijing was 0.8% and 0.6%, respectively, and the net flow of talent from Beijing to Shanghai; Shanghai's net talent inflows from 2016 to 2019 accounted for 1.3% and 1.2%, respectively , 0.9%, 0.5%, continued net inflow but gradually decreased, mainly due to Shanghai's control of population and industrial transfer; Shenzhen's net talent inflow in 2016-2019 accounted for -0.2%, 0.1%, 0.4%, 0.2%, mainly due to Shenzhen's strong vitality, attractive talent policy; Shenzhen and Guangzhou are the first target cities for brain drain, and the proportion of talent outflow from Shenzhen to Guangzhou and Guangzhou to Shenzhen is 0.7% and 0.6%

respectively, and the scale is basically balanced; Guangzhou 2016-2019 talent net inflows accounted for 0.3%, 0.5%, 0.5%, and 0.6%, respectively, and continued to stabilize the net inflow, mainly due to the rapid development of Guangzhou and the lowest cost of living in first-tier cities.

1.1.3.3 Second-Tier Cities: The Proportion of Net Inflows of Talents in Hangzhou, Nanjing and Han Showed an Upward Trend, while Jin Rong Declined.

The proportion of net talent inflows in Hangzhou from 2016 to 2019 was 0.8%, 1.0%, 1.2%, and 1.4%, which were always positive and rising year by year. The main reason is that the industry represented by e-commerce in Hangzhou is developing rapidly, and the salary exceeds Guangzhou in ten major cities. Ranked fourth in the middle; Nanjing's net talent inflows in 2016-2019 accounted for 0.8%, 0.9%, 0.9%, and 0.9%, respectively, which were always positive and relatively stable, mainly due to the rapid development of Nanjing and the "Ningju plan in 2018" Implement talent attraction; Chongqing's net talent inflow in 2016-2019 accounted for -0.1%, -0.1%, 0.5%, and 0.3%, respectively. In 2018, it turned from negative to positive, mainly because of the development of the information technology industry to attract talent; Wuhan 2016-2019 the proportion of net talent inflows was -0.3%, 0.0%, 0.8%, and 0.1%, respectively. In 2017, it changed from negative to positive, mainly due to the implementation of the policy of "millions of college students staying in China" in 2017; and the proportion of net talent inflows in Tianjin from 2016 to 2019. 0.2%, 0.1%, -0.1%, -0.1%, declining year by year and turning from positive to negative in 2018, mainly due to the slowdown of Tianjin's development speed, the GDP growth rate of 5.3% in 2019 is the lowest among the ten cities, and the salary is the lowest among the ten cities ; Chengdu's net talent inflow in 2016-2019 accounted for -0.8%, -0.3%, -0.3%, and -0.6%, which were always negative. The main reason was that Chongqing and Chengdu were the first target cities for talent outflows due to the low salary level. The net flow of talent from Chengdu to Chongqing.

Table 1: Average monthly income per industry and per city in 2017.

Industry(ies)	Ave monthly income (In CNY)	Beijing	Shanghai	Shenzhen	Hangzhou	Guangzhou	Nanjing	Wuhan	Chongqing	Chengdu	Tianjing
Finance	10784	13753	13194	12562	11101	11204	10386	9540	9136	9478	10230
IT/Communication/Electronics/Internet	9631	12628	11364	9825	9680	8770	9161	8234	8164	8165	8049
Agriculture/Forest/Pastoral/Fishing/Other	8828	10040	10713	9775	8985	8557	8305	7891	7923	7648	6933
Business services	8794	11118	11120	9815	10146	8578	8838	7222	7683	7223	7997
Energy/Mineral/Environmental Protection	8679	11539	10159	9552	9222	8313	8250	7621	7693	7555	7415
Real Estate/Construction	8355	10320	10619	9844	9930	8988	8664	8313	8465	8200	7700
Stylistic Education/Arts and Crafts	8058	10347	10301	9142	8895	9012	7571	7553	7073	7089	6849
Production/processing/manufacturing	8040	9975	9565	8727	8654	7867	7968	7565	7599	7355	6799
Transportation/Transportation/Logistics/Warehousing	8000	8862	8277	8829	8954	6854	7437	7296	7149	7636	6444
Trade/Wholesale/Retail/Leasing	7938	8904	8707	8227	8111	7389	7348	7007	6855	6773	6480
Culture/Media/Entertainment/Sports	7663	9232	8767	8441	8326	7322	7574	7028	6811	7165	6983
Service industry	7611	9291	8898	8569	8205	7504	7430	6890	7272	6921	6832
Government/non-profit organization	7609	9384	9924	9062	9528	8132	8618	7633	7561	8039	6939

1.1.3.4 Regional Level: The Return of Labor in The Central and Western Regions, The Localization of Migrants in The East, and The Accelerated Outflow of Population in The Northeast.

From 1978 to 2010, the population relocating from the central and western regions to the eastern region was dominated by labor, and most of them did not move their household registrations or bring children. The phenomenon of left-behind children in the central and western regions is very obvious. After the reform and opening up, a large number of people gathered in the eastern region with the first economic development. From 1978 to 2010, the annual resident population in the eastern, central, western, and northeastern regions increased by 1.39%, 0.86%, 0.85%, and 0.73%, respectively. The change is 4, -1.5, -1.7, -0.8 percentage points. However, the household registration population and the number of primary school students in the eastern region have not increased significantly with the permanent population. The household registration population in the eastern, central, western, and northeastern regions increased by an average of 1.06%, 1.14%, 1.1%, and 0.69%, respectively. 0.8, 0.5, -1 percentage points; the number of primary school students in the eastern, central, western, and northeastern regions increased by -1.12%, -1.11%, -1.03%, and -2.60%, respectively, and the proportion of primary school students changed by 0.8, 0.8, and 1.6, respectively, -3.2 percentage points.

Since around 2010, part of the population has returned to the central and western regions, and the eastern region has actively promoted the localization of foreign population such as university graduates and skilled personnel in the face of employment pressure. In 2009, the proportion of migrant workers working in the Yangtze River Delta and Pearl River Delta regions

accounted for 2.4% and 7.6% of the country's migrant workers, respectively, and there was a significant "labor shortage" in the eastern coastal areas in the second half of 2009; although the employment scale of college graduates in the eastern region continued to grow from 2013 to 2017, the proportion decreased from 65.7% to 56.7% (see the "Makes Institute's "China University Student Employment Report"). Facing the pressure of employment, the eastern region took the initiative to deepen the reform of the household registration system to attract migrants to live and work in peace and contentment. Since 2011, Jinjiang, famous for its shoe and apparel industry, has implemented the zero-threshold "residence permit" system in Fujian. In 2013, it took the lead in implementing the "no house also settled" policy. After the State Council requested further advancement of the household registration system reform in 2014, Fujian announced in 2015 that the restrictions on settlement in areas other than Fuzhou, Pingtan, and Xiamen would be fully liberalized; Guangdong announced that, in addition to Guangzhou and Shenzhen, the liberalization of direct family members should be liberalized, and college degrees (including College) Requirements for entry of households for academic graduates, skilled talents, and special professionals. From 2011 to 2017, the resident population in the eastern, central, western, and northeastern regions increased by 0.74%, 0.48%, 0.63%, and -0.1% annually, respectively, and the proportion of resident population changed by 0.6, -0.1, 0.2, and -0.3 percentage points respectively. Although the growth rate of the resident population in the eastern region has decreased significantly, the growth rate of the registered population and primary school students has not decreased but increased. From 2011 to 2017, the household registration population in the eastern, central, western and northeastern regions increased by an average of 0.82%, 0.5%, 0.48% and -0.54%, respectively, and the proportion of household registration population changed by 0.7, 0, -0.1 and -0.6 percentage points respectively. The number of primary school students in the eastern, central, western, and northeastern regions increased by 2.38%, -0.72%, -0.83%, and -2.69% annually, respectively, and the proportion of primary school students changed by 5.2, -2, -2.2, and -1 percentage points respectively. Among them, the average annual growth rate of the resident population in the eastern region from 2014 to 2017 decreased by 0.02 percentage points from 2011-2013, but the average annual growth rate of the registered population increased by 0.22 percentage points.

In terms of different provinces, after 2010, the local population of the eastern provinces such as Jiangsu, Guangdong, Fujian and Zhejiang is obviously localized, the population of traditional migrant workers in the provinces of Sichuan, Anhui, Xiangxi and Guizhou has returned significantly. The population situation is the most severe. From 2011 to 2017, 11 provinces including Guizhou, Henan, Jiangxi, Jiangsu, Guangdong, Fujian, Hebei, Shandong, Zhejiang, Yunnan, and Qinghai had a positive annual growth rate difference between the registered population and the permanent population. Among them, Guizhou, Henan, Jiangxi, Hebei, and Yunnan are traditional migrant-exporting provinces. The average annual growth rate of the registered population in 2001-2010 is higher than that of the permanent population. From 2011 to 2017, this trend only continued. The narrowing of the annual average growth rate of the permanent population indicates that the migrant labor has returned. The population return is more obvious in Hubei, Chongqing, Sichuan, Anhui, Hunan, Guangxi and other provinces. The growth

of permanent population exceeded that of household registration in 2011-2017. In Jiangsu, Guangdong, Fujian, and Zhejiang, the average annual growth rate of the registered population in 2001-2010 was lower than that of the permanent population, indicating a large amount of foreign population inflows; the average annual growth rate of the registered population in 2011-2017 began to be greater than that of the permanent population Speed, indicating the localization of the immigrant population's household registration. At the same time, the average annual growth rate of elementary school students in eastern provinces such as Jiangsu, Guangdong, Fujian, and Zhejiang from 2011 to 2017 was significantly higher than the national average growth rate of 0.2%, indicating that a large number of migrants gradually moved their children to the local area after they settled in the east. Admission. In addition, the growth rate of the permanent population and household registration population of the three northeastern provinces all turned negative in 2011-2017, and the growth rate of the number of primary school students in Heilongjiang is even the lowest in the country.

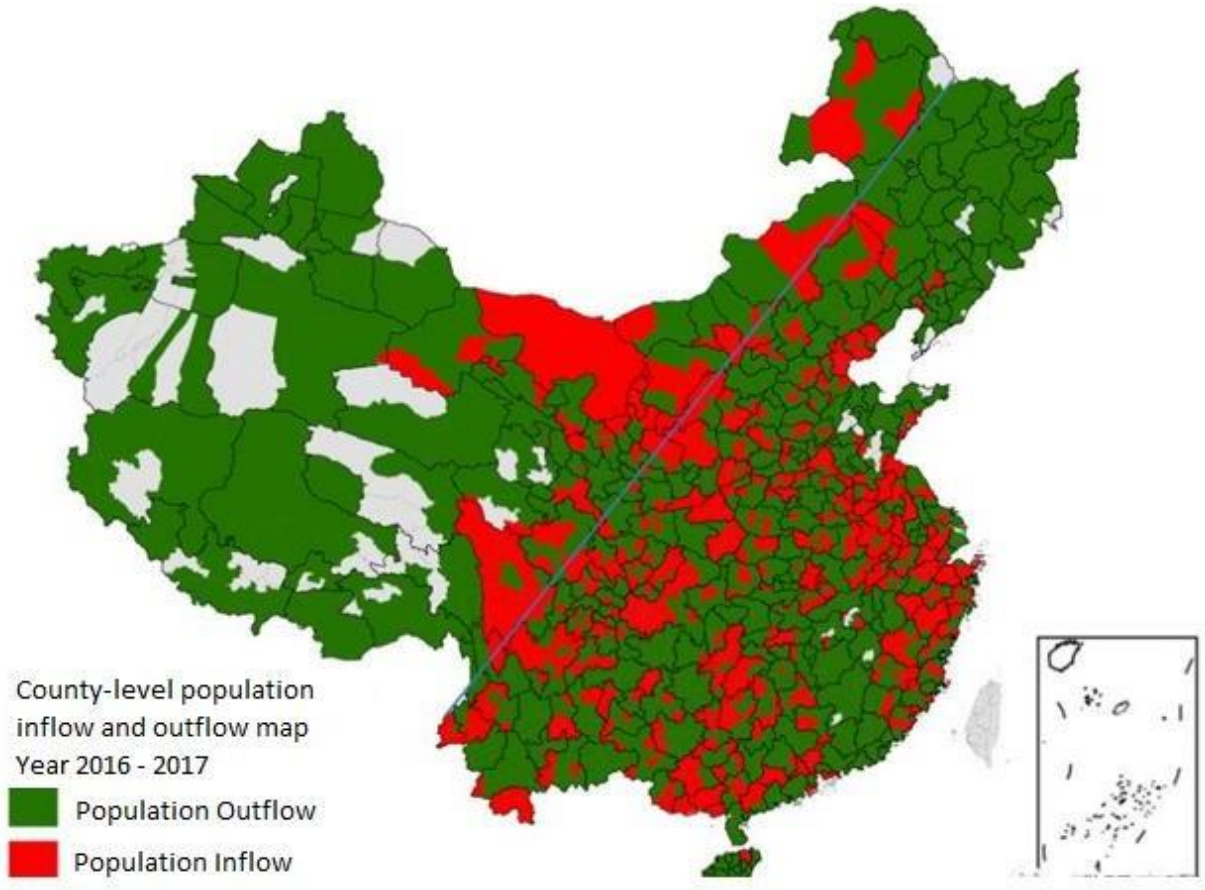


Figure 1: Country-Level Population Inflow and Outflow Map in China, Year 206-2017.

1.2 Research Significance

In the overall evaluation dimension of the real estate market risk, multiply the probability of risk occurrence and the after-effects to obtain the size of the urban real estate market risk. The evaluation result is broad and thick, and some risks may even be missed, or risk assessment overlaps in order to bring interference to the formulation of regulatory policies by government departments, the existing risk evaluation methods cannot meet the requirements of urban real estate risk management under the new normal. Therefore, according to the characteristics of the real estate market under the new normal, the paper identifies the risk influencing factors, analyzes the path of risk action, establishes a fuzzy evaluation model, and proposes a real estate market regulation strategy to construct a method of urban real estate risk management in the whole process. Under normal circumstances, the real estate market regulation has an important reference value, and it will also enrich the urban real estate risk management theory.

Through analysis of the evaluation results of real estate risks in 35 large and medium-sized cities in China under the new normal, combined with the study of risk action paths, the key elements of risk prevention and risk treatment are established, and the idea of urban real estate market regulation based on risk response is proposed. On this basis, the use of system dynamics methods to evaluate the effectiveness of short-term control policies, the establishment of system dynamics models for real estate land policies, credit policies, taxation policies and simulations, analysis of the effectiveness of the real-time market short-term control policies, and ultimately From the perspective of establishing risk prevention mechanism, perfecting market supervision mechanism, and constructing long-term development mechanism, we put forward suggestions on long-term regulation and control policies for China's urban real estate market.

The content of this article analyzes the risk of real estate investment decision-making in detail, and research helps to raise the risk awareness of the entire industry and enhance risk awareness.

Secondly, risk research is conducive to improving the risk management level of real estate development enterprises and preventing and controlling risk losses.

Third, real estate investment risk research is conducive to the conscious use of risk mechanisms to regulate and promote the development of the real estate industry. Because the consequences of risk are twofold, risks hide crises and risks breed opportunities. Therefore, the risk is not only prevention but also a solution to the problem of utilization.

In short, the research on urban real estate risk assessment and control strategies not only conducts premises for enterprises and individuals. Industrial investment management has an important impact, and is of vital practical significance for the safe operation of the country and society. At the same time, it has important theoretical significance for the development and innovation of the entire process management method of real estate risk. Therefore, it is of great practical and theoretical significance to study the risk assessment and control strategies of Chinese urban real estate under the new normal.

1.3 Research Method

This study starts from the perspective of government control of real estate risks and real estate market supervision, and from the new normal of China's real estate market risk characteristics, identifying and analyzing risk influencing factors, studying risk behavior paths, constructing risk assessment models, and applying the model to China large and medium cities. Risk comparison assessment, risk response methods, simulation analysis of short-term control policies based on risk disposal, and finally put forward long-term control policy recommendations for urban real estate market based on risk prevention.

The main method of this article is the purpose and application of this article as follows:

- Qualitative and quantitative analysis of China's new economic situation;
- China's “Thirteenth Five-Year Plan” social survey and policy analysis;
- Questionnaire and data analysis;
- Based on DEMATEL analysis of factors affecting real estate risk;
- Measurement and analysis based on FN-CHK method;
- Multiple regression weighted scoring (MRWS) method;
- Development strategy of real estate enterprises.

1.4 Research Content

(1) The first part is the introduction.

This part mainly explains the research background of the thesis, analyzes and defines the research object, and points out the significance and purpose of the research. This article summarizes the factors and risk assessment methods that affect domestic and foreign urban real estate risks, and puts forward the main research content and paper structure.

(2) The second part is the identification and analysis of factors that affect real estate risk under the new normal.

Based on the risk characteristics of China's urban real estate market under the new normal, this part determines a variety of influencing factors such as inventory, price, capital and policy environmental risks, and uses the DEMATEL method to calculate the degree of impact, centrality and causes of each factor. Screen the key factors that affect the risks of the real estate industry.

(3) The third part is the risk identification of real estate enterprises.

This part classifies high-risk enterprises as "zombie enterprises". This paper improves the government subsidies and tax benefits by improving the recognition of the existing "zombie enterprise" measurement field and referring to the FN-CHK method. Considering the use of factors such as 2011-2018 listed company data to predict potential real estate "zombie companies".

(4) The fourth part is based on the multiple regression weighted scoring (MRWS) method of urban real estate market risk assessment

Step 1: construct an indicator system from the five dimensions of macroeconomics, population status, investment popularity, housing market, and capital supply, and comprehensively evaluate the strength of each dimension factor in supporting housing prices, thereby reflecting the risk of the urban real estate market;

Step 2: assign a certain weight value to the five dimensions through expert evaluation, and at the same time set some detailed indicators for each dimension, and split the total weight value of the dimension into each detailed indicator; under each dimension, each detailed The sum of the weight values of the items is equal to the total weight of the dimension, and the weight value of each detail item is given by experts.

Step 3: Perform forward normalization processing on each index value based on the city, and then perform weighted calculation on the processed index to obtain the comprehensive score of each city;

Step 4: Finally, each city is divided into active intervention, cautious intervention and prohibited intervention levels according to the comprehensive score.

1.5 Technical Route

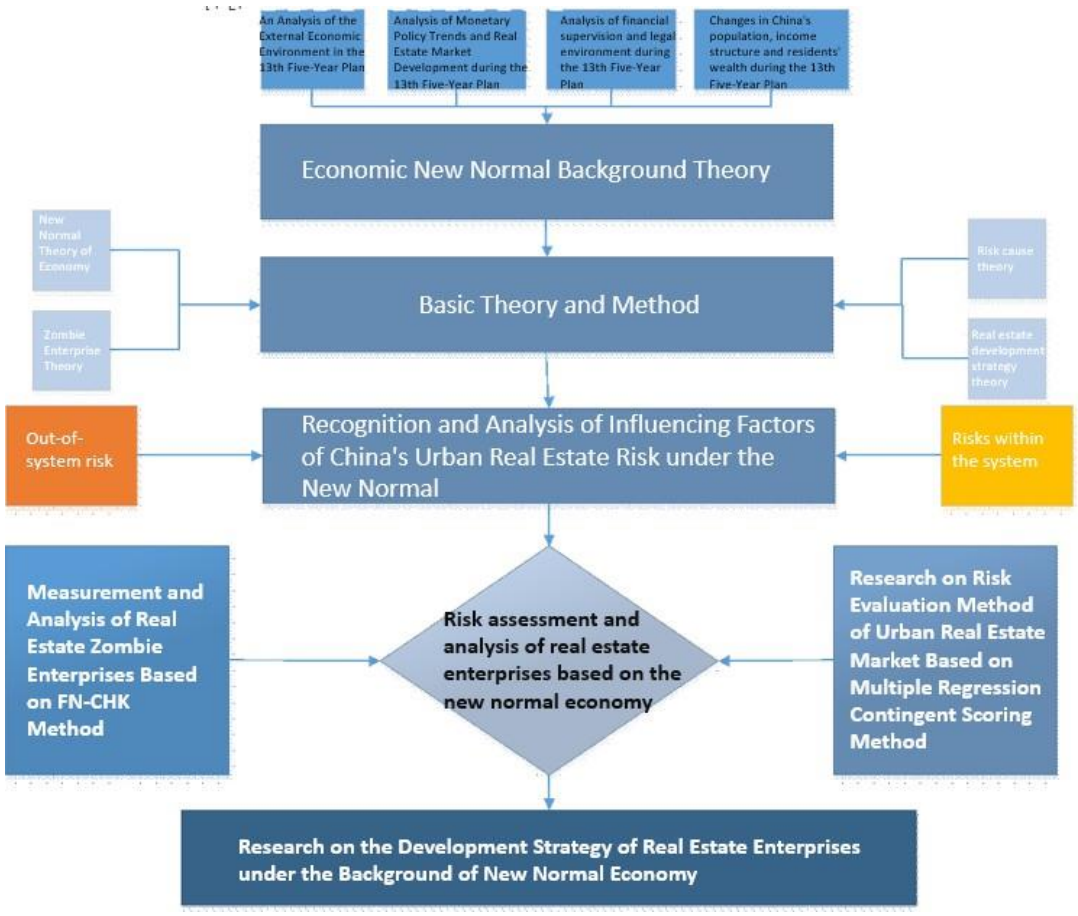


Figure 2: Outline of the Research Content

Chapter 2: China's Real Estate Development History and Status Quo analysis and Future Prospects

2.1 Development Course of China's Real Estate Market

China's real estate brokerage industry is an old and trendy industry and one of the important components of the real estate industry. The real estate industry research report pointed out that China's real estate brokerage activity sprouted in the Western Han Dynasty, and developed rapidly after the Tang and Song Dynasties. After 1949, as the state abolished the private ownership of real estate and prohibited real estate sales and leases, real estate brokers were gradually banned. Since the reform and opening up in 1978, the real estate brokerage industry began to recover and developed at a relatively rapid pace. At present, China's real estate brokerage industry is still in the primary stage of development. Let's take a look at the development of the real estate industry.

The prosperity and rapid development of China's real estate began with the reform of the monetization of the housing system in 1998. In 1998, the State Council issued the “Circular of the State Council on Further Deepening the Urban Housing System Reform and Accelerating Housing Construction” (Circular 23), which ended the welfare housing distribution system, marking the opening of China’s commercial housing market and establishing real estate as a new economic The growth point means that the real estate era has officially arrived.

From 1998 to 2018. China's real estate market has experienced 20 years of development:

Sales rose from 251.3 billion to 13.4 trillion; sales area rose from 122 million square meters to 1.7 billion square meters; investment rose from 361.4 billion to 11 trillion yuan; new construction area rose from 204 million square meters to 1.8 billion square meters; completed area increased from 1.76 Yiping rose to 1.075 billion ping; the compound annual growth rates were 23%, 15%, 20%, 12%, and 10%. Of course, these 20 years have not been growing steadily, but a cyclical spiral upward growth. Specifically, according to the policies issued, the 20-year history of real estate development can be divided into 7 stages.

(1) From 1978 to 1998, the theoretical breakthrough and initial stage, the formulation and implementation of the Land Law and Planning Law provided a legal basis for the development of real estate. (That is, the preparation stage before the formal marketization of Chinese real estate)

(2) From 1998 to 2002, the "Notice on Further Deepening Urban Housing System Reform and Accelerating Housing Construction" was issued in 1998, and it was decided to stop the physical distribution of housing from that year, and establish the monetization of housing distribution, commercialization of housing supply, and socialization. New housing system.

(3) From 2002 to 2007, after the real estate market was launched in 1998, real estate was overheated and slender from 2002 to 2004. After 2002, real estate macro-control was fully implemented. Among them, the goal of regulation in 2002-2004 was to curb the overheating of the real estate market, and the goal of regulation in 2005-2007 was to stabilize housing prices.

(4) From 2008 to 2009, the international financial crisis broke out. In order to stabilize economic growth and avoid the decline of the real estate market, policies began to shift to stimulating housing consumption, the introduction of credit support, increased protection of housing supply and tax relief policies, housing prices rose sharply. Landmark event: Four trillion investment stimulus plan! This stage is a leap in China's housing prices.

(5) From 2010 to 2013, in April 2010, on the one hand, "the most stringent regulation in history" kicked off after the "two sessions"; on the other hand, the call for "secondary housing reform" became more and more demanding Increase the construction of affordable housing. On the basis of land supply, market structure, taxation and credit control, a comprehensive purchase restriction measure was introduced, and the overheating of real estate was temporarily restricted.

(6) From 2014 to 2016, the Chinese economy entered a new normal. Under the policy demands of "steady growth" and "destocking", four rounds of stimulus policies were introduced, mainly to relax purchase and loan restrictions, strengthen credit support and tax relief. From 2015 to 2016, the first and second tier housing prices skyrocketed, the third and fourth tiers were stable, and regional differentiation was obvious. China's real estate has made another leap, with first- and second-tier housing prices basically doubling.

(7) From 2016 to the present, in 2016, the real estate market exhibited a regional differentiation of “first- and second-tier high housing prices and third- and fourth-tier high inventories”. From the beginning of 16 years, it is mainly the destocking stage of 3rd, 4th and 5th tier cities.

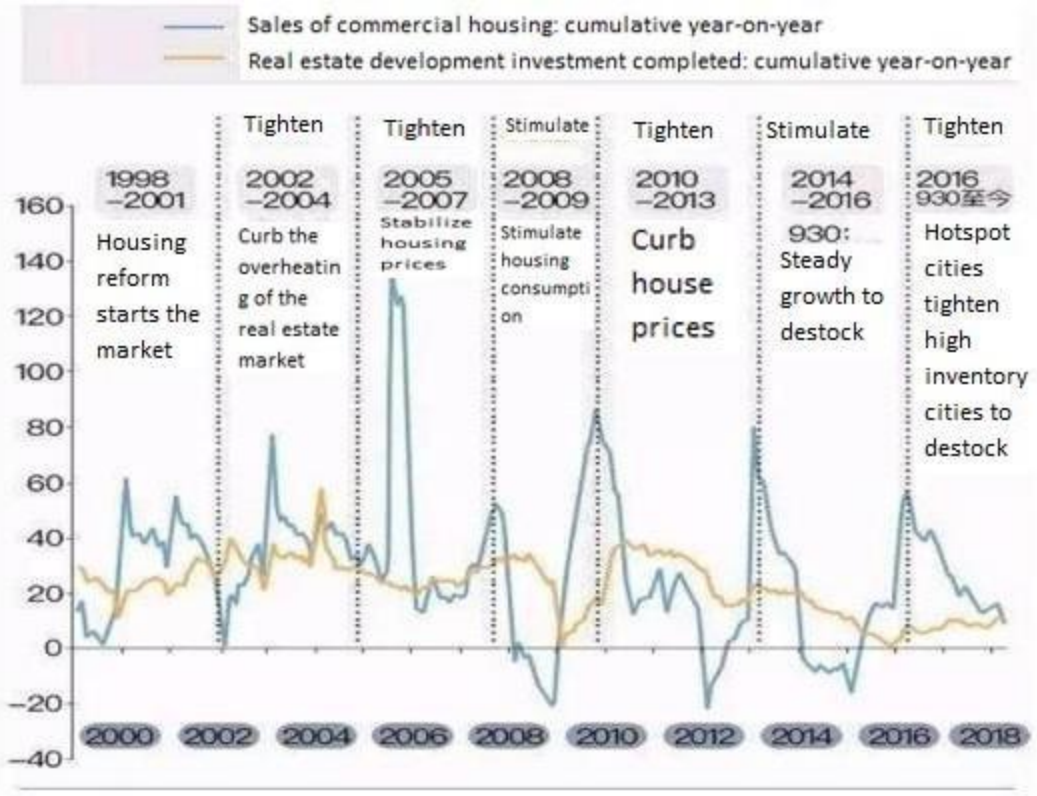


Figure 3: Investment and Sales Cycle Since Real Estate Marketization

According to the analysis of the sales area and sales prices of commercial housing in the country in the past 20 years (1998-2017), there have been two "leaps" in real estate across the country, respectively from 2008 to 2009 and 2015 to 2016. The leap from 2008 to 2009 directly benefited from the 4 trillion stimulus plan, which opened the era of large infrastructure such as high-speed rail; the leap from 2015 to 2016 directly benefited from the real estate represented by the "330 New Deal" Stock stimulation plan. These two leaps have basically quadrupled housing prices in some first- and second-tier cities.

In general, in the 20 years since the beginning of 1998, China's real estate has experienced two leaps, respectively 2008-2009 and 2015-2016, but the focus of the two leaps is different. The most fundamental reason for the first leap is that the target population of potential house buyers is very large, the policy stimulus is only a fuse, and the fundamental factor is the potential need for super exuberant; the second leap took advantage of the baby boom tail and psychological warfare. The real golden 10 years of China's real estate began with the "4 trillion stimulus plan" in 2008.

2.2 China's Real Estate Market Development Status

According to the local government’s tax report, the biggest beneficiaries of real estate development are local governments. The local government benefits from the real estate industry, in addition to land transfer fees, real estate tax, urban land use tax, land value-added tax, cultivated land occupation tax, deed tax and other 5 taxes, as well as land financing. Ren Zeping, Xia Lei and Xiong Chai estimated that the land transfer fee and the five taxes alone accounted for 60% to 70% of the local government’s general public budget income.

According to the latest data, as of September 2018, the transfer fee for state-owned land use rights was 5.2 trillion yuan, a year-on-year increase of 40.7% and an increase of 23.9 percentage points from 2016. The income from the transfer of state-owned land use rights is the main source of government fund income, and it is also the reason why the revenue of local government fund accounts for much higher than the central government.

Local general public budget revenue is the main and most direct indicator of the city's financial strength. The income of the "land transfer fee" is included in the budget of the government fund and is the main source of fund income. In 2017, local government revenue was 9.1 trillion yuan, and government fund revenue was 5.8 trillion yuan, up 7.7% and 37.3% year-on-year, respectively, and real estate-related income accounted for 45%.

The data shows that the national land sales revenue in 2018 was 6.5 trillion yuan, a year-on-year increase of 25%, the highest value in history. Local general public budget income at this level was 9.7 trillion in 2018, a year-on-year increase of 7%. In 2018, land grant income was approximately 66.48% of the local general public budget for the same period, compared with 56.9% in 2017.

In recent years, real estate market regulation policies have been intensively introduced, and the regulation policy system has been continuously improved. Real estate development investment and corporate funding sources have grown steadily, housing sales area has been steadily falling, new construction and land purchase intentions are strong, housing prices have risen, land prices have dropped significantly, and the sales situation of benchmark real estate companies has been significantly better than that of the national and interregional The differentiation continues, and the third and fourth tier cities have become the main force driving real estate investment and sales growth.

China's real estate systemic risks are closely related to China's real estate regulation and control policies. The real estate risk spillover status and correlation can be truly identified from the effects of macroeconomic regulation and control policies. The real estate risk spillover situation and correlation can also identify the pros and cons of China's real estate control policies.

The real estate regulation and control policy continues to build a system of combination of length and short-term under the tone of "no housing and housing speculation"[2] and "combination of rent and purchase". The construction of the housing rental market continues to accelerate. The initiative to introduce regulatory policies by chance has increased significantly.

The balance of real estate loans of major financial institutions (including foreign capital) nationwide was 37.5 trillion yuan, a year-on-year increase of 20.4%, and the growth rate was the same as that in the first half of the year. The balance of real estate loans accounted for 28.1% of the balance of various loans. Among them, the balance of personal housing loans was 24.97 trillion yuan, an increase of 17.9% year-on-year, and the growth rate was 0.7 percentage points lower than that at the end of June; the balance of housing development loans was 7.1 trillion yuan, an increase of 33.9% year-on-year, and the growth rate was 0.3 lower than that at the end of June Percentage point; the balance of real estate development loans was 1.45 trillion yuan, an increase of 6.6% year-on-year, and the growth rate was 0.4 percentage points lower than that at the end of June.

Constrained by the total amount of residential credit, it is expected that the mortgage interest rate will decline slightly in 2019, the growth rate of the amount of loans will slow down, and the growth of the mortgage balance will increase by 14%.

[2] No housing and housing speculation——House should be used for living not speculation.

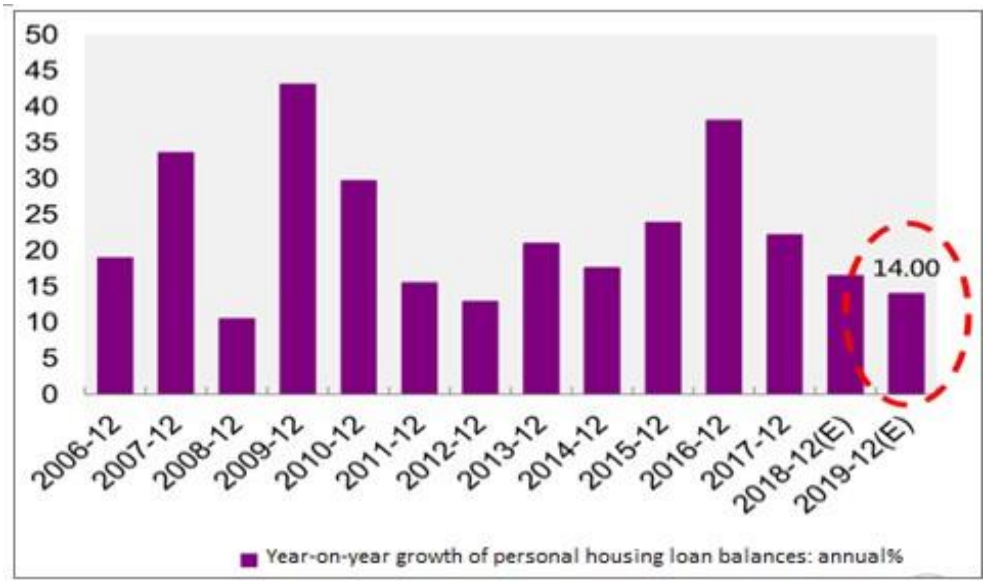


Figure 4: Personal Housing Loan Balance Year-on-Year Growth (2006-2019)

The first- and second-tier core cities have been regulated for a long time, and a large number of improvement needs have been suppressed. It is estimated that the national sales amount in 2019 will be -3.5%, the sales area will be -8.1%, and the average sales price will be +5.0%.

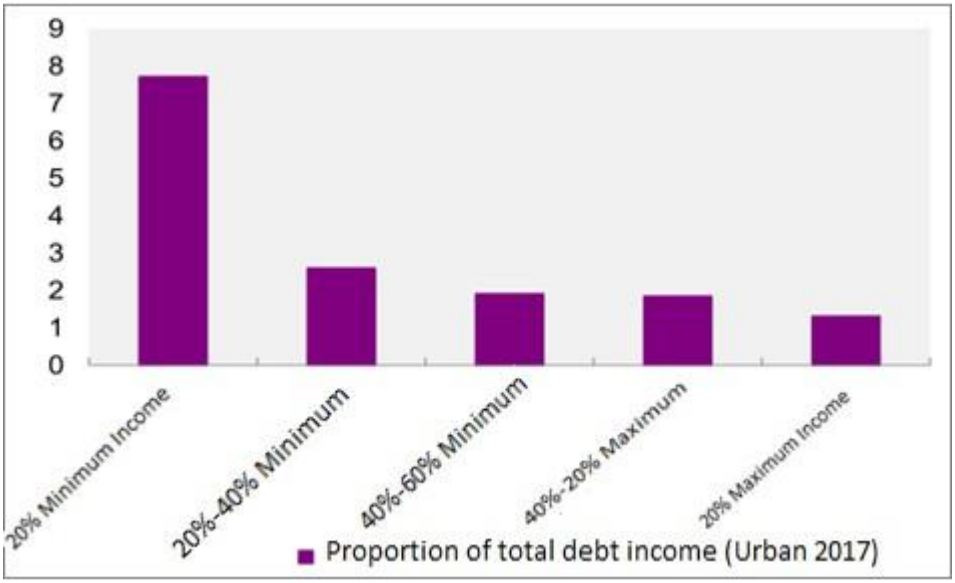


Figure 5: China's Urban Household Total Debt to Income Ratio in 2017

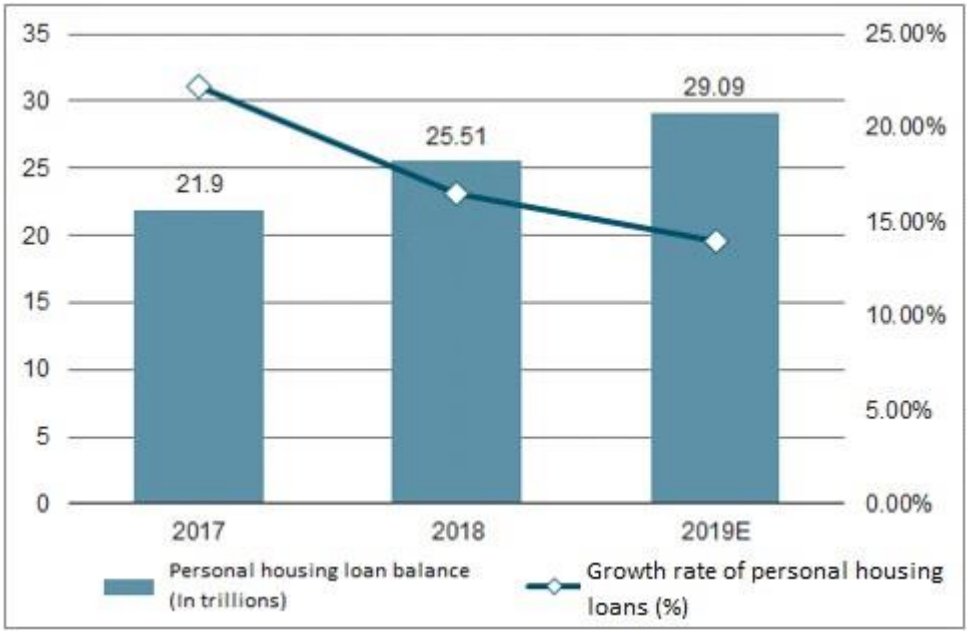


Figure 6: Personal Housing Loan Demand Side Sales Forecast (2017-2019)

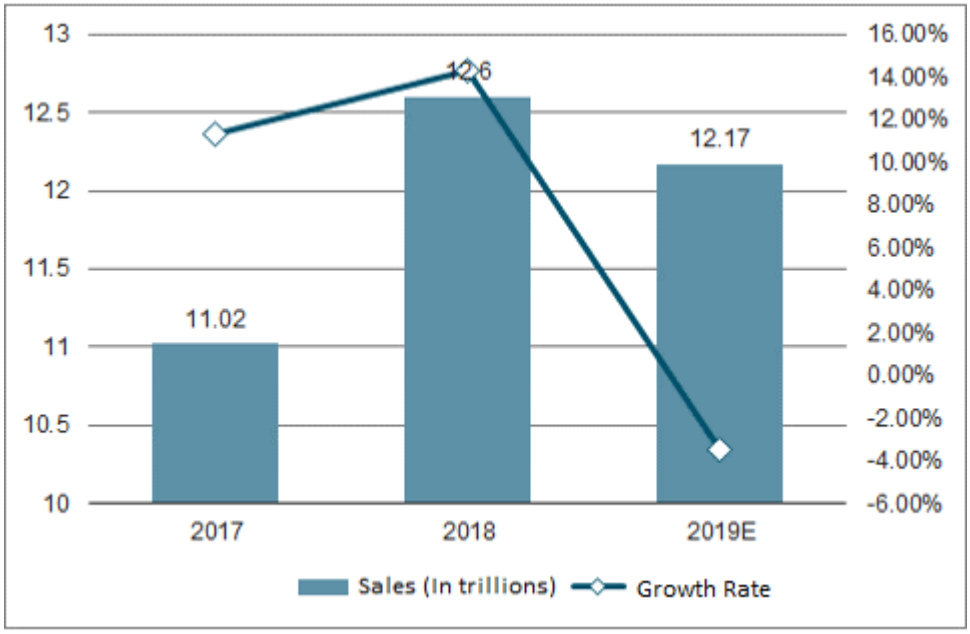


Figure 7: New Commercial Housing Sales and Growth Rate Chart (2017-2019)

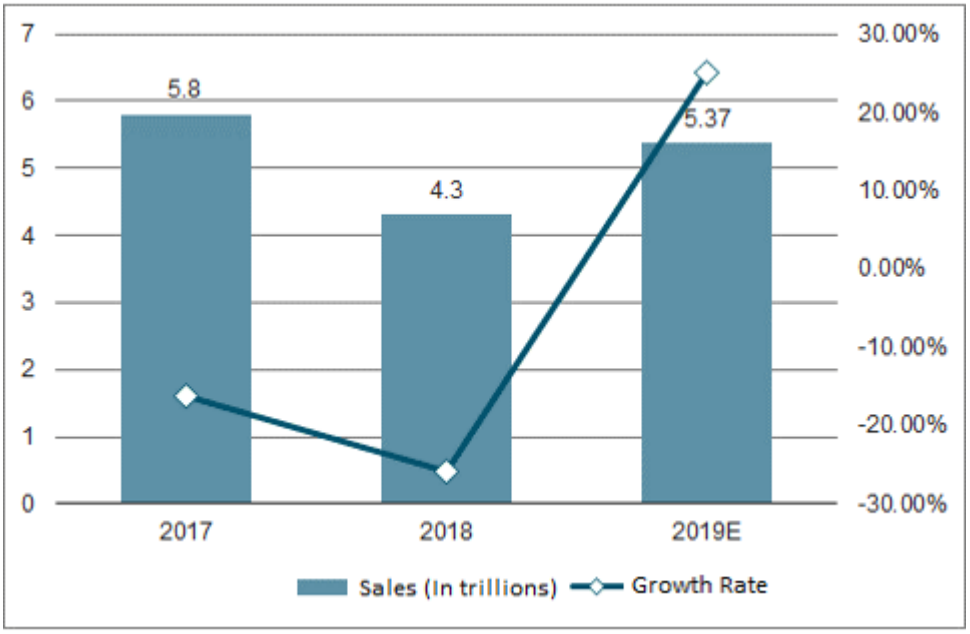


Figure 8: Stock Housing Sales and Growth Rate Chart (2017-2019)

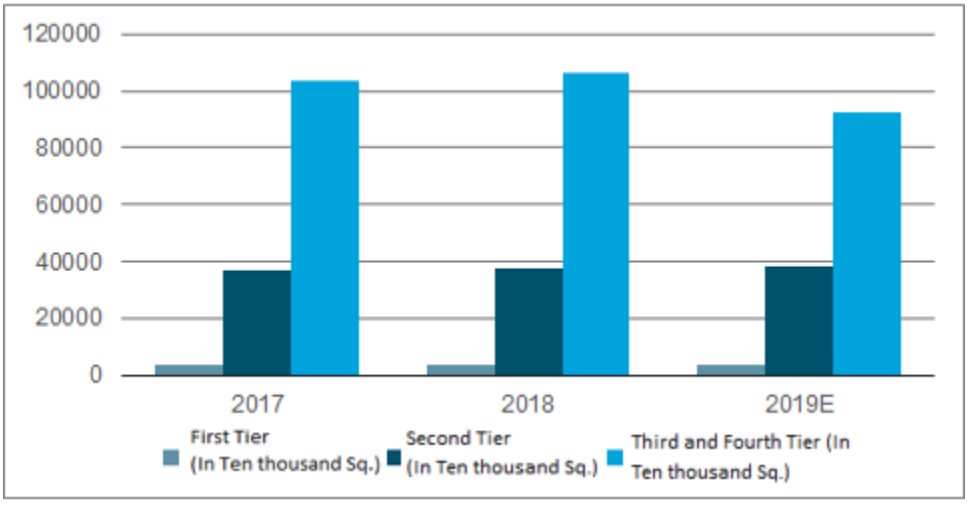


Figure 9: City Sales Area Map (2017-2018)

The growth rate of construction area in 2019E has rebounded to 7%-8%. New construction has maintained a relatively high growth. The completion period will increase the speed of infrastructure + merger and acquisition resumption. 2019 hidden inventory or accelerated manifestation. Large-scale fall/uniform caliber, construction unit price -1% year-on-year.

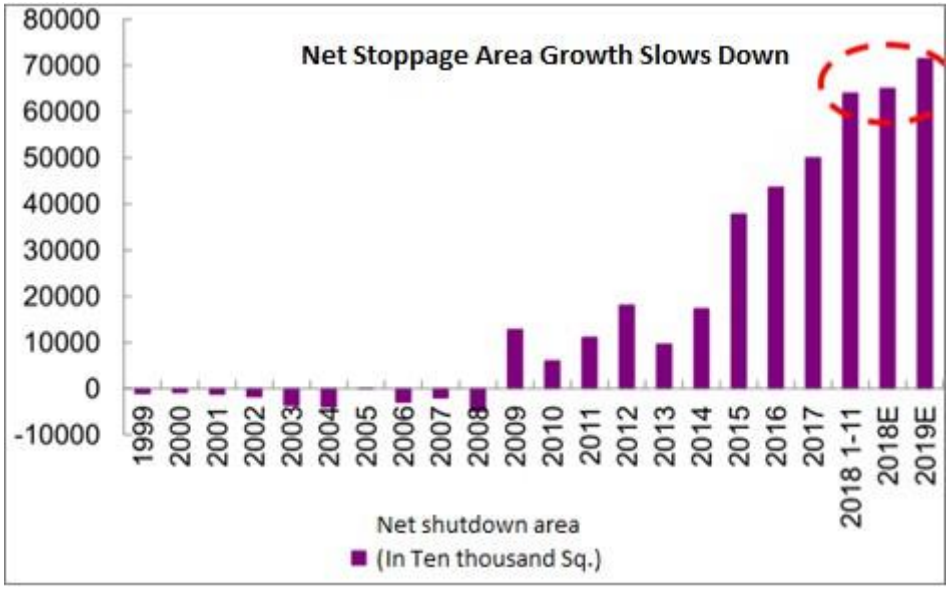


Figure 10: Map of Net Shutdown Areas from 1999 to 2019

Starting in 2019, housing companies will usher in the peak of debt maturity, superimposing our prediction that national sales growth will decline, some small and medium-sized housing companies have increased credit risk, and cash flow management capabilities and poor debt structure may appear. Partial default.

The land transaction price is the total price paid on the land parcel contract. According to the provisions of the Ministry of Land and Resources on the payment of land transfer instalments, after the land transfer is completed, the transfer contract must be signed within 10 working days, and the first payment of 50% of the transfer price must be paid within 1 month after the contract is signed. The contract stipulates that payment should be made in time, and the latest payment time should not exceed one year. The land purchase fee includes the land transaction price and various compensation and resettlement fees paid in installments, so the change lags behind the land transaction price. The time gap between the change in land purchase fees and land transaction prices is theoretically within one year, and the actual lag time varies depending on the heat of the land market and the financing situation of real estate developers.

In 2019, the main factors affecting the demand side of the land market (regulation policies, restrictions on soil auctions).

The growth rate of land purchase fees in 2019 may be narrowed as the year-on-year trend of land price transactions. Since land acquisition fees accounted for about 87% of other expenses

in the first ten months of 2018, the year-on-year growth rate of other expenses will also narrow. The year-on-year growth rate of new construction area will be similar to the historical trend, lagging behind as the sales area year-on-year growth rate narrows. The construction area was affected by changes in the newly started area, and the year-on-year growth rate declined slightly. In general, the year-on-year data of real estate development investment in 2019 will still show a trend of high and low. The policy has a strong ability to grasp stability, and the possibility of a downward stall is relatively small. The real estate development investment in 2019 is expected to grow by about 5% year-on-year, with a fluctuation range of 3%-7%.

The land reserve mainly focuses on the sales performance of housing companies in the first- and second-tier cities, which will be relatively better than those in the third and fourth-tier cities. The latter faces downward pressure on the fundamentals more than the former. In addition, the first- and second-tier cities are greatly affected by regulatory policies. If there is a downward stall in the course of the industry's fundamental decline, there may be expectations of policy reversal.

2.3 Literature Review

The real estate systemic risks have a strong spillover to the key economic sectors of the national economy and current national policies. Through the relevant fiscal and monetary policy transmission mechanisms, their own risks are positively related to the macroeconomic development status. Therefore, the theoretical research on the effective prevention and control of real estate risk spillovers has paid special attention to the domestic and international economic theory circles, and has produced fruitful research results in multiple dimensions.

This article carefully studies the research results of domestic and foreign theoretical literature from the aspects of systemic risk and risk spillover of real estate in China, summarizes the research trends of domestic and foreign theoretical literature, and combines the research on effective prevention and control of real estate risk spillover in this paper There are theoretical contributions and deficiencies, and some aspects of deepening research are proposed.

The research results of Liu Shengjun (2017) in "Tame the "Gray Rhinoceros": China Urgently Needs to Release Financial Risks" is that risks in China's financial sector mainly lie in real estate bubbles and corporate debt accumulation. To eliminate this accumulated financial risk,

one must dilute the indicators of economic growth, eliminate zombies, and market the monetary policy; the other is to promote the expansion of openness, simplified administration, and decentralization.

Deng Liyang (2017)'s "China Economic Report" pointed out how to serve the real economy as the purpose of the financial industry how to become a "gray rhino"? This is due to the high incidence, spread and harmful nature of risks in the financial system. The research article of Xiong Yuan (2017) "Tsinghua Financial Review" believes that China's real estate bubble has become the judgment of the largest "gray rhino" in China's economic field, which is in line with the status quo of real estate risk. The “grey rhino” needs to be tied to the real estate bubble. One is to maintain the continuity of the policy and the regulation and control; the other is to take a multi-pronged approach from the three aspects of land supply, rental market and policy foresight, and establish an adaptability to our national conditions. The basic system of market law and the long-term mechanism of real estate regulation

Song Xuetao, Lu Zhe (2017) based on the economic cycle theory, analyzes the Sino-US debt cycle, and studies China's residential sector housing loan growth rate, leverage ratio, mortgage ratio, loan income ratio in recent years and data before the outbreak of the US subprime mortgage crisis. A comparative analysis of the perspective of residents and real estate leverages revealed the outline of China's debt cycle real estate "gray rhino" (debt crisis), and proposed a local strategy to maintain a safe distance from it.

This thesis is based on completely market-oriented conditions for real estate risk research abroad. Domestic research to prevent and control the risks of China's real estate cannot be separated from the national conditions of China's real estate market is an incomplete market, and the decisive influence of the state's regulation and control of the real estate market cannot be ignored.

At present, the focus of research in China's theoretical circles is that soaring housing prices bring huge risks. The focus of the research is on the current policy regulation of the country, including the role of monetary and fiscal policies. The shortcomings of the research are the rich results of the research on the root causes and threats of real estate systemic risks and the transmission effect of real estate risks. However, there are few achievements in strategic research focusing on the prevention and control of real estate risk control. For example, on how to prevent and control real estate risk control, the current theoretical research is mostly from the perspective

of regulatory policies, the pros and cons of theoretical or empirical regulatory policies, in order to make suggestions or countermeasures. The real threat to the national economy of the systematic risks of China's real estate is its strong spillover. Therefore, in the research on the content setting of constructing a long-term mechanism, the focus should be on the prevention and control of real estate risks. The limitations of the current theoretical research on effective prevention and control of real estate risk control are related to the fact that China's current real estate regulation and control policies are more difficult to establish an empirical model, and it is also related to a lot of data on real estate in China. There is almost nowhere to look in the administrative records.

In this thesis, in the research of prevention and control of real estate risk control strategies, we strive to grasp scientific and authoritative statistical data, and use domestic and foreign research results to explore local strategies for effective prevention and control of real estate risk control based on national conditions.

Chapter 3: The Theory and Factors Identification Analysis of Chinese Urban Real Estate Risk under the New Normal

The identification and analysis of influencing factors of urban real estate risk is the first link of risk management and the foundation of constructing a risk evaluation model. In order to accurately identify the influencing factors of China's urban real estate risk under the new normal, this chapter starts from the characteristics of China's real estate's new normal, identifies and analyzes the urban real estate risk influencing factors, establishes the list of influencing factors of Chinese urban real estate risk under the new normal, and uses the DEMATEL method to study The degree of impact of various influencing factors on risk, and the key influencing factors are screened out, which lays a theoretical foundation for the next step of research on the role of risk and evaluation model.

Under the new normal, urban real estate risk is affected by many factors, and it is important to identify and classify the real estate risk influencing factors. In order to better understand the risk of urban real estate, this article combines the characteristics of risk to understand the real estate risk influencing factors from the process of real estate risk formation. The formation of risk is mainly the risk of the system's own state and threats. Specific to real estate risk, according to the characteristics of risk events. The difference and the different emphasis of identification, combined with the urban real estate supply and demand theory and the real estate market vulnerability theory under the new normal, identify and classify the real estate risk influencing factors.

According to the real estate supply and demand theory, the urban real estate market is oversupplied or in short supply, which is specifically expressed as

Real estate inventory surplus or shortage, resulting in real estate price fluctuations, excess inventory and price fluctuations come from within the real estate system, these two aspects of risk influencing factors become the internal risk factors of the system; real estate market vulnerability theory mainly shows that the market is resistant to external disturbances Insufficient performance, weak self-balancing and self-adjusting ability, poor internal stability, and strong dependence on policy. Its market mechanism determines the function of resource allocation is weakened. The risk influencing factors in this area are called external influencing factors. Under the new normal, the

internal risk factors of the urban real estate system are divided into two main aspects: real estate inventory risk and real estate price risk, and the external system risk factors are divided into two main aspects of real estate fund risk and real estate policy environmental risk.

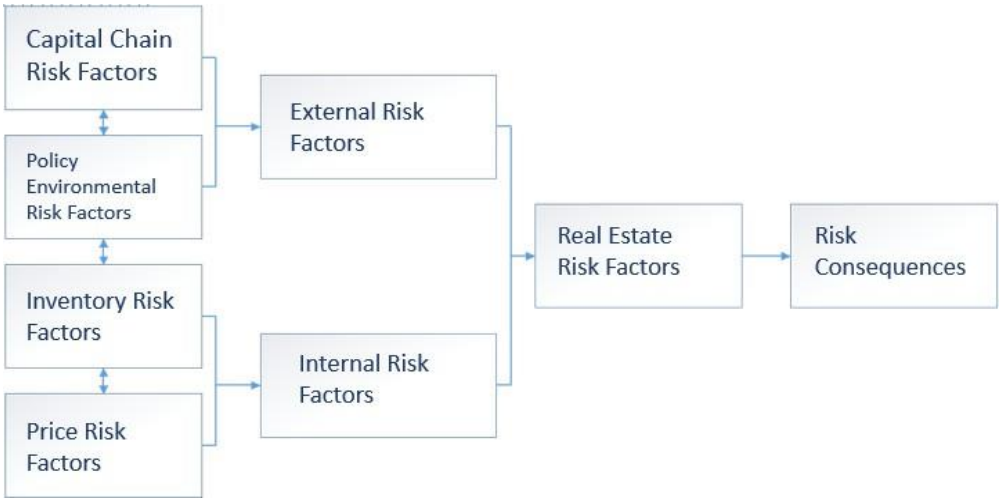


Figure 11: Real Estate Risk Formation Framework

Specifically, the four categories of factors such as the digestion status of urban real estate stocks, real estate price volatility, real estate capital chain risk, and real estate policy environmental dependence reflect the characteristics of urban real estate risk under the new normal. According to the real estate supply and demand theory and financial vulnerability theory, and based on the framework of urban real estate risk formation, urban real estate risk influencing factors under the new normal can be divided into urban real estate system internal risk factors and external system risk factors. Among them, the former is generated within the scope of the urban real estate economic system itself, and the risk influencing factors that affect the operational utility of the real estate economic system, such as market supply, demand, inventory, prices, etc.; the latter is generated outside the scope of the urban real estate economic system itself, such as Dependence on housing policy and urban environment, real estate capital chain situation, etc.

3.1 Internal Risk Factors of the System

Through the related research and analysis of the influencing factors of China's real estate risk, combined with the analysis of the development situation of China's urban real estate market, according to the systematic, operability and comparability principles of influencing factor

variables, the risk influencing factors within the urban real estate system are reflected from two In terms of aspects, the inventory risk mainly reflects the digestion of real estate inventory and the price risk reflects real estate price fluctuations.

3.1.1.Real Estate Inventory Risk (KC)

The digestibility of commercial housing inventory depends on the current inventory, the future inventory increases in a certain period, that is, the area to be sold in a certain period, and the effective demand of the society, that is, the consumer's willingness to consume the house. The growth rate of commercial housing transaction area determines the developer's investment in the development of commercial housing area. The higher the transaction growth rate, the higher the ratio of commercial housing construction to completed area. When the ratio of sales area to completed area is less than 1, it will cause an increase in inventory. According to the supply and demand theory and inventory measurement indicators, on the basis of existing research results, the main indicators for measuring real estate inventory include per capita inventory, inventory digestion cycle, year-end area for sale, growth rate of commercial housing transaction area; commercial housing construction and completion area Ratio, sales area to completed area ratio, per capita living area.

1) Inventory per capita (KC1). Per capita inventory refers to the inventory area shared by the unit population, which is an indicator that intuitively reflects the real estate inventory degeneration status. This indicator is affected by the local population. The increase in the regional population will make the local per capita inventory when the inventory area remains unchanged. The amount drops.

2) Digestion cycle (KC2). The digestion cycle refers to the time it takes for the available-for-sale area to be absorbed by the market in the same period. This indicator can reflect the supply and demand situation of the market. A long digestion cycle indicates that the buyer leads the market. When the consumer's willingness to purchase is not strong, the inventory of the real estate market increases, and a short removal cycle indicates that the seller leads the market, to a certain extent. The ratio of floor space completed for commercial housing construction increased.

3) Area for sale at the end of the year (KC3). It reflects the supply of housing area in the real estate market and has a direct impact on the completed area and sales speed of commercial housing. As the completed area increases and the sales speed decreases, the area to be sold

increases. Changes in the base area of completed area and sales speed will inevitably lead to changes in the area for sale.

4) The growth rate of transaction area of commercial housing (KC4). Reflecting the housing sales speed of the real estate market and consumers' willingness to buy a house, the growth rate of the transaction area determines the investment amount and development area of the open business.

5) The ratio of the construction area of commercial housing to the completed area (KC5). Construction area of commercial buildings refers to the construction area of all commercial buildings constructed during the reporting period. The area of commercial housing completed refers to the total construction area of all buildings completed in accordance with the design requirements during the reporting period. This indicator is affected by the market sales situation and the willingness to buy a house. The market sales situation is good. The construction and completion area have increased sequentially, reflecting the market's supply and demand to a certain extent.

6) The ratio of commercial housing sales area to completed area (KC6). If the ratio of sales area to completion in a specific period is greater than 1, it indicates that the real estate inventory is in a good condition. If the sales area and completion area are less than 1, it will lead to an increase in market inventory.

7) Per capita living area (KC7). The per capita living area reflects the economic consumption level of the region. The increase in per capita living area shows that consumers' willingness to buy a house increases to a certain extent, which has a greater impact on real estate demand.

3.1.2. Real Estate Price Risk (JG)

Supply and demand are the basic factors that affect market prices. According to the relationship between supply and demand prices, supply is inversely proportional to price, and demand is directly proportional to price. Studies have shown that housing prices and the disposable income of urban residents, GDP, real estate development investment, fixed asset investment, housing ownership rate and other factors will significantly affect the real estate market price.

Based on reading the relevant literature and combining with the actual situation, the indicators to measure the fluctuation of real estate prices are determined as the average price of

commercial housing, the ratio of house price to income, the ratio of house price growth rate to GDP growth rate, average land transaction price, urban housing index growth rate, The ratio of real estate development investment to fixed investment, housing ownership rate, etc.

1) The average price of commercial housing (JG1). The average price of commercial housing directly reflects the fluctuation of real estate prices. According to the psychology of consumer demand, the increase in average price will cause consumers to panic buying to a certain extent, thereby promoting the growth rate of sales area. With the construction area unchanged, to a certain extent, it reduces market inventory.

2) House-to-income ratio (JG2). The price-to-income ratio refers to the ratio of housing prices to the annual income of urban households.

When the growth rate of housing prices is greater than the annual income rate of urban households, people's ability to buy houses is reduced, and the real estate market gradually enters a cooling period, while adversely affecting real estate prices. Many foreign literature studies use this indicator as the main measure of the real estate bubble, but it is not appropriate to use this indicator as the real estate risk evaluation index in China.

3) The ratio of house price growth rate to GDP growth rate (JG3). It mainly measures the expansion speed of the real estate industry relative to the national economy. The general index value of the ratio of house price growth rate to GDP growth rate within 1 is within a reasonable range.

4) Land transaction price (JG4). The lack of effective land supply and the unreasonable supply structure have caused land prices to rise, affecting development costs. The rise in land costs is the core factor that directly causes real estate prices to rise. The land transaction price is an important part of the price of commercial housing, which largely determines the sales price of commercial housing.

5) Urban housing index growth rate (JG5). The urban housing index is a national real estate price index compiled by the former Ministry of Construction. The index is based on the real estate transaction information recorded in the city’s real estate market warning and forecast information system, and uses a characteristic price index method that meets the same and comparable requirements, the monthly city-level real estate price index. The growth rate of the urban housing index is a relative number that reflects the trend and degree of real estate price changes. It reflects the rise and fall of house prices in different periods in the form of a percentage. It has a direct and

timely expression of market fluctuations.

6) The ratio of real estate development investment to fixed asset investment (JG6). The proportion of real estate development investment in fixed asset investment is a measure of the development speed of the real estate industry relative to its fixed asset investment. This indicator is usually 30% as a suitable proportion.

7) Housing Ownership Rate (JG7). The common indicators used to investigate the living conditions of residents internationally refer to the ratio of the number of households living in their own property-owned housing to the number of households in the entire social housing. It is an indicator that reflects the living standards and living conditions of residents, and it affects market demand to a certain extent.

3.2 External Risk Factors of the System

The external risk factors of the urban real estate system are mainly reflected in the two aspects of capital chain risk and policy environment dependence. Breaking the capital chain will lead to real estate risk, and changes in the policy environment will also change market expectations. Therefore, the impact of real estate external risk factors on real estate risk cannot be ignored. The capital level of real estate development enterprises is directly related to the corporate capital chain, and the policy environment is to control the invisible hand of the real estate market and control the future direction of real estate. The external risk factors of the urban real estate market are mainly considered from two aspects, the capital risk reflecting the status of the enterprise's capital chain and the policy environmental risk reflecting the real estate's dependence on the real estate policy environment.

3.2.1 Real Estate Fund Risk (ZJ)

Generally speaking, the size of urban real estate risk is closely related to real estate funds. If the capital chain breaks, it will trigger a series of risks in the real estate development process. The level of corporate funds is related to the status of funds required for real estate development. With reference to the existing literature research and the focus of the paper, the main factors affecting the level of real estate development enterprise funds in this study include: real estate development investment growth rate, actual funds in place this year, real estate open loan balance,

self-raised funds, loan interest rate level, Corporate debt ratio.

1) Real estate development investment growth rate (ZJ1). It is the embodiment of the financing ability of real estate enterprises. A higher investment growth rate means a larger investment amount, more sufficient corporate funds, and a higher level of financing.

2) The actual funds in place this year (ZJ2). It reflects the sales recovery rate of real estate companies and the amount of financing required, which has a certain degree of influence on the future investment and development area of real estate.

3) The balance of real estate development loans (ZJ3). The outstanding amount of loans issued by real estate development enterprises for housing, commercial housing, and other real estate development and construction loans. If the amount of outstanding loans of real estate companies is high, it will directly affect the credibility of real estate companies' loans, which in turn will affect the level of financing of enterprises.

4) Self-raised funds (ZJ4). Reflecting the development capabilities of real estate companies, the higher the self-raised funds, the less financing, and the higher the level of financing.

5) Enterprise loan interest rate (ZJ5). The level of loan interest rate directly affects the status of corporate funds and has a great impact on corporate financing costs. The size of the loan interest rate will bring a certain degree of impact on the return of real estate companies.

6) Corporate debt ratio (ZJ6). It reflects the investment ability of real estate enterprises and directly affects the financing ability of enterprises.

3.2.2 Housing Policy and Environmental Risk (ZC)

The development of the urban real estate market is closely related to the national macroeconomic policy and the city's own environment. The adjustment of the national macroeconomic policy and changes in the urban environmental conditions will directly affect the investment enthusiasm of real estate companies, and also affect the consumption expectations of home buyers, which in turn causes the real estate market. Fluctuations. Through the research of the existing literature, the factors of real estate policy and environmental dependence are summarized as: real estate land policy, real estate financial policy, disposable income of urban residents, urban infrastructure level, urban public service level, and the number of permanent residents at the end of the year.

1) Real estate land policy (ZC1). The state regards land regulation and control as the "third hand" of macro regulation and control, and the introduction of a series of land regulation and control policies will certainly have an impact on the real estate market. The impact of the land supply method and size on the real estate market cannot be underestimated. The land supply method determines the land price to a certain extent, and the amount of land supply directly affects market expectations.

2) Real estate financial policy (ZC2). The development of the real estate market is inseparable from the support of bank credit. The monetary policy affects the effect of real estate credit on real estate prices, especially the down payment ratio has a greater impact on the cost of home buyers. At the same time, real estate tax policy, especially the tax policy of the transaction link, directly leads to changes in the expectations of home buyers and has an impact on the operation of the real estate market.

3) Disposable income of urban residents (ZC3). It reflects the purchasing power of consumers and affects the real estate market demand. In addition, the disposable income of residents in different regions has different effects on real estate prices.

4) The level of urban infrastructure (ZC4). A good urban infrastructure environment can provide good hardware conditions for the development of the regional real estate market, and promote the development of the real estate market, while affecting real estate prices.

5) Urban public service level (ZC5). Reflecting the status of public services provided by residents in the region, such as the status of urban medical education, the improvement of urban environment and other soft power, will indirectly affect the demand for urban real estate.

6) The number of permanent residents in the city (ZC6). The population of the city has a direct impact on the supply of real estate, while driving market demand.

Based on the above content, through a summary of relevant research on the influencing factors of real estate risk in Chinese cities, and a summary of the influencing factors of real estate risk. These indicators reflect the opinions of researchers, but their scientific, effectiveness, and rationality are difficult to fully guarantee. Therefore, the next step is to verify whether these influencing factors have a significant impact on risk, and quantitatively study the degree of their impact. To lay a theoretical foundation for in-depth study and analysis of the path of risk influencing factors on urban real estate risk consequences.

Chapter 4: The Theory of Risk Identification of Chinese Urban Real Estate under the New Normal

To identify the risk factors of urban real estate, we must determine the scientific and rationality of the risk factor system, select key impact factors, and lay the foundation for analyzing the path of risk.

The real estate business of domestic financial institutions accounts for a relatively high proportion, and scientific assessment of real estate market risks is of great significance to prevent systemic financial risks. At present, the evaluation method used has important defects such as variable index selection and parameter setting, strong subjectivity, and time lag in evaluation. It has been difficult to meet the needs of related business development and risk management.

Because DEMATEL in the complex network theory is a decision laboratory analysis method, it is a method for analyzing the importance of system factors based on graph theory and matrix tools. It can directly affect the degree of influence of matrix calculation factors by analyzing the logical relationship between the factors in the system. Influenced degree, cause degree and centrality reveal important influencing factors and internal structure. This method emphasizes the priority to improve the cause factors, and determines the priority improvement order according to the importance of the factors. It is an effective systematic comprehensive analysis method. Therefore, this part applies the DEMATEL method to the identified risk impact factors to determine the importance of each factor on the urban real estate risk.

4.1 Analysis of Factors Affecting Real Estate Risk based on DEMATEL

This paper mainly applies the decision experiment and evaluation laboratory (DEMATEL) method, structural equation model, fuzzy matter element analysis method and system dynamics method. Among them, the DEMATEL method is mainly used for the identification and analysis of risk influencing factors. The structural equation model is mainly used for empirical research on the path of risk influencing factors. The fuzzy matter-element analysis method is applied to the construction of the urban real estate risk assessment model, and the system dynamics method is mainly applied to the evaluation of the urban real estate short-term control policy.

4.1.1 DEMATEL Method

Decision Marking Trial and Evaluation Laboratory (Decision Marking Trial and Evaluation Laboratory) is used to screen the main factors of complex systems, simplify the process of system structure analysis and apply to the methodology of practical research. This method mainly uses graph theory and matrix tools for system element analysis. By analyzing the logical relationship and direct influence relationship between each element in the system, the degree of influence and influence degree of each factor on other factors are calculated, and then each element is determined. The centrality and degree of each factor determine the factors. Evaluation of the existence and strength of the relationship. At present, this method has been successfully applied in many fields such as enterprise innovation capability evaluation and green building evaluation. In the following, the principle and application of DEMATEL's method in this study are highlighted.

The determination of the attributes of real estate risk influencing factors is the basis for studying the importance of influencing factors. Considering the related research of previous people comprehensively, the method of in-depth interviews with experts is mainly used to determine the attributes of influencing factors and the relationship between them. Experts interviewed by the experts mainly include: first, experts and scholars of the Housing Policy Research Committee of the Ministry of Housing, Urban and Rural Construction; second, researchers of real estate development companies and real estate intermediary agencies; third, real estate policy research by the Ministry of Housing, Urban and Rural Construction, the Ministry of Land and Resources Relevant leaders; Fourth, real estate professors in well-known universities. Because these experts and scholars have participated in the national real estate market situation report and demonstration meetings many times, they have many years of real estate research work experience. Therefore, the results obtained from interviews with these experts are highly reliable.

This section mainly uses the 0-4 scale to analyze the degree of mutual influence between urban real estate risk factors. The degree of influence of factor *i* on factor *j* is divided into "none", "weak", "weak", "strong", and "very strong", which are denoted by 0, 1, 2, 3, and 4, respectively, through expert in-depth interview Determine the degree of direct influence between different factors. According to the analysis steps of DEMATEL method, a direct influence matrix is established according to the logical relationship between factors, and a comprehensive influence

matrix is constructed. On the basis of calculating the influence degree and influence degree of each influence factor, the cause degree and calculate the centrality, determine whether the factor is the cause factor or the result factor, and finally infer which influencing factors are the key factors in the system.

4.1.2 Calculation of Influence Degree, Influenced Degree, Centrality Degree and Cause Degree

The DEMATEL method is used to calculate the influence relationship between the factors, and the comprehensive influence relationship between the factors is mainly investigated, including the four basic indicators of influence degree, influenced degree, centrality degree and cause degree. Through expert interviews and exchanges with experts, the degree of correlation between the first and second indicators of real estate risk influencing factors is scored, and the direct impact matrix between factors and the comprehensive impact matrix T*i* and T2 between factors are determined after finishing. The influence degree F*i*, influenced degree, centrality degree M*i* and cause degree N*i* of each influencing factor primary index and secondary index are calculated respectively. The basic indicators can be used to calculate the degree of influence of various factors on urban real estate risk, and finally determine the key influencing factors.

4.2 Structural Equation Model

Structural Equation Model (SEM) originated from the concept of path analysis proposed by Sell Wright.[33] The multivariate measurement and interpretation model for analyzing the internal structure of latent variables and the causality of latent variables based on the covariance of variables is a comprehensive use of multiple regression analysis, A statistical data analysis tool formed by path analysis and factor analysis methods. At present, SEM is widely used in various fields of social science, including economics, sociology, economics, education, demography, biology, etc., and has become a more widely used method in academic research.

[3] Path analysis was first proposed by Sewall Wright in 1921 and mainly applied to population genetics. It was not until 1934 that Wright published the method of path coefficients (Ann. Math. Statist., Vol. 5).

4.2.1 Basic Principles

SEM is mainly used to describe the interrelationship of latent variables, the complex correlation between latent variables and between latent variables and corresponding observation variables. It can use the correlation analysis and estimation of direct influence to test and estimate the indirect causal influence. SEM is usually represented by a path diagram, which intuitively reflects the relationship between various variables. A circle or an ellipse represents a latent variable, a square or a rectangle represents an explicit variable, and the relationship between variables is represented by a line. If there is no line connected, there is no direct relationship between the two. Compared with traditional statistical analysis methods, SEM has the ability to process multiple dependent variables at the same time, allow independent variables and dependent variables to contain measurement errors, simultaneously estimate factor structures and factor relationships, allow for a more flexible measurement model, and estimate the entire model. Advantages such as the degree of fit.

From the perspective of variable generation, SEM can be divided into endogenous latent variables and exogenous latent variables. Endogenous latent variables refer to variables that can affect other variables or can be affected by other variables; exogenous latent variables refer to variables that can only affect other latent variables and cannot be affected by other latent variables. Researchers need to have a complete and clear conceptual framework for the research content, put forward research hypotheses based on theoretical analysis, and establish SEM accordingly. It is generally represented by a road map, which can intuitively and clearly reflect the research design ideas of researchers.

SEM is a verification method rather than an exploratory method. In actual research, the model should be set according to the specific research problem, and then the model fitting should be carried out through data collection. When the model fitting effect is not good or cannot pass the test. It may be that the model setting is not accurate, and the model needs to be revised. The SEM analysis process is shown in the figure below (Figure 12).

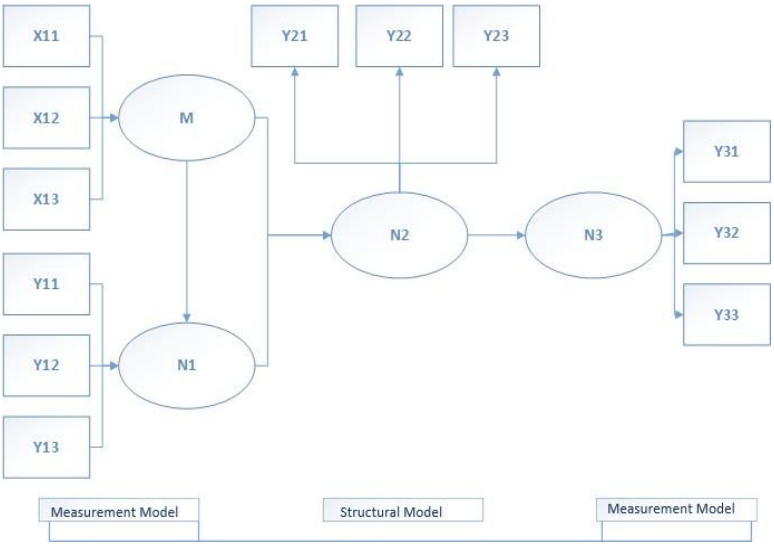


Figure 12: Structural Equation Model (SEM) Analysis Process

1) Model settings. A standard model is composed of a structural model and a measurement model and is composed of 3 matrix equations:

$$x = \Lambda_x \xi + \delta$$

$$y = \Lambda_y \eta + \varepsilon$$

$$\eta = B\eta + \Gamma\xi + \xi$$

Where: x, y are exogenous and endogenous indicators; δ , s is the error in the measurement of x and y; Λ_x is the relationship between the x index and the latent variable ε ; Λ_y is the relationship between the y index and the latent variable η; B and Γ are the path coefficients, ξ is the residual term of the structural equation.

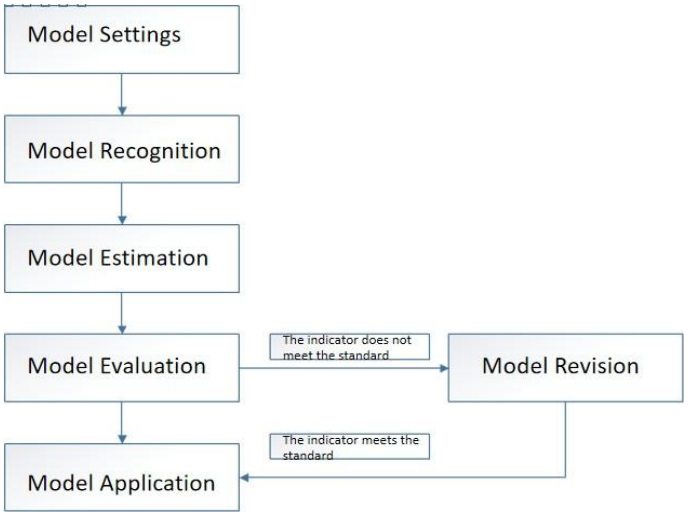


Figure 13: Model Identification Method

2) Model identification. If the degree of freedom df≥0, the model may be recognized; if df<0, the model must not be recognized. Model identification must establish a measurement scale for each latent variable in the model. The variance of the latent variable can be set to 1, or the load of any factor in each latent variable can be set to 1. Before model identification, the measurement model part should be judged according to the verification factor analysis model identification method. If it can be identified, then the structural model part is judged. If it is passed, the entire model can be identified.

3) Model estimation. There are many methods for model parameter estimation, including maximum likelihood estimation, generalized least squares, and unweighted least squares. At present, the most commonly used estimation methods are maximum likelihood estimation and generalized least squares. When using these two estimation methods, it is necessary to assume that the observed variable is a continuous variable and has a multivariate normal distribution. In specific practical applications, generally need to use some data statistics software to achieve, most of them currently use AMOS and LISREL software.

4) Model evaluation. The most important step of the structural equation model is to use the sample data to estimate the parameters of the constructed theoretical model, reconstruct the variance covariance according to the parameter estimates, and fit the reconstructed variance covariance matrix to the observed variance covariance matrix. The degree determines how well the model fits the sample data. How well the model fits can be measured by a series of indicators, such as absolute fitness index GH, AGFI, RER, RMSEA; value-added fitness index NFI, RFI; simple fitness index PGFI, PNFI, etc.

5) Model correction. Under normal circumstances, it is difficult to achieve a single fit so that all indicators meet the fitting standard. In order to make the indicators meet the standard and improve the adaptability of the initial model, the model needs to be revised. The model is continuously revised according to the MI value and CR value provided by the structural equation model software until the index of the fitting degree basically reaches the standard, and a model with good fitting and reasonable estimated parameters is obtained.

4.2.2 Application

The path analysis of urban real estate risk is the prerequisite and basis for studying the relationship between the various subsystems of risk. Path analysis is an important link to verify the significance of the key risk influencing factors, it is the main link to determine the weight of risk evaluation indicators, and it is also to study and formulate risk prevention. The theoretical basis of the method. Because urban real estate risk under the new normal involves multiple levels such as inventory, price, capital, and policy environmental risk, there is also a correlation between different levels of risk. By comparing and analyzing the advantages and disadvantages of various statistical analysis methods, considering the superiority of SEM in analyzing multivariate relationships and tolerance for errors, it was decided to introduce the model and use it as an analysis tool for empirical links.

The development and changes of urban real estate risk are affected by many factors, and it is difficult to foresee many sudden factors. Therefore, after scientifically identifying the risk influencing factors, carrying out research on the role of risk and exploring the deep-seated relationship between risks can improve the risk assessment. Targeting, enhancing the risk response and the effectiveness of the real estate market regulation policy; accurately grasping the research risk action path also helps to correctly determine the urban real estate risk point and the key link to control the urban real estate risk; the risk action path is to study and formulate the real estate market regulation policy For reference, the principle of real estate market regulation is "policy-based regulation and regulation by category". It is necessary to formulate urban real estate risk prevention and control measures for each city's current and future real estate development planning, and the risk action path provides an analytical tool. In short, carrying out research on the role of real estate risk is the basic work of government departments to formulate a long-term mechanism for urban real estate regulation and control based on risk prevention.

4.3 Fuzzy Matter-Element Analysis

The theory of matter-element analysis was proposed by Chinese scholar Professor Cai Yuan.[4] Matter element analysis is an emerging discipline that studies the laws and methods of solving incompatible problems. It is a cross-edge discipline of thinking science, system science, and mathematics. It is suitable for multi-factor evaluation problems. The fuzzy matter-element analysis method is an organic combination of fuzzy mathematics and matter-element analysis to analyze and synthesize the ambiguity of the corresponding values of the characteristics of things and the incompatibility among many factors affecting things, so as to solve this problem. A method for quasi fuzzy incompatible problems.

4.3.1 Basic Principles

The core of the fuzzy matter-element analysis method is to describe a thing with three element indexes of "things, magnitudes and characteristics", and call these three elements an ordered unit called matter-element in order to characterize things Analysis and quantitative calculation. Usually given the name *M* of a thing, its magnitude with respect to feature *c* is *v*, then the ordered triplet *R* (*M, C, V*) is used as the basic element to describe the thing, referred to as the matter element, if the magnitude is ambiguous Sex is called fuzzy matter element. The fuzzy matter element is represented by a symbol as:

$$R = \begin{Bmatrix} M \\ C \quad \mu(x) \end{Bmatrix}$$

In the formula, *R*-fuzzy matter-element, which means the whole process of real estate risk evaluation in this paper;

M-things, that is, the cities selected for evaluation in this article;

C- the sign of things, that is, in this article, it represents various risk evaluation indicators;

$\mu(x)$ -The degree of membership of the fuzzy magnitude X (evaluation value) corresponding to the feature C (evaluation index).

Generally speaking, the main steps of using fuzzy matter-element method to study the problem include the following parts:

[4] In 1983, Chinese scholar Professor Cai Yuan published his paper 《Extension Set and Incompatibility》 in *Journal of Scientific Exploration.*

1) Establish fuzzy matter-element matrix. For each of the m comparison objects (the cities selected for evaluation), their respective n-dimensional (evaluation indicators) fuzzy matter-element combinations form a composite fuzzy matter-element matrix (evaluation indicator system). Expressed as:

$$R=\begin{Bmatrix} & M_1 & M_2 & \cdots & M_m \\ C_1 & u(x_{11}) & u(x_{21}) & \cdots & u(x_{11}) \\ C_2 & u(x_{12}) & u(x_{22}) & \cdots & u(x_{11}) \\ \vdots & \vdots & \vdots & \cdots & u(x_{11}) \\ C_n & u(x_{1n}) & u(x_{2n}) & \cdots & u(x_{11}) \end{Bmatrix}$$

In the formula, *Rmn*—*n*-dimensional composite elements of *m* objects, that is,

M evaluation city *n* group index composition system;

Mm—the *m*-th comparison (evaluation city);

Cn-compare the nth feature (evaluation index) of things;

$u(x_{mn})$— The degree of membership of the fuzzy value corresponding to the evaluation index *G* and the *m*-th city.

2) Membership calculation. According to the matter-element theory, the membership degree of each fuzzy index (evaluation value) *X* of each evaluation index (risk factor) *C* is calculated, which is recorded as the subordination degree is generally positive. The principle established from this is called the subordination principle. For the evaluation index whose evaluation index value is an accurate number, there are generally two types of subordination membership degree according to the evaluation index characteristic value, respectively, the larger the better type and the smaller the better type, the calculation formula is:

The bigger the better index (positive index): $m(c_{ij})=\dfrac{c_{ij}-\min c_{ij}}{\max c_{ij}-\min c_{ij}}$

The smaller the better the index (inverse index): $m(c_{ij})=\dfrac{\max c_{ij}-c_{ij}}{\max c_{ij}-\min c_{ij}}$

Where C_{ij}—— $m$is the quantity corresponding to the nth evaluation index of m cities;

max C_{ij}—the maximum value of all the values of this risk assessment indicator of each city;

max C_{ij}—the minimum value of all the values of the risk assessment indicators of each city;

m (C_{ij})—the optimal membership of the corresponding index;

3) Construct a standard fuzzy matter-element matrix. The standard fuzzy matter-element matrix refers to the maximum or minimum value of the dominant membership degree of each evaluation index determined by the above formula.

$$R = \begin{Bmatrix} & M \\ C1 & \mu_1 \\ C2 & \mu_1 \\ \vdots & \vdots \\ C\text{n} & \mu_n \end{Bmatrix}$$

4) Determine the index weight.

The determination of weights is a key link in matter-element analysis, which directly affects the results of evaluation analysis. The weight determination methods include subjective weighting method and objective weighting method. The former is based on the experience of judges and experts and uses the analytic hierarchy process and other methods to determine the weight of the indicator by comparing each attribute; the latter is based on the corresponding attributes of the program Data to determine the weight. The paper selects the entropy weight method to determine the index weight, and the specific introduction will be in the relevant chapters later.

5) Weighted fuzzy matter-element matrix and ideal solution.

Multiplying the composite fuzzy matter-element matrix by the weight of each index can obtain the weighted fuzzy matter-element matrix:

$$Z = \left(r_{ij}\right)_{m*n}$$

In the formula

$$r_{ij} = w_j \cdot \mu_{ij}$$

Further determine the positive ideal solution vector Z^+ and negative ideal solution vector Z of the matrix Z:

$$Z^+ = \left(Z_1^+, Z_2^+, \cdots Z_n^+\right), Z^- = \left(Z_1^-, Z_2^-, \cdots Z_n^-\right)$$

In the formula: $Z_j^+ = \max\left(Z_{1j}, Z_{2j}, \cdots Z_{nj}\right), Z_j^- = \left(Z_{1j}, Z_{2j}, \cdots Z_{nj}\right)$

4.3.2 Application

The research of urban real estate risk evaluation model is an important part of the thesis. What method and how to evaluate urban real estate risk need to be selected in combination with the evaluation object and evaluation purpose. In the research of this paper, through the identification analysis of real estate risk influencing factors and the research results of risk action path, it is found that the real estate risk problem of Chinese cities under the new normal is very complex and uncertain, and the use of fuzzy matter-element analysis method is to deal with complex, An important tool for uncertain system problems.

In this paper, fuzzy matter-element analysis is applied to the research on the risk assessment model of Chinese urban real estate, which provides a basis for the research and formulation of urban real estate market regulation policies under the new normal.

4.4 System Dynamics Method

System Dynamics (SD) is a quantitative research method based on feedback control theory and assisted by computer simulation technology to study complex socio-economic systems. System Dynamics is reformulated headed by Professor Forrester led by Massachusetts Institute of Technology in the United States. It was founded in the mid-1950s and gradually developed. It is currently mainly used in social development, economic development, transportation, and ecological environment. This method is based on the knowledge of system structure, automatic control, information transmission, etc., and integrates the knowledge of disciplines such as system theory, cybernetics, information theory, and decision theory.

4.4.1 Basic Principles

SD is a method that can comprehensively consider multiple factors and analyze and study complex systems. It is suitable for mid- and long-term prediction and dealing with high-order, nonlinear, and time-varying problems. This method is based on the premise of a real existing system, based on historical data, practical experience, and mechanism relationships within the system to establish a dynamic simulation model to test the system changes caused by various influencing factors. It is a scientific and effective method. The calculation steps using the system dynamics model are as follows:

1) Analyze the system. Investigate and collect relevant system conditions and statistical data; clarify the problems to be solved by the system; analyze the basic problems and main problems, variables and main variables of the system; delimit the system and determine the endogenous variables, exogenous variables, input and policy variables to determine the reference mode of system behavior.

2) Analyze causality. Analyze the overall and local feedback mechanism of the system; divide the system hierarchy and sub-blocks; analyze the relationship between system variables and variables, determine the types and main variables of variables; determine the loop and the feedback coupling relationship between loops.

3) Establish SD model. Establish various equations such as state, velocity, auxiliary, and constant; determine and estimate parameters; assign values to initial equations, constant equations, and table function equations. In other words, draw a flow diagram based on the causal relationship; establish mathematical equations and construct equations, and make preliminary tests and evaluations of the model.

4) Simulation and analysis. Use SD theory as a guide for model simulation and policy analysis, and in-depth analysis of the system; find decision-making methods to solve problems, analyze the results of simulation, find regular problems, and obtain more effective information.

4.4.2 Application

In the analysis of the short-term control policy of the urban real estate market, considering the superiority of the SD method in evaluating policies and tolerance for errors, it can cover multiple subsystems of the real estate market and reflect the correlation between the factors of each subsystem Degree, select this method as an analytical tool for empirical links.

Because the SD method has the characteristics suitable for dealing with cyclical problems, the real estate economic policy, real estate economic structure, real estate prices, interest rates, exchange rates and other factors change trends, etc., can be reasonably and scientifically explained by the SD method. At the same time, the model is also suitable for dealing with nonlinear and time-varying problems. The urban real estate economic system is complex, and it is difficult to solve equations and obtain complete information from it using conventional mathematical methods. The SD method uses computer simulation as a technical means and is particularly suitable for dealing with the complex and complex problems of the real estate economic system.

Chapter 5: Measurement and Analysis of Real Estate Zombie Enterprises Based on FN-CHK Method

The double superposition effect of the new economic normal and the background of the new crown epidemic situation is only that our country's economy has suffered a serious entrance examination. The risk factors of the real estate market include market risk and corporate risk. ", this paper improves the current FN-CHK method of "zombie companies" measurement research recognition and high citation, considering government subsidies, tax rebates and other factors, using 2011-2018 listed company data to predict potential Real estate "zombie enterprise".

5.1 Theoretical Policies Related to "Zombie Enterprises"

5.1.1 Definition of “Zombie Enterprise”

The concept of "Zombie Company" was first proposed by the American economist Kane during the analysis of the Japanese economic crisis in the 1980s. It specifically refers to those who are hopeless to recover but are temporarily exempt from bank credit or government subsidies. Bankruptcy of indebted enterprises. In the early 1990s, Japan’s domestic asset price bubble burst, and in order to cover up bad debts, banks provided loan extensions and lower loan interest rates to companies that had lost their profitability, spawning a large number of “zombie companies” and becoming Japan’s important reason for the "lost decade".

After the financial crisis in 2008, "zombie companies" once again became a hot topic and triggered a wave of academic research on "zombie companies". From the mainstream Western point of view, “zombie enterprises” mainly refer to enterprises that can generate cash flow but cannot attract enough investment to promote the development of the enterprise and repay the debt. These enterprises are still operating, trading, and consuming resources, but in fact have been unable to repay their debts. According to OECD estimates, the capital ratio of “zombie enterprises” in 2013 reached 28%, 19%, and 16% in Greece, Italy, and Spain, respectively.

In China, there is currently no official identification standard for "zombie enterprises". In December 2015, for the first time, the State Council listed "enterprise that does not meet national

energy consumption, environmental protection, quality, and safety standards, has sustained losses for more than three years, and does not meet the direction of structural adjustment." From the perspective of the local government, some provinces have also defined “zombie enterprises” in the relevant documents to promote the elimination of backward production capacity and economic structural adjustment (Table 2). Although the standards are different, the common definition features are similar. Common features include the fact that they have production suspension or semi-production suspension, continuous losses, and excessive asset-liability ratios. In essence, the enterprise has basically lost its ability to continue operations and rely on its own cash flow to pay its debts.

Combined with the mainstream views at home and abroad, the essential characteristics of "zombie enterprises" are: (1) the need for continuous bank "concessionary" lending or government subsidies to maintain production and operation; (2) high debt ratio and still continue to deteriorate; (3) in the foreseeable future years, they will not attract new investors and may stop production at any time.

Table 2: Some Provinces' Recognition Criteria for "Zombie Enterprises"

Province	**"Zombie Enterprise" Certification Standard**
Guangdong	Mainly rely on government subsidies or bank renewal to maintain production and operation. The asset-liability ratio exceeds 85% and the loss has been continuous for more than 3 years. Wages, taxes, interest, and arrears have been owed for more than 3 years. Or industrial enterprises above the designated size that have ceased production for more than one year.
Shandong	Enterprises that have completely lost their self-healing and self-development capabilities, are insolvent, and hopeless to reverse losses are divided into three categories: (1) Enterprises that are still in production and operation, but have insufficient profits to pay corporate credit interest, continuous losses, and high asset-liability ratios. ; (2) Enterprises whose production and operation are basically at a standstill, suspending electricity consumption; (3) Enterprises that have ceased business activities for more than half a year and have not paid VAT for more than half a year.

Qinghai	Specifically, there are two types of enterprises: (1) Three consecutive years of losses, the asset-liability ratio is above 85%, the net cash flow from operating activities is negative for three consecutive years, and the pre-interest and profit after deduction of non-recurring gains and losses for three consecutive years is less than Enterprises with borrowing costs; (2) The capacity utilization rate is less than 50%, the production is suspended for more than half a year (the turnover tax has not been paid or the application for suspending the power capacity for more than half a year), the bank's due debts cannot be repaid and it lasts for more than one year.
Gansu	Four types of holding enterprises: three consecutive years of loss-making enterprises, insolvent enterprises, closed enterprises, and holding enterprises below level three.
Guizhou	Enterprises that have been suspended or semi-suspended production, consecutive years of losses, insolvency, government subsidies and bank renewal
Liaoning	Enterprises without effective assets, production and operation activities, and solvency

5.1.2 Sorting Out the Policies Related to the Disposal of "Zombie Enterprises"

The historical experience of countries such as Japan shows that "zombie enterprises" can seriously distort resource allocation and even lead to long-term economic stagnation. At the same time, by aggravating resource constraints, distorting credit allocation, and damaging fair competition in the industry and other channels, "zombie enterprises" will also reduce the innovation capacity of normal enterprises.[5] Therefore, in recent years, the central and local governments have increased their attention to the issue of "zombie enterprises" and become one of the key areas of government economic work.

The development of China's "zombie enterprise" disposal policy can be roughly divided into three stages (See Table 3):

One is to propose the stage of disposing of "zombie enterprises" (2014-2015). At this stage, the problem of "zombie enterprises" gradually became apparent, and the handling of "zombie enterprises" became the focus of structural reform on the supply side. For the first time, the central government formally defined the scope of "zombie enterprises", and took the disposal of "zombie enterprises" as the key content of the capacity reduction work.

The second is to formulate the disposal process and measures (2016-2017). In 2016, the central government began to formulate a timetable for the disposal of "zombie enterprises". This was listed as the second most important task of the year, and the central government also requested to speed up the cleanup of "zombie enterprises" in key areas such as coal and steel to resolve excess capacity, and proposed to complete the cleanup of 345 large and medium-sized central "zombie enterprises" in three years. jobs. At the same time, the formulation of relevant disposal policies has proceeded in an orderly manner and has been released one after another.

The third is to refine and implement the disposal policy stage (since 2018). At this stage, the relevant disposal policies were further refined, and the central government further clarified the disposal principles, scope, methods, and procedures, and began to focus on implementation, requiring that all disposal work be completed by the end of 2020 in principle.

[5] Wang Yongqin, Li Wei, & Dai Yun. How do zombie companies affect corporate innovation?: Evidence from Chinese industrial companies [J]. Economic Research, 2018, 53 (11): 101-116.

Table 3: "Three Zombie Enterprises" Disposal Policy Development Three Stages

The first stage: The problem of "zombie enterprises" gradually revealed, and the disposal of "zombie enterprises" became the focus of supply-side reform	The second stage: formulate a timetable for the disposal of "zombie enterprises", accelerate the "zombie enterprises" in key areas, and clean up to eliminate excess capacity	The third stage: In-depth promotion of the disposal of "zombie enterprises" and the elimination of excess capacity, the formulation of relevant debt disposal policies
At the central level, the disposal of "zombie enterprises" was officially regarded as the key work of capacity reduction, and the scope of "zombie enterprises" was officially defined.	The SASAC has formulated a timetable for the disposal of "zombie enterprises", and relevant ministries and regions have accelerated the introduction of related supporting policies: coal, steel and other key areas are actively clearing "zombie enterprises"	Further clarify the "zombie enterprise" disposal principles, disposal scope, disposal method, disposal process and time, etc., and issue comprehensive policies and related policies to promote the "zombie enterprise" debt disposal.
Year 2014 - 2015	Year 2016 - 2017	Year 2018 and after

5.2 Measurement and Analysis of "Zombie Enterprises" based on the FN- CHK Method

American economist Caballero and Japanese economist Hoshi put forward the identification standard of zombie enterprises, namely CHK model. Japanese economists Fukuda and Nakamura supplement the CHK standard and propose FN-CHK method.

In view of the fact that there is no unified standard for the identification of "zombie enterprises" in China, this article first sorts out the three types of measurement methods that have been recognized and cited in the literature (Table 4). Combining the three essential characteristics of the aforementioned "zombie enterprise", we believe that the measurement method should be able to reflect the connotation of preferential support such as bank credit subsidies, government subsidies, and tax refunds. Therefore, we finally chose the FN-CHK method as the main reference calculation method in this article.

Table 4: The Main Measurement Methods of "Zombie Enterprises"

Test Methods	Recognition condition	Features
Dong Dengxin's "Real Profit Law"	After deducting non-recurring gains and losses, companies whose earnings per share have been negative for three consecutive years.	Improvements to official standards. Ignore the role of bank credit and government subsidies in the formation of "zombie enterprises".
The Credit Subsidy Law (CHK method) proposed by Caballero, Hoshi and Kashyap (2008)	If the interest paid by an enterprise for its own debt is lower than the interest rate paid at the lowest interest rate in the market, then the loan relationship between the enterprise and the bank is abnormal and is a "zombie enterprise".	(1) The definition of "zombie enterprise" from the perspective of credit does not consider the role of the government; (2) For companies with good operating conditions, low default risk, and preferential loans from banks, the government's key support or emerging industries may be over-identified as "zombie enterprises"; (3) For enterprises whose actual profits are not enough to pay interest on loans, and rely on banks to "borrow new and return old", the CHK method cannot be identified.
Fukuda and Nakamura (2011) the continuous loan method (FN-CHK method)	Based on the CHK method, the "profit standard" and "continuous credit standard" are introduced. The "zombie enterprise" must meet the following three standards: (1) The actual profit of the enterprise is negative (the income before interest and tax exceeds the minimum interest expense); (2) Liabilities exceed 50% of total assets; (3) Enterprises with liabilities in period *t* greater than period *t*-1.	(1) Comprehensively consider the two aspects of the enterprise's operating capacity and credit subsidies; (2) Factors such as government subsidies and tax rebates are not considered.

5.2.1 Introduction to Evaluation Methods

The core idea of the FN-CHK method is to first calculate the minimum cost of financing (including loans and bonds) in the financial market. If a company's profit is still negative when it obtains funds below the lowest financing cost in the market, and the asset-liability ratio is greater than 50%, and the total debt scale continues to rise from the previous year, then this company is considered a "zombie company".

We have improved the FN-CHK method, taking into account government subsidies, tax rebates and other factors, and eliminating the interference of new companies. Specific steps are as follows:

(1) Calculate the minimum interest expense

$$R_{it}^{*} = rs_t \times BS_{it} + \left(\frac{1}{5} \sum_{j=1}^{5} rl_{t+1-j} \right) \times BL_{it} + rcb_{\min overlast5year,t} \times Bonds_{it}$$

Among them, R_{it}^{*} is the minimum interest expense of the enterprise in the year, rs_t rl_t and $rcb_{\min overlast5year,t}$ represent the average short-term minimum interest rate in year t, the average long-term minimum interest rate in year t, and the minimum interest rate of corporate bonds issued in the first five years of t, BS_{it}, BL_{it} and $Bonds_t$ represent the total amount of short-term bank loans, long-term bank loans and bonds issued by the enterprise i at the end of year t.

(2) Calculate actual profit

$$realpro_{it} = OP_{it} - (R_{it}^{*} - R_{it})$$

Among them, $realpro_{it}$ represents the actual profit of enterprise i at the end of year t,

OP_{it} represents the operating profit of enterprise i at the end of year t,

R_{it} represents the actual interest expense of enterprise i at the end of year t,

$(R_{it}^{*} - R_{it})$ can represent the bank credit subsidy obtained by the enterprise.

This article uses operating profit mainly to consider the impact of non- recurring gains and losses such as government subsidies and tax rebates. If the company's profit is still negative after enjoying government subsidies and credit subsidies, then the company may be a "zombie enterprise."

(3) Set the identification conditions for "zombie enterprises"

1. $realpro_{it} < 0$;

2. The asset-liability ratio is greater than 50%;

3. Total liabilities increased compared with the previous year;

4. The age of the enterprise is greater than 3 years.

Taken together, the improved FN-CHK method can first describe the characteristics of blind expansion of the daily operations of "zombie enterprises" and weak profitability; secondly, it considers the obvious lack of solvency, access to bank credit subsidies and government subsidies, The subsidies still fail to cover important features such as interest expenditures and the inability to pay off due debts. Finally, considering that newcomers are prone to operating difficulties during the start-up period and fall into the predicament of weak profitability, the sample of newcomers is deducted.

5.2.2 Selection of Related Indicators

The above measurement methods involve a series of indicators such as loan interest rate, bond issuance interest rate, corporate debt scale, operating profit, corporate age, etc. The specific selection criteria are shown in Table 5.

Table 5: Selection of Related Indicators

Variable	Index	Comment
Short-term Minimum Interest Rate (RS)	The arithmetic average of the benchmark interest rate of RMB loans within 6 months (inclusive) and 6 months to 1 year (inclusive) announced by the central bank	When calculating the minimum interest rate, the time weight is calculated according to the time interval before and after the central bank announces the interest rate
Long-term Minimum Interest Rate (RL)	The arithmetic average of the benchmark interest rates of RMB loans announced by the central bank for 1 to 3 years (inclusive), 3 to 5 years (inclusive), and more than 5 years	adjustment date, and the weighted average obtains the short-term and long-term minimum interest rate for each year. The annual short-term and long-term minimum interest rate will be lowered by 10%.
Minimum Corporate Bond Rate (RCB)	Calculate the annual average of the issuance interest rate of the most senior (AAA) corporate bonds	Choose the lowest value in the past 5 years
Short-term Bank Loans (BS)	Short-term loan	

Long-term Bank Loan (BL)	Long term loan	
Total Bond (Bonds)	Bonds payable	
Actual Interest Expense (R)	Interest expense	
Business Age	Calculate the time since the establishment of the company	
Operating Profit	Operating Profit	
Debt Scale	Total Liabilities	
Asset/Liability Ratio	Asset/Liability Ratio	

5.3 "Zombie Enterprise" Evaluation Process

5.3.1 Data Sources and Processing

At present, there are two main types of databases that can be used for calculation: Chinese industrial enterprise database and listed company database. In view of the data quality problems of the industrial and enterprise database after 2013, and considering the availability and timeliness of the data, this article chose to use the listed company database, the data comes from Wind.

This article uses the data of listed companies from 2011 to 2018. Since most companies have not yet announced their 2018 annual reports, they will use the data from the third quarterly report in 2018. In addition, the selected sample enterprises exclude banks, securities, and insurance companies, as well as short-term loans, long-term loans, bonds payable, short-term bonds payable, and interest payments. At the same time, there are no sample companies with data, and finally get listed companies that can calculate relevant indicators every year.

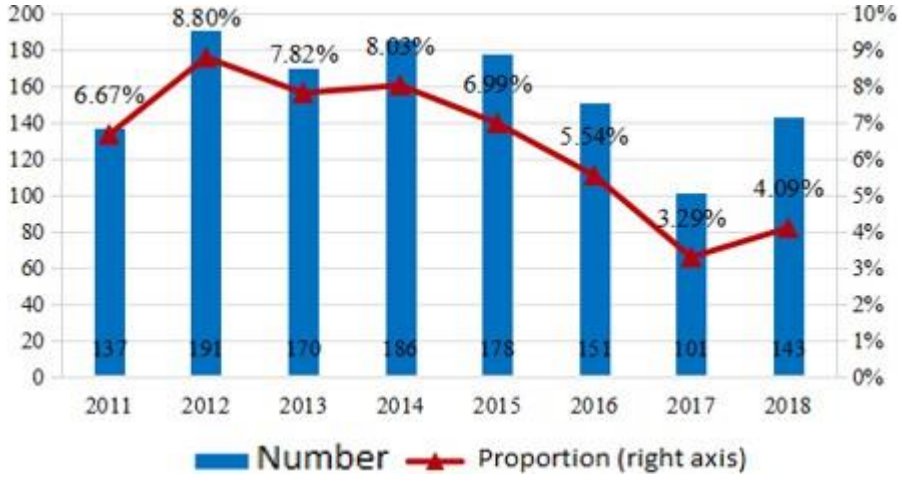
5.3.2 Analysis of Measurement Results

Based on the measurement results of the sample data of listed companies from 2011 to 2018, we further conducted an in-depth analysis of the development status and characteristics of "zombie enterprises" from the six dimensions of number, industry, region, nature of the company, size of the company, and age of the company.

1. The number and proportion of "zombie enterprises" generally showed a downward trend, but rebounded significantly in 2018

First, look at the change in total quantity. The number of "zombie enterprises" and their proportion generally show a trend of rising first and then falling (Figure 14). In 2012, it reached a peak of 191, accounting for 8.8%. Since 2016, with the advancement of the central government's capacity reduction work, the number of "zombie enterprises" has decreased significantly, but in 2018 it increased significantly by 41.58%, an increase of 42 from the previous year. The number of "zombie companies" in the field has increased significantly. It should be pointed out that the proportion of "zombie enterprises" remained at a low level of 4.09% in 2018, mainly due to the increase in the total number of listed companies in recent years.

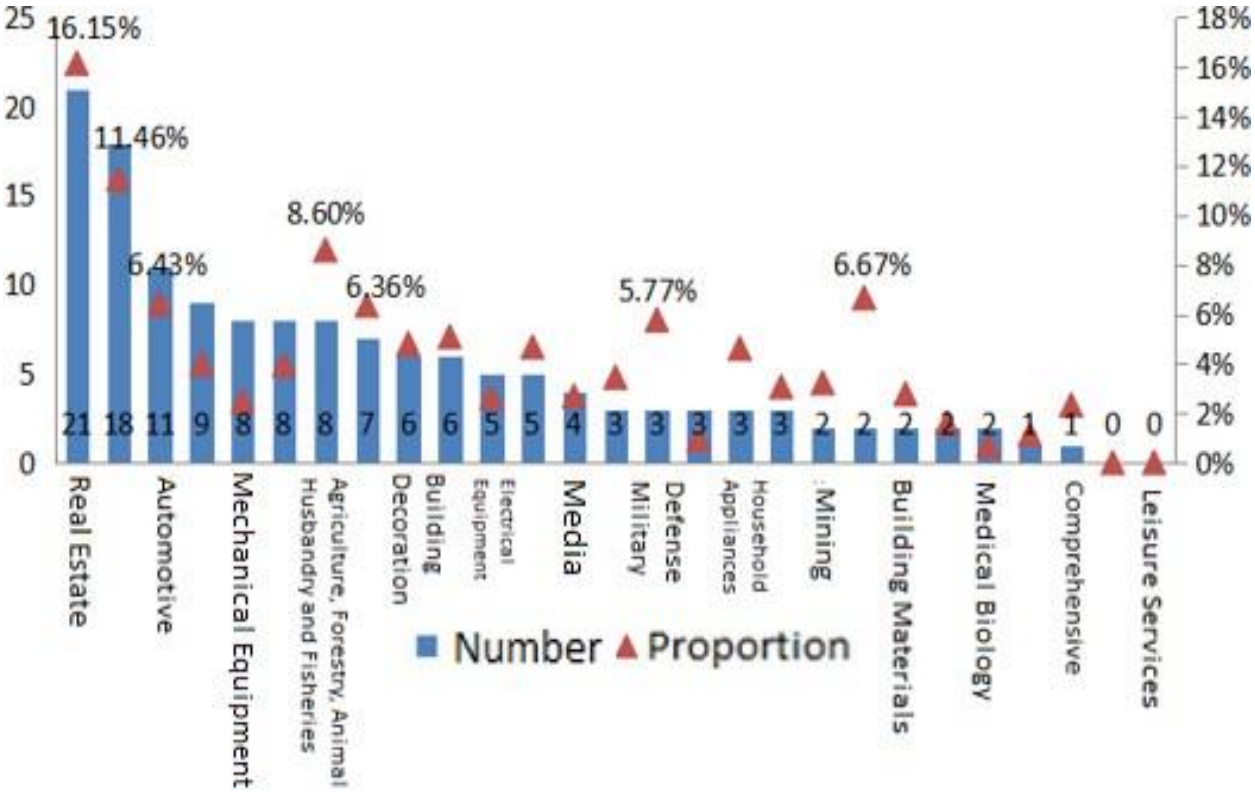
Figure 14: Changes in the Number and Proportion of "Zombie Enterprises" of Listed Companies from 2011 to 2018



2. Obvious results have been achieved in capacity reduction in traditional key areas, but real estate and other industries have become new key areas where "zombie companies" are frequent.

From the perspective of changes in industry distribution. The number and proportion of “zombie enterprises” in the capacity reduction industry that are centrally deployed by the central government such as mining, steel, and chemical industries have been well controlled, reflecting the significant results achieved in capacity reduction in key areas. But at the same time, the number of "zombie companies" in real estate, utilities, automobiles, electronics and other industries has increased significantly (see Figure 15). In particular, in the real estate and public utility sectors, in recent years, due to the impact of real estate regulation and control policies and economic downturn, corporate operating pressure and risks have increased, and they need to focus on. In 2018, there were 21 "zombie house companies" among listed companies, accounting for 16.15%; 18 "zombie utility companies", accounting for 11.46%.

Figure 15: Industry Distribution of "Zombie Enterprises" of Listed Companies in 2018



3. The overall development of “zombie enterprises” in various regions shows a good trend, but there are obvious inter-provincial differences in structure.[6]

Since 2012, the proportion of “zombie enterprises” of listed companies in various regions has gradually improved, but in 2018, the eastern, western and northeastern regions rebounded slightly, and the proportion of “zombie enterprises” in the eastern region is significantly better than other regions (Figure 16, Figure 17). However, from a structural point of view, there are obvious inter-provincial differences in the layout of "zombie enterprises". For example, among the provinces in Northeast China, the proportion of “zombie enterprises” in Liaoning has improved year by year, but Heilongjiang and Jilin have deteriorated in the past two years after a period of improvement. Among the provinces in the East, Zhejiang, Jiangsu, Hebei, and Shandong, the proportion of “zombie enterprises” has gradually improved, and other provinces have generally deteriorated in 2018. Among the provinces in the central region, the proportion of “zombie enterprises” in Shanxi, Jiangxi, Henan, and Hunan has decreased significantly since 2016, and the proportion of Anhui has remained The low level is stable, and the proportion of Hubei has rebounded sharply in 2018; among the provinces in the western region, except for the proportion of “zombie enterprises” in Gansu that rebounded sharply to the highest level in recent years of 15% in 2018, other provinces have The double-digit figure dropped to within 8%, of which Chongqing, Sichuan and Yunnan maintained a good development trend. It should be pointed out that from an absolute point of view, the greater number of “zombie enterprises” in eastern provinces such as Guangdong, Jiangsu, and Beijing are related to the higher number of listed companies in these regions, and their proportion is not high.

[6] The proportion in this section is the proportion of the number of "zombie enterprises" in different regions to the total number of listed companies in that region

Figure 16: Changes in the Proportion of "Zombie Enterprises" of Listed Companies in Various Regions from 2011 to 2018

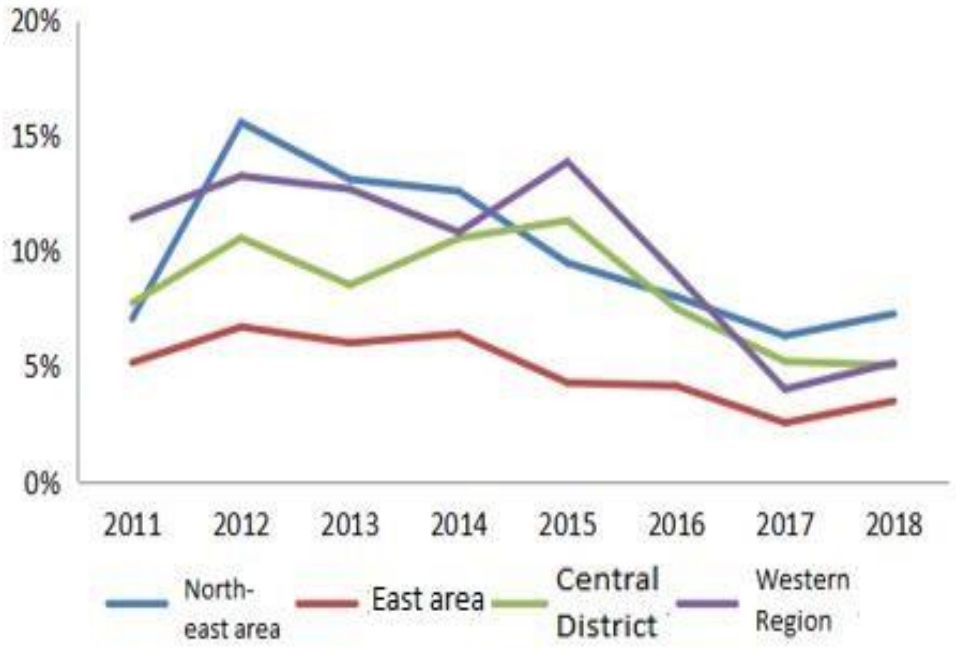
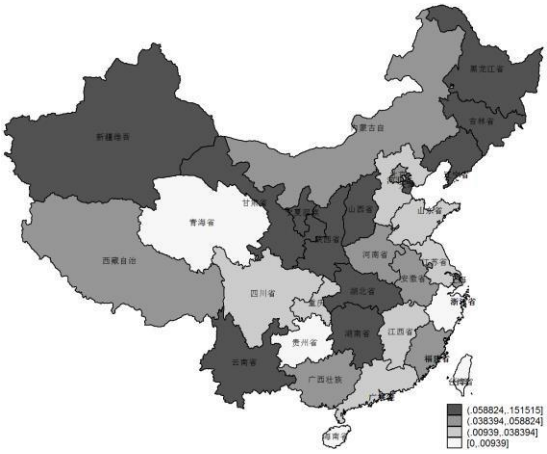


Figure 17: Regional Distribution of the Number of "Zombie Enterprises" of Listed Companies in 2018

Figure 18: Regional Distribution of the Proportion of "Zombie Enterprises" of Listed companies in 2018



4. The state-owned enterprises have achieved results in capacity reduction. The number and proportion[7] of private "zombie enterprises" are at a high level in recent years.

Before 2016, the proportion of state-owned "zombie enterprises" generally showed an upward trend, and the proportion of private "zombie enterprises" generally showed a downward trend. In the past two years, the number and proportion of state-owned "zombie enterprises" have decreased significantly, while the number and proportion of private "zombie enterprises" have been at a high level in recent years. This aspect reflects the achievements of state-owned enterprises in reducing production capacity, and on the other hand, it also shows that the operating pressure of private enterprises has increased significantly. At present, state-owned "zombie enterprises" account for half, with central enterprises accounting for 32.2% and local state-owned enterprises accounting for 18.2%; private "zombie enterprises" account for 43.4%.

Figure 19: Changes in the Proportion of Chinese Companies and Private Companies in " Zombie Companies" of Listed Companies[8]

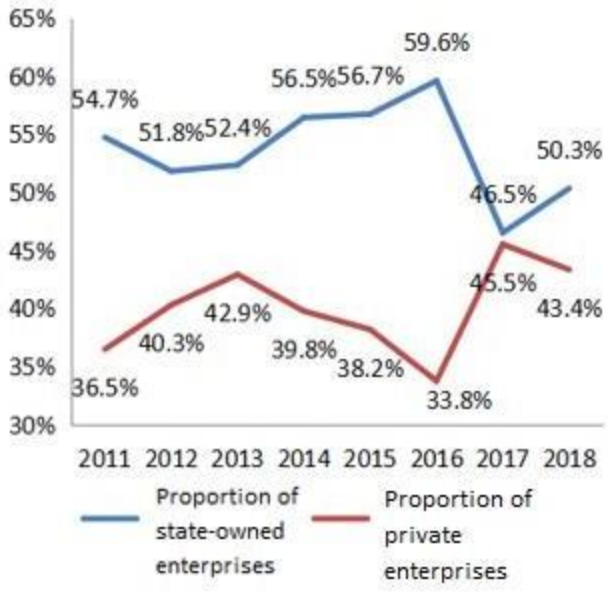
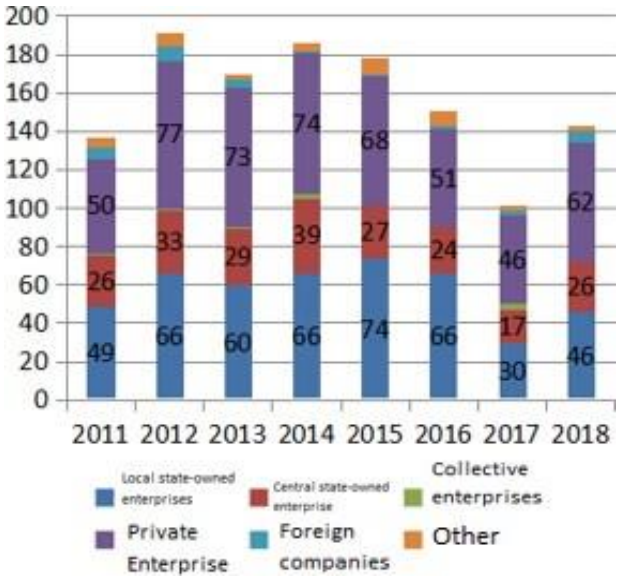


Figure 20: Changes in the Number of "Zombie Companies" of Various Types of Listed Companies



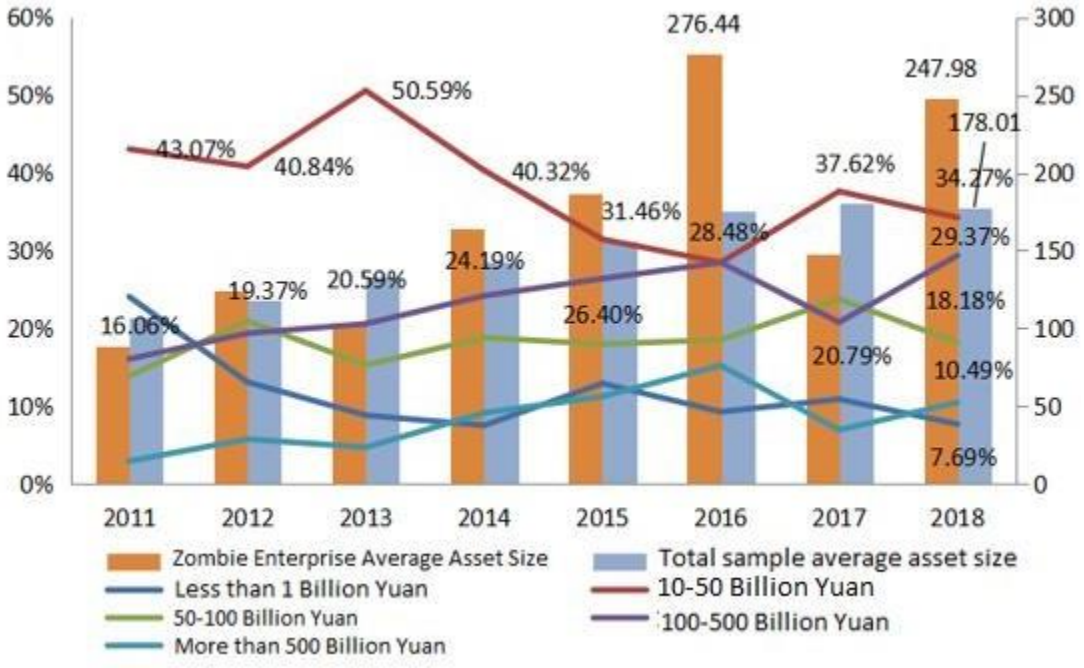
[7] The proportion in this section is the proportion of "zombie enterprises" in different attributes to "zombie enterprises".

[8] Taking into account the sample selection bias, we also compared the trend of private "zombie enterprises"/"zombie enterprises"- private enterprises/total samples, state-owned "zombie enterprises"/"zombie enterprises"-state-owned enterprises/total samples. 7 Consistent. Therefore, Figure 19 can effectively describe the changes of "zombie enterprises" in Chinese enterprises and private enterprises.

5. The asset scale of "zombie enterprises" shows an upward trend, and the proportion[9] of large and medium-sized enterprises gradually increases.

The size of assets of "zombie enterprises" generally shows an upward trend. In 2011, the average total assets of "zombie enterprises" was 8.765 billion yuan, but in 2018 it has reached 24.798 billion yuan, with a peak of 27.644 billion yuan in 2016. In terms of scale structure, the proportion of "zombie enterprises" with total assets of 1 billion to 5 billion yuan is the highest. The proportion of enterprises with assets of less than 5 billion yuan is declining, and those with assets of more than 10 billion yuan are increasing significantly. trend. We believe that the scale of "zombie enterprises" is expanding on the one hand because of economic growth driving the overall expansion of the assets of listed companies, and on the other hand because part of "zombie enterprises" continue to increase the scale of debt in the case of difficult corporate operations.[10]

Figure 21: Changes in the Proportion of "Zombie Enterprises" of Listed Companies of Different Sizes from 2011 to 2018



Note: The unit of the average asset size of the "zombie enterprise" and the average asset size of the total sample is 100 million yuan, the coordinate of the right axis.

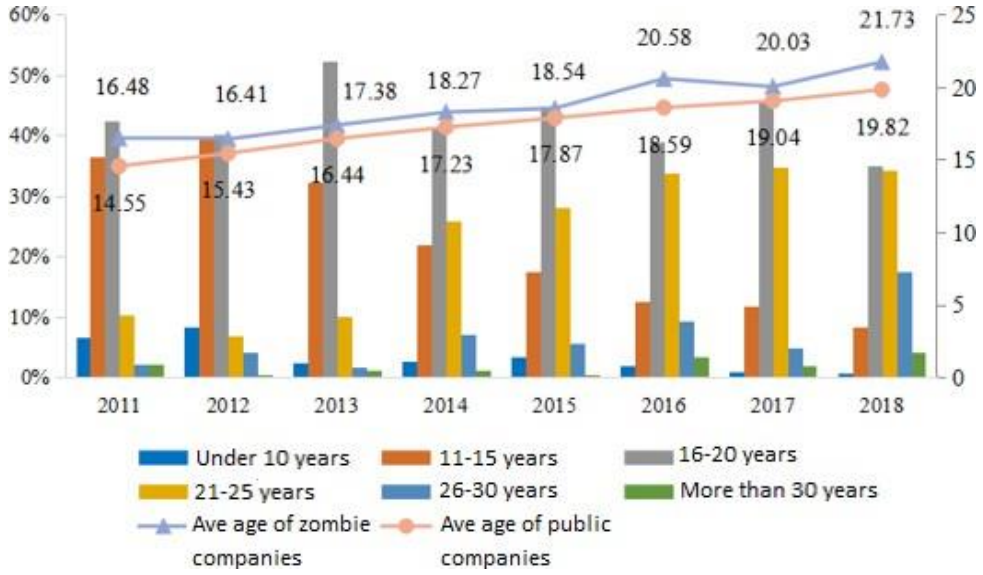
[9] The proportion of this subsection is the proportion of "zombie enterprises" of different sizes to "zombie enterprises".

[10] This is reflected in the fact that the average asset size of "zombie companies" is growing faster than the overall number of listed companies.

6. "Zombie Enterprises" presents an "aging" development trend, and the problem of soft financial constraints remains to be solved.

Judging from the age distribution of "zombie companies" in various years, the constant is more than 95% of "zombie companies" in each year, whose ages are concentrated in 10-30 years, and the change is 11-15 years in "zombie companies" The proportion shows a gradual downward trend. The proportion of “zombie enterprises” in the age groups 21-25 and 26-30 is gradually increasing, with an average age rising from 16.48 years to 21.73 years. At the same time, the average age of "zombie companies" is higher than that of listed companies as a whole, which shows that even if the trend factors are excluded, the development of "zombie companies" still shows the trend of "aging" (Figure 22). We believe that the “aging” development trend of “zombie enterprises” shows that under financial constraints, bank credits, government subsidies and other benefits extend the average lifespan of “zombie enterprises”. At the same time, however, the overall development bottleneck age of listed companies began to extend from 10-20 years to 15-25 years, indicating that the overall domestic business environment has improved.

Figure 22: The trend of the proportion of “zombie companies” of listed companies of various ages from 2011 to 2018



5.3.3. Research on FN-CHK Method

The core idea of the FN-CHK method is to first calculate the minimum cost of financing (including loans and bonds) in the financial market. If a company's profit is still negative when it

obtains funds below the lowest financing cost in the market, and the asset-liability ratio is greater than 50%, and the total debt scale continues to rise from the previous year, then this company is considered a "zombie company".

We have improved the FN-CHK method, taking into account government subsidies, tax rebates and other factors, and eliminating the interference of new companies. Specific steps are as follows:

1. Calculate the minimum interest expense

$$R_{it}^{*} = rs_t \times BS_{it} + \left(\frac{1}{5} \sum_{j=1}^{5} rl_{t+1-j} \right) \times BL_{it} + rcb_{\min overlast5year,t} \times Bonds_{it}$$

Among them, R_{it}^{*} is the minimum interest expense of the enterprise in the year, rs_t rl_t and $rcb_{\min overlast5year,t}$ represent the average short-term minimum interest rate in year t, the average long-term minimum interest rate in year t, and the minimum interest rate of corporate bonds issued in the first five years of t, BS_{it}, BL_{it} and $Bonds_t$ represent the total amount of short-term bank loans, long-term bank loans and bonds issued by the enterprise i at the end of year t.

2. Calculate actual profit

$$realpro_{it} = OP_{it} - (R_{it}^{*} - R_{it})$$

Among them, $realpro_{it}$ represents the actual profit of enterprise i at the end of year t, OP_{it} represents the operating profit of enterprise i at the end of year t, R_{it} represents the actual interest expense of enterprise i at the end of year t, $(R_{it}^{*} - R_{it})$ can represent the bank credit subsidy obtained by the enterprise. This article uses operating profit mainly to consider the impact of non-recurring gains and losses such as government subsidies and tax rebates. If the company's profit is still negative after enjoying government subsidies and credit subsidies, then the company may be a "zombie company."

3. Set the identification conditions for "zombie enterprises"

1. $realpro_{it} < 0$;

2. The asset-liability ratio is greater than 50%;

3. Total liabilities increased compared with the previous year;

4. The age of the enterprise is greater than 3 years.

5.3.4. Selection of Related Indicators

The above measurement method involves a series of indicators such as loan interest rate, bond issuance interest rate, corporate debt scale, operating profit, corporate age, etc. The specific selection criteria are shown in the table (Table 6) below.

Table 6: Selection of Related Indicators

Variable	Index	Comment
Short-Term Minimum Interest Rate (rs)	The arithmetic average of the benchmark interest rate of RMB loans within 6 months (inclusive) and 6 months to 1 year (inclusive) announced by the central bank	When calculating the minimum interest rate, the time weight is calculated according to the time interval before and after the central bank announces the interest rate adjustment date, and the weighted average obtains the short-term and long-term minimum interest rate for each year. The annual short-term and long-term minimum interest rate will be lowered by 10%.
Long-Term Minimum Interest Rate (rl)	The arithmetic average of the benchmark interest rates of RMB loans announced by the central bank for 1 to 3 years (inclusive), 3 to 5 years (inclusive), and more than 5 years	
Minimum Corporate Bond Rate (rcb)	Calculate the annual average of the issuance interest rate of the most senior (AAA) corporate bonds	Choose the lowest value in the past 5 years
Short-Term Bank Loans (BS)	Short-term loan	
Long-Term Bank Loan (BL)	Long term loan	
Total Bond (Bonds)	Bonds payable	

Actual Interest Expense (R)	Interest expense	
Business Age	Calculate the time since the establishment of the company	
Operating Profit	Operating Profit	
Debt Scale	Total Liabilities	
Asset/Liability Ratio	Asset/Liability Ratio	

Based on the measurement results of the sample data of listed companies from 2011 to 2018, we further conducted an in-depth analysis of the development status and characteristics of "zombie companies" from the six dimensions of number, industry, region, nature of the company, size of the company, and age of the company.

Chapter 6: Research on Risk Evaluation Method of Urban Real Estate Market Based on Multiple Regression Contingent Scoring Method

In recent years, with the continuous and rapid rise in domestic housing prices, the hidden worries of all sectors of society on the potential risks of the real estate sector have also increased. Preventing and mitigating market risks in the real estate sector has become the focus of the central economic work this year [January 21, 2019, Central Political Bureau A special seminar for leading cadres at the provincial and ministerial levels was held to discuss the prevention and resolution of major risks facing China. Among them, the three areas of real estate market, financial market and "zombie enterprise" are the key areas for preventing and mitigating risks.]. The proportion of real estate business in domestic financial institutions is generally high. As of the first quarter of 2019, the balance of real estate development loans and personal mortgage loans accounted for 47.4% of the balance of RMB loans. It is expected that the real estate business will remain the core business of financial institutions for a long time to come. Therefore, it is of great significance to scientifically and reasonably assess the risks in the real estate market. At present, there are many studies on the evaluation of real estate market risk in academia and industry, but there is not much research on systematic quantitative assessment of real estate market risk, especially the city-level real estate market risk. At present, the evaluation method used has important defects such as variable index selection and parameter setting, strong subjectivity, and time lag in evaluation. It has been difficult to meet the needs of related business development and risk management. This article uses scientific quantitative methods to construct a new set of urban real estate market risk assessment methods, and uses this set of methods to evaluate and analyze 11 first- and second-tier cities. In the future, risk departments can use the methodology provided in this article to expand the scope of data and analyze and evaluate the real estate market risks in more cities to improve their risk management and control capabilities, so as to better serve and guide business departments to develop real estate business.

The real estate business of domestic financial institutions accounts for a relatively high proportion, and scientific assessment of real estate market risks is of great significance to prevent systemic financial risks. At present, the evaluation method used has important defects such as

variable index selection and parameter setting, strong subjectivity, and time lag in evaluation. It has been difficult to meet the needs of related business development and risk management.

This article aims to improve the risk assessment and control methods of the urban real estate market in order to improve the risk management and control capabilities, so as to better serve and guide business departments to carry out real estate related business.

The core ideas of the evaluation method construction in this paper are: the first step is to screen preliminary variables based on theoretical research and data availability, and use the stepwise regression method to select indicators that have a significant impact on house price growth; the second step is to measure the significant impact indicators and Correlation coefficient between house price growth rate, and normalize the correlation coefficient to the weight of each indicator; the third step is to sort the indicators of each city according to their numerical value, and the optimal city score is set to 100 The index scores of other cities are converted according to the index value in a percentage system; the fourth step is to calculate the overall score of each city based on the index scores and weights set above. The higher the score, the stronger the kinetic energy of rising house prices.

6.1 Introduction to Real Estate Risk Assessment Analysis Model

6.1.1 Analysis of Existing Real Estate Risk Evaluation Models

At present, most of the risk ratings and risk assessment methods used by banks in the urban real estate market, the core construction ideas are:

Step 1: build an indicator system from the five dimensions of macroeconomics, population status, investment popularity, housing market, and capital supply, and comprehensively evaluate the strength of each dimension factor in supporting housing prices, thus reflecting the risk of urban real estate market;

Step 2: assign a certain weight value to the five dimensions through expert evaluation, and at the same time set some detailed indicators for each dimension, and split the total weight value of the dimension into each detailed indicator[11];

[11] In each dimension, the sum of the weight values of each detail indicator is equal to the total weight of the dimension, and the weight value of each detail indicator is given by an expert.

Step 3: Perform forward normalization processing on each index value based on the city, and then perform weighted calculation on the processed index to obtain the comprehensive score of each city;

Step 4: Finally, each city is divided into active intervention, cautious intervention and prohibited intervention levels according to the comprehensive score.

Table 7: Index System of Urban Real Estate Market Risk Assessment

Index classification	Weights	Indicator name	Weights	Indicator Construction	Direction	Judgement Principle
Macro-economics	13%	National GDP	5%	Annual GDP	+	Top Ranking Prioritized
		Regional GDP Growth Rate	8%	GDP growth rate in the past year	+	Top Ranking Prioritized
Macro-economics	24%	Total Resident Population	5%	Permanent population at the end of the year	+	Top Ranking Prioritized
		Permanent Population Growth	9%	Growth rate of permanent population in the past year	+	Top Ranking Prioritized
		Urban per Capita Disposable Income Growth Rate	5%	Increase in disposable income of urban residents in the past year	+	Top Ranking Prioritized
		House Price Income Ratio	5%	Residential unit price/per capita disposable income of urban residents	-	Top Ranking Prioritized
Investment Popularity	23%	Total Investment in Real Estate Development	5%	Annual real estate development investment	+	Top Ranking Prioritized
		Real Estate Development Investment Accounts for Fixed Assets Investment	5%	Total investment in real estate development / total investment in fixed assets of the whole society	+	Top Ranking Prioritized
		Growth Rate of Real Estate Development Investment	8%	Growth rate of total investment in real estate development in the past year	+	Top Ranking Prioritized
		Growth Rate of Land Purchase Price	5%	Increase in land purchase price (land purchase fee/land area purchased this year) in the past year	+	Top Ranking Prioritized
Residential Market	35%	Residential Sales Area	5%	Annual residential sales area	+	Top Ranking Prioritized
		Floor Area of Newly Started Housing Per Capita	8%	Floor area of newly started housing/resident population at the end of the year	-	Top Ranking Prioritized

		Vacant House Area	8%	Growth rate of vacant house area	-	Top Ranking Prioritized
		Sales Completion Ratio	9%	Sales area/completed area	+	Top Ranking Prioritized
		Residential Land Unit Price Ratio	5%	Residential unit price/land unit price	+	Top Ranking Prioritized
Funding	5%	Proportion of Domestic Loans	5%	Domestic loans/subtotal	+	Top Ranking Prioritized

We believe that the current urban real estate market risk assessment method has at least the following defects:

One is that the index selection is subjective and the substitution between indexes is strong[1212]. The development of the real estate market is affected by many factors such as population, land, finance, etc. Although the current evaluation method considers many dimensions, there are few indicators in each dimension, and many indicators actually reflect the same type of impact and have a certain alternative. For example, the macroeconomic dimension actually involves only one variable of GDP, and does not reflect important macroeconomic variables such as local debt levels and industrial structure.

The second is that the method of empowerment is not scientific enough. The weighting of the current method for each dimension and each index is mainly given by expert scoring, subjectivizes is also relatively strong, and there are significant selective deviations. The setting of weight parameters is directly related to the type of experts selected, and the weight values given by different groups of experts may be quite different, so the setting of weight parameters has a certain randomness.

The third is time lag. The current evaluation results of the urban real estate market risk rating are based on 2015 data, but in recent years the domestic real estate market has undergone major changes. The evaluation results have not been able to reflect the risk status of the real estate market in various cities. The guiding role of the business has declined.

6.1.2 The Core Idea of the Evaluation Method Construction in This Paper

Similar to the current assessment method, this article defines the urban real estate market risk as "whether the city's housing prices have the internal momentum to continue to rise", and these internal momentums include a series of factors such as population, land, income, investment,

[12] From the perspective of econometrics, there is collinearity among some explanatory variables and strong substitution among variables.

debt, and finance. If the internal kinetic energy is not enough to support the steady and continuous rise of urban housing prices, it is considered that the development of the city's real estate market faces potential risks.

On this basis, the construction method of the evaluation method is mainly divided into the following four steps:

The first step is to select indicators that have a significant impact on housing prices. Based on data availability, first collect as many variable indicators as possible that may affect house prices, and based on the stepwise regression model, screen out indicators that have a significant impact on house prices.

The second step is to empower each indicator. Calculate the correlation coefficient between the significant impact indicator and house price, and normalize the correlation coefficient, and use the processed correlation coefficient as the weight of each indicator.

The third step is to convert the index value into a percentage system. The indicators of each city are sorted by numerical value, and the optimal city score is set to 100. The scores of other city indicators are converted according to the value of the indicator on a 100% scale.

The fourth step is to calculate the comprehensive score of each city and rank. Based on the scores and weights of the indicators set above, the city's comprehensive score is calculated by weighting. The higher the score, the stronger the momentum of rising house prices.

Compared with the current evaluation method, the evaluation method in this paper has the following advantages: First, the index number range is wider, and the index selection uses a quantitative method, which solves the problem that the selected index may not have a strong interpretation of house prices or there is an alternative between the indicators; second The quantitative method is used to set the index weight, which avoids the subjectivity and instability of the expert scoring method. The third is to evaluate the situation in 2015 compared with the current method, and the evaluation in this article is updated to 2017. It should be pointed out that, due to the wide range of primary indicators in this paper which affected the availability of data, only 11 first- and second-tier cities were evaluated, but this did not affect the practicability of the evaluation method.

6.2 Improving the Assessment Steps of Urban Real Estate Market Risk

6.2.1 Index Screening

First, based on theoretical research and data availability considerations of housing price influencing factors, 26 indicators were initially selected from the five dimensions of population, economic finance, resident income, real estate investment, and land. On this basis, we used a stepwise regression model, selecting the indicators that have a significant impact on the growth rate of house prices from the above 26 primary selection variables. The specific steps of the model are detailed in Appendix 1. The 13 significant indicators finally selected.

Table 8: Variable Significance Test Results

Variable Dimension	Primary Indicators	Distinctiveness	Retention
Population-Related	Permanent population size	Notable	Include
	Growth rate of net inflow of permanent population	Not Notable	Exclude
	Inverted degree of permanent population and registered population	Not Notable	Exclude
	Number of elementary school students	Not Notable	Exclude
	The population density	Notable	Include
	Natural population growth rate	Notable	Include
	Urbanization rate	Not Notable	Exclude
	Proportion of working population	Notable	Include
Economic and Financial Related	Tertiary industry's share of GDP	Not Notable	Exclude
	The proportion of fiscal revenue and expenditure balance in GDP	Not Notable	Exclude
	Growth rate of land grant	Not Notable	Exclude
	City GDP growth rate	Notable	Include
	Land transfer fees accounted for the proportion of total fiscal revenue	Notable	Include
	Deposit balance growth	Not Notable	Exclude
	Growth of loan balance	Notable	Include
Resident Income and Expenditure	Per capita disposable income growth rate of urban residents	Not Notable	Exclude
	Growth rate of per capita consumption expenditure of urban residents	Not Notable	Exclude

	Per capita expenditure of urban residents/per capita disposable income	Notable	Include
Real Estate Investment Related	Residential Investment Income Index (Jan 2009=100)	Notable	Include
	Average growth rate of urban residential rents	Notable	Include
	Growth rate of new housing construction area	Notable	Include
	Commercial housing sales area growth rate	Not Notable	Exclude
	Growth rate of real estate development investment completion	Notable	Include
Land Supply Related	Growth rate of residential land transaction total land price	Notable	Include
	Growth rate of land area purchased this year	Not Notable	Exclude
	Growth rate of land supply area	Not Notable	Exclude

On this basis, we use a stepwise regression model to select the indicators that have a significant impact on the growth rate of house prices from the above 26 primary selection variables. The 13 significant indicators finally screened are shown in the table (Table 9) below.

Table 9: Variable Significance Test Results

Variable Dimension	Primary Indicators	Distinctiveness	Retention
Population-Related	Permanent population size	Notable	Include
	Growth rate of net inflow of permanent population	Not Notable	Exclude
	Inverted degree of permanent population and registered population	Not Notable	Exclude
	Number of elementary school students	Not Notable	Exclude
	The population density	Notable	Include
	Natural population growth rate	Notable	Include
	Urbanization rate	Not Notable	Exclude
	Proportion of working population	Notable	Include

Economic and Financial Related	Tertiary industry's share of GDP	Not Notable	Exclude
	The proportion of fiscal revenue and expenditure balance in GDP	Not Notable	Exclude
	Growth rate of land grant	Not Notable	Exclude
	City GDP growth rate	Notable	Include
	Land transfer fees accounted for the proportion of total fiscal revenue	Notable	Include
	Deposit balance growth	Not Notable	Exclude
	Growth of loan balance	Notable	Include
Resident Income and Expenditure	Per capita disposable income growth rate of urban residents	Not Notable	Exclude
	Growth rate of per capita consumption expenditure of urban residents	Not Notable	Exclude
	Per capita expenditure of urban residents/per capita disposable income	Notable	Include
Real Estate Investment Related	Residential Investment Income Index (Jan 2009=100)	Notable	Include
	Average growth rate of urban residential rents	Notable	Include
	Growth rate of new housing construction area	Notable	Include
	Commercial housing sales area growth rate	Not Notable	Exclude
	Growth rate of real estate development investment completion	Notable	Include
Land Supply Related	Growth rate of residential land transaction total land price	Notable	Include
	Growth rate of land area purchased this year	Not Notable	Exclude
	Growth rate of land supply area	Not Notable	Exclude

6.2.2 Index Empowerment

Correlation analysis of the above selected indicators and house price growth rate and calculation of correlation coefficients, then the normalization of correlation coefficients to obtain the weight of each indicator (Table 10).

From the perspective of weight value, investment return, land, population and finance are the main driving forces supporting the rise in housing prices. Investment income (18.8%) and land price (18.1%) have the strongest impetus for housing prices, indicating that the property function of China's real estate market is strong; the newly started area (16.8%) reflects the balance between supply and demand in the real estate market, and new construction starts when demand exceeds supply. The growth rate of area is on the rise, and the growth rate of house prices is accelerating; population density (11%) and finance (7.3%) also have a strong supporting effect on rising house prices. It should be pointed out that the urban GDP growth rate and house price growth show a negative correlation. We believe that the main logic behind it is that the slowdown of urban GDP growth will trigger local governments to stimulate the development of the real estate market to support economic growth. The local government controls the land supply and guides the rise in housing prices, resulting in a prosperous market, and then speeds up land promotion and development investment approval.

Table 10: Index Weighting Results of Standardized Processing Correlation Coefficients

Variable Dimension	Total weight	Include Index	Index Weight		Correlation Coefficient with House Price Growth
Population	24.5%	Permanent Population Size	4.4%		0.0886
		Population Density	11.0%		0.2239
		Natural Population Growth Rate	4.3%		0.0877
		Proportion of Working Population	4.9%		0.0990
Economic Finance	13.5%	City GDP Growth Rate	4.9%		-0.0990
		Land Transfer Fee/Total Fiscal Revenue	1.3%		0.0269
		Growth of Loan Balance	7.3%		0.1490

Resident Income and expenditure	3.0%	Per capita consumption expenditure of urban residents/per capita disposable income	3.0%		0.0616
Real Estate investment	40.8%	Residential Investment Income Index (January 2009=100)	18.8%	Standard-ization ⇐	0.3828
		Average Growth Rate of Urban Residential Rents	2.8%		0.0566
		Growth Rate of New Housing Construction Area	16.8%		0.3421
		Year-on-year Growth Rate of Real Estate Development Investment Completion	2.4%		0.0494
Land	18.1%	Growth Rate of Residential Land Transaction Total Land Price	18.1%		0.3693
Total	100%	/	100%		1

Note: Due to the negative correlation between the urban GDP growth rate and the dependent variable (commercial housing price growth rate), during the empowerment process, we will conduct a positive standardization process, which translates into a negative urban GDP growth rate.

6.3 Comprehensive Score and Result Analysis

The indicators of each city are sorted according to the numerical value (negative correlation indicators are arranged in reverse order), the optimal value city score is set to 100, and the other city's score is converted according to the relative value of the index value. (See Appendix 2 for details) Then, for each city, a comprehensive weighted score is calculated based on the scores and weights of the indicators.

Judging from the comprehensive scores and rankings of the 11 participating cities in 2017, the ranking of first-tier cities is generally high, indicating that the momentum of rising house prices in first-tier cities is still strong; various factors in second-tier cities in Chongqing and Hangzhou have strengthened support for housing prices. The score is ranked in the top 5.

Table 11: 2017 Comprehensive Score and Ranking of 11 Participating Cities

Year 2017	Score	Ranking
Beijing	58.3027	1
Chongqing	56.6471	2
Shenzhen	40.4189	3
Guangzhou	40.3817	4
Hangzhou	36.9857	5
Shanghai	36.0057	6
Chengdu	34.8836	7
Changsha	34.1362	8
Tianjin	30.5351	9
Fuzhou	29.6425	10
Nanjing	22.6270	11

On the basis of the comprehensive scores and rankings of the 11 participating cities in 2017, we will further investigate the contribution of 13 specific indicators, and classify and compare first-tier and second-tier cities. See Table 12 and Table 13 for details.

Table 12: The contribution of various indicators of the first-line participating cities in 2017

	Beijing	Shanghai	Shenzhen	Guangzhou
Resident size	4.16	4.22	3.87	3.95
Population Density	9.04	10.37	11.00	9.53
Natural population growth rate	0.76	0.57	4.31	3.20
Proportion of Working Population	3.71	3.66	4.86	3.84
Total	**17.67**	**18.83**	**24.03**	**20.51**
City GDP Growth Rate	-2.92	-2.23	-4.86	-3.22
Land Transfer Fee/Total Fiscal Revenue	0.67	0.33	0.38	0.97
Growth of Loan Balance	4.29	5.65	6.73	7.07
Total	**2.04**	**3.75**	**2.24**	**4.82**
Per Capita Consumption Expenditure of Urban Residents/Per Capita Disposable Income	2.60	2.72	2.91	2.95
Residential Investment Income Index	18.65	11.79	18.80	14.41
Average Growth Rate of Urban Residential Rents	2.26	0.57	1.68	1.06
Growth Rate of New Housing Construction Area	-2.18	-1.52	-6.95	-7.34
Growth rate of real estate development investment completion	-0.88	0.46	2.43	0.73
Total	**17.85**	**11.29**	**15.96**	**8.86**
Growth Rate of Residential Land Transaction Total Price	18.14	-0.59	-4.74	3.24

From the perspective of first-tier cities, the main features are as follows:

(1) Population and return on investment are the most important driving factors for urban housing prices. Shenzhen's population advantage is significantly stronger than other first-tier cities. Shenzhen and Beijing's return on investment have obvious advantages;

(2) Beijing's land price has a stronger supporting effect on housing prices than other first-tier cities, and it is a prominent advantage of its top ranking;

(3) Finance also has a certain supporting effect on housing prices in first-tier cities. Guangzhou and Shenzhen are slightly better than Beijing and Shanghai in terms of credit support.

Table 13: The Contribution of Various Indicators of the Second-Tier Participating Cities in 2017

	Chengdu	Fuzhou	Hangzhou	Nanjing	Tianjing	Changsha	Chongqing
Resident size	4.00	3.60	3.71	3.65	3.98	3.62	4.35
Population Density	8.81	8.05	7.98	8.98	9.02	8.18	7.45
Natural population growth rate	1.01	1.17	1.25	0.75	0.53	-0.40	0.79
Proportion of Working Population	3.67	4.74	4.64	3.54	3.71	3.83	3.60
Total	**17.49**	**17.56**	**17.59**	**16.92**	**17.24**	**15.23**	**16.19**
City GDP Growth Rate	-4.55	-4.71	-3.53	-3.71	-1.28	-3.68	-3.19
Land Transfer Fee/Total Fiscal Revenue	0.97	1.28	1.32	1.26	0.75	0.84	0.69
Growth of Loan Balance	6.29	4.53	5.57	6.10	4.65	7.32	5.32
Total	**2.71**	**1.10**	**3.35**	**3.64**	**4.12**	**4.48**	**2.83**
Per Capita Consumption Expenditure of Urban Residents/Per Capita Disposable Income	2.62	2.69	2.73	2.32	3.03	2.97	2.85
Residential Investment Income Index	9.92	14.65	7.28	12.95	9.97	10.65	11.52
Average Growth Rate of Urban Residential Rents	1.40	-0.52	2.78	1.09	1.24	-0.08	2.11
Growth Rate of New Housing Construction Area	-4.76	-8.40	0.99	-15.74	-4.10	-1.72	16.80
Growth rate of real estate development investment completion	-0.64	0.10	0.56	2.01	-0.33	2.04	0.78
Total	**5.92**	**5.83**	**11.61**	**0.31**	**6.77**	**10.89**	**31.21**
Growth Rate of Residential Land Transaction Total Price	6.13	2.45	1.70	-0.56	-0.63	0.57	3.58

From the perspective of second-tier cities, the main features are:

(1) Population and investment return are also the most important factors supporting housing prices. The contribution of population factors in second-tier cities is roughly the same, and the investment return contribution varies greatly. Fuzhou and Nanjing have obvious advantages in investment income, and Hangzhou has the lowest investment income contribution;

(2) Chengdu's land price has a stronger supporting effect on housing prices than other second-tier cities;

(3) Financial contributions are roughly equivalent in first-tier cities, with Changsha, Chengdu, and Nanjing having more advantages than other second-tier cities.

Examining the top three major contributing factors for housing prices from 2012 to 2017, the first-tier cities are compared with the second-tier cities. The results are shown in Table 14 and Table 15.

Table 14: Changes in the Top Three Contributing Factors of First-Tier Participating Cities from 2012 to 2017

	2012	2013	2014	2015	2016	2017
Residential Investment Income Index	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai, Shenzhen
The population density	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai	Beijing, Guangzhou, Shanghai, Shenzhen	Beijing, Guangzhou, Shanghai, Shenzhen
Growth rate of residential land transaction total land price		Beijing, Guangzhou, Shanghai	Shanghai, Guangzhou	Beijing, Shenzhen		Beijing
Growth rate of new housing construction area	Beijing, Guangzhou, Shanghai, Shenzhen	Shenzhen	Beijing, Guangzhou, Shenzhen	Guangzhou, Shenzhen	Shenzhen, Guangzhou	
Growth of loan balance				Shanghai		Guangzhou, Shanghai, Shenzhen
City GDP					Beijing, Shanghai	

The results of first-tier cities show:

(1) Housing investment income and population density are important factors that affect housing prices in various cities, and the two types of factors are relatively stable;

(2) Except for 2012 and 2017, the contribution of land factors is also relatively large. In particular, land factors have contributed to higher housing prices in Beijing than other first-tier cities;

(3) Real estate development factors have a greater impact on Guangzhou and Shenzhen;

(4) Financial factors also contribute to Shanghai housing prices significantly.

Table 15: Changes in the Top Three Contributing Factors of Second-Tier Cities Participating in 2012-2017

	2012	2013	2014	2015	2016	2017
Residential Investment Income Index	Chengdu, Fuzhou, Hangzhou, Nanjing, Tianjin, Chongqing, Changsha	Chengdu, Fuzhou, Nanjing, Tianjin, Chongqing, Changsha, Hangzhou	Chengdu, Fuzhou, Nanjing, Tianjin, Changsha, Chongqing	Chengdu, Fuzhou, Hangzhou, Nanjing, Tianjin, Chongqing, Changsha	Fuzhou, Tianjin, Chongqing, Chengdu, Nanjing, Changsha, Hangzhou	Chengdu, Fuzhou, Tianjin, Changsha, Hangzhou, Nanjing, Chongqing
The population density	Chengdu, Fuzhou, Hangzhou, Nanjing, Tianjin, Chongqing, Changsha	Chengdu, Fuzhou, Hangzhou, Nanjing, Tianjin, Chongqing, Changsha	Chengdu, Shenzhen, Fuzhou, Hangzhou, Nanjing, Tianjin, Changsha, Chongqing	Chengdu, Hangzhou, Tianjin, Chongqing, Fuzhou, Nanjing, Changsha	Chengdu, Hangzhou, Fuzhou, Tianjin, Chongqing, Nanjing	Hangzhou, Chengdu, Fuzhou, Tianjin, Changsha, Nanjing, Chongqing
Growth rate of residential land transaction total land price	Changsha, Chengdu, Fuzhou	Hangzhou, Nanjing, Tianjin, Chongqing	Hangzhou	Fuzhou	Tianjin, Changsha	
Growth rate of new housing construction area	Hangzhou, Nanjing, Tianjin, Chongqing	Changsha	Nanjing, Tianjin, Changsha, Chongqing, Fuzhou, Hangzhou, Chengdu	Nanjing, Changsha, Hangzhou, Chongqing	Nanjing, Hangzhou, Changsha, Changsha, Chengdu, Fuzhou, Chongqing	Fuzhou, Nanjing, Chongqing
Growth of loan balance		Chengdu, Fuzhou, Chongqing		Chengdu, Tianjin		Chengdu, Hangzhou, Tianjin, Changsha

The results of the second-tier cities show:

(1) Residential investment income and population density are still the two main influencing factors of strong stability;

(2) The volatility of land factors and real estate development factors is relatively large. Among them, the growth rate of new real estate construction area in 2014 and 2016 is the main factor in many cities. Since 2014, the impact of land factors in most participating cities has weakened;

(3) The growth rate of loan balance contributed significantly to the housing prices in Chengdu than other cities.

Overall, population, return on investment, housing supply, and finance are the main factors supporting housing prices in 11 cities, but there are certain differences between cities, and this difference is more obvious in second-tier cities. Land prices and new construction in some cities have a greater impact on housing prices, and there are also large differences in the direction of contribution, which is the main reason for the changes in the comprehensive score ranking of different cities in different years. Under the general direction of real estate regulation of "housing and housing is not speculation", the contribution of future investment returns to housing price support may gradually decline, and population and housing supply will become the most important and stable factors influencing housing prices. Judging from the contribution of these two factors to housing prices, first-tier cities are generally better than second-tier cities, especially the contribution of demographic factors is relatively obvious.

6.4 Future Directions for Further Optimization

This article aims at the main defects of the current urban real estate market risk assessment methods, using quantitative methods to improve the scientific and rationality of the assessment methods. From a methodological point of view, the evaluation methods proposed in this paper have been greatly improved over the current evaluation methods in terms of index screening, index weighting, and index scoring, but there is still room for further improvement in terms of data and models.

One is to expand the length of the time series of indicators and the scope of cities, and improve the accuracy and stability of the selection of core indicators. This article uses a stepwise regression model to screen for significant indicator variables. In view of the availability of data, this article only covers data for 11 cities from 2012 to 2017. In the future, the accuracy and stability of the model results will be further optimized if the index data can cover the major cities of one, two, three, and four, and the time series cover a longer time span.

The second is to improve the coverage dimension of the indicator. The construction of the indicator system in this paper does not involve policy variables, and some of the policy variables (such as purchase restrictions, price restrictions, etc.) are direct or underlying factors that affect house prices, which may eventually be reflected in variables such as economic finance, population, and land. Therefore, the other direction of data index improvement is the quantitative design of policy variables, so as to further improve the entire index system.

The third is to optimize the model and improve the accuracy of the model results through more reasonable variable settings. Screening of significant indicators is a key part of the assessment method. Some indicator variables may have a lagging effect on house prices, and there may also be a two-way relationship in the causal relationship with house prices. Other methods must be used to confirm the lag order and the independent variable. Causality direction, further optimize model settings.

Chapter 7: Summary and Outlook

China's economy has entered a new normal, and "medium and high speed, excellent structure, new power, and multiple challenges" will become the main features of economic operation in the next five years. In the next five years, the three major driving forces driving China’s economic growth, external demand, manufacturing, and real estate, will gradually fail. In particular, the downward risk of asset prices represented by real estate will increase, which will bring greater uncertainty to the future judgment of China’s external environment.

Under this background, China's economy has entered a new normal stage. The country has successively issued a series of laws to restrict the overheating of real estate investment, while vigorously supporting the development of high-tech industries. The extensive growth of the real estate industry that has relied on investment in the past has been unsustainable. Large real estate companies and local investment groups have also begun to experience debt risk and liquidity crises. Therefore, the risk assessment, analysis and development strategy research of real estate enterprises based on the new normal economic background has become an important subject for continued in-depth research.

This article is based on the current situation of China's real estate industry, based on China's future economic development trends, and based on China's population structure as a clue, through the analysis of DEMATEL-based factors affecting real estate risk to identify and analyze the influencing factors of China's urban real estate risk factors Elements. Further use the FN-CHK method to analyze and analyze the real estate zombie enterprises in China, and identify the crisis in the industry as soon as possible. On this basis, the urban real estate market risk assessment method based on the multiple regression contingency scoring method (MRWS) is used. According to the basic principles of the market economy, a comprehensive assessment of the risks of the real estate market in China is made from the market perspective, and the corresponding risk control for the local government of China is proposed. The strategy provides a theoretical basis.

Finally, based on the comprehensive consideration of China's national policies, social conditions, population structure and many other factors, this article proposes a set of corresponding risk control and sustainable and orderly development strategies based on the above risk assessment analysis of Chinese real estate companies and industries, with a view to It provides theoretical basis and strategic guidance for the benign and orderly development of the real estate industry in

the context of the new normal of China's economy.

The research on the risk assessment and control strategies of China’s urban real estate market is a very complex issue, involving a wide range of content, not only closely related to the level of urban economic and social development, the level of urban resource endowment, and the level of urban public services, but also related to the development of the urban real estate market. There is a certain relationship between different periods. Therefore, the future real estate risk assessment and control strategies of China's cities will also require further research on the international situation, the domestic economic development and the income structure of residents.

Appendix 1: Stepwise Regression Model to Screen for Significant Variables

Considering the operability and complexity of the method, we use regression methods to screen for significant indicators. This method is mainly to establish a stepwise regression model, select the combination with the smallest AIC value, and select the index with a significant coefficient in the combination. The specific method is as follows:

Step 1: Establish a univariate regression model with p independent variables $X_1, X_2, \ldots, X_p$ and dependent variable Y, namely $Y = \beta_0 + \beta_1 X_i + \varepsilon$, $i = 1, 2, \ldots, p$, and calculate the AIC value of each equation, take the variable with the smallest AIC value, Record it as X_k.

Step 2: Establish a binary regression model of dependent variable Y and independent variable subset $\{X_k, X_1\}, \ldots, \{X_k, X_{k-1}\}$, $\{X_k, X_{k+1}\}, \ldots, \{X_k, X_p\}$, p-1 in total. Calculate the AIC value of each variable group, take the independent variable combination of the smallest AIC value, and record it as $\{X_k, X_m\}$.

Step 3: Consider the ternary regression of dependent variables on the independent variable subsets $\{X_k, X_m, X_i\}$, $i = 1, \ldots, k-1, k+1, \ldots, m-1, m+1, \ldots p$, with a total of p-2 regression models, and repeat step 2. Repeat in this way, and select one of the independent variables from the regression model each time until no variables are introduced.

Step 4: When the AIC value of all n+1 meta-regressions of the dependent variable to the independent variable subset is greater than the minimum AIC value in the n-ary regression, the minimum AIC value in the n-ary regression is selected to be worth combining. Panel fixed effect regression is used for the selected n independent variable combinations, and the variables with significant regression coefficients are selected (10% significance level, that is, the p value is less than 0.1).

Appendix 2: Comprehensive Scoring Method

According to the absolute value of the selected index, each city is scored, and finally the comprehensive score is calculated. Specifically, in our study, the 12 variables (x_i , $i=1,\cdots,12$) that are positively related to the dependent variable are arranged in descending order of variable values as $x_{i,j,t}^{(1)}, x_{i,j,t}^{(2)}, \ldots, x_{i,j,t}^{(11)}$, where j represents the city and $j=1,2,\ldots,11$, t represents the year, $t=2012,\ldots,2017$. The first order value is assigned 100, that is, $x_{i,j,t}^{(1)}=100$, the second order value is $100x_{i,j,t}^{(2)} / x_{i,j,t}^{(1)}$, and so on (Note: if there is a negative value in the above variable sequence, it is a negative score).

The city GDP growth rate (y_1), which is negatively correlated with the dependent variable, is positively sorted into $y_{1,j,t}^{(1)}, y_{1,j,t}^{(2)}, \ldots, y_{1,j,t}^{(11)}$ in ascending order, where j represents the city, $j=1,2,\ldots,11$, t represents the year, and $t=2012,\ldots,2017$. The first order value is given as -100, that is, $y_{1,j,t}^{(1)}=-100$, the second order value is $-100y_{1,j,t}^{(2)} / y_{1,j,t}^{(1)}$, and so on.

From this we can get the score ($X_{j,t}$) of each variable of city j in year t, multiply the score by the weight of the corresponding variable and add up to get the house price growth index of city j in year t, namely ($X_{j,t}=\sum_{c=1}^{12} a_c x_{c,j,t} + b_1 y_{1,j,t}$). The larger $X_{j,t}$ indicates that the city has more incentive to support the rise of commodity housing prices in year t.

References

Adrian, Tobias, & Shin, Hyun Song. 2010. Financial Intermediaries and Monetary Economics [J]. *FRB of New York Staff Report* 389.

Altunbas, Yener, Gambacorta, Leonardo, & Marques-lbanez, David. 2014. Does Monetary Policy Affect Bank Risk Taking? [J] *International Journal of Central Banking* 10 (1): 95-136.

Black, Angela, Fraser, Patricia, & Hoesli, Martin. 2006. House Prices, Fundamentals and Bubbles [J]. *Journal of Business Finance & Accounting* 33 (9-1): 1535-1555.

Case Karl E. 2000. Real Estate and the Macro-Economy [J]. *Brookings Papers on Economic Activity* 31 (2): 119-162.

Case, Karl E, & Shiller, R. 2003. Is There a Bubble in the Housing Market? [J]. *Brookings Papers on Economic Activity* 34 (2): 299-362.

Cheng, Shi, & Qian, Zhijun. 2018. Beware of "Gray Rhino" Hitting "Black Swan" [J]. *China Foreign Exchange*.

Chia-Li Lin, & Tzeng, Gwo-Hshiung. 2008. A Value-Created System of Science (Technology) Park by Using DEMATEL [J]. *Expert Systems with Applications* 36 (6): 9683-9697.

Contreras, Victor, Garay, Urbi, Santos, Miguel Angel, & Betancourt Cosme. 2014. Expropriation Risk and Housing Prices: Evidence from an Emerging Market [J]. *Journal of Business Research* 67 (5): 935-942.

Cooper, Adrian. 2004. The Impact of Interest Rates and the Housing Market on the UK Economy [J]. *Economic Outlook* 28 (2).

Correa-López, Monica., & Doménech, Rafael. 2012. The Internationalisation of Spanish Firms [J]. *BBVA Working Papers* 12/30.

Crowe, Christopher, Dell'Ariccia, Giovanni, Igan, Deniz, & Rabanal, Paul. 2013. How to Deal with Real Estate Booms: Lessons from Country Experiences [J]. *Journal of Financial Stability* 9 (3): 300-319.

Darrat Ali F.. & Glascock, John L. 1993. On the Real Estate Market Efficiency [J]. *The Journal of Real Estate Finance and Economics* 7 (1): 55-72.

Davis, Philip E. 1995. *Debt, Financial Fragility, and Systemic Risk* [M]. Oxford: Clarendon Press.

Dawkins, Casey J., & Nelson, Arthur C. 2002. Urban Containment Policies and Housing Prices: An International Comparison with Implications for Future Research [J]. *Land Use Policy* 19 (1): 1-12.

Diamond, Douglas W., & Rajan, Raghuram. 2001. Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking [J] *Journal of Political Economy* 109 (2): 287-327.

Fang Yi. 2015. Analysis of Bank's Risk Assumption under the Impact of Monetary Policy and Real Estate Prices [J]. *World Economy*.

Sindt, Roger P. 1998. *Real Estate Investment: Analysis and Application* [M]. Pennsylvania: Prentice Hall.

Gerber, Mariana., & Von Solms, Rossouw. 2005. Management of Risk in the Information Age [J] *Computers & Security* 24 (1): 16-30.

Gerlach, Stefan, & Peng, W. 2004. Bank Lending and Property Prices in Hong Kong [J]. *Journal of Banking and Finance* 29 (2): 461-481.

Harris, Jack C. 1989. The Effect of Real Rates of Interest on Housing Prices [J]. *Journal of Real Estate Finance and Economics* 2 (1): 47-60.

He Qing, Qian Zongxin, & Guo Junjie. 2015. Does Real Estate Drive the Chinese Economic Cycle? [J] *Economic Research*.

Hong, Harrison., Scheinkman, José, & Wei Xiong. 2006. Asset Float and Speculative Bubbles [J]. *The Journal of Finance* 61 (3): 1073-1117.

Hott, Christian. & Monnin, Pierre. 2008. Fundamental Real Estate Prices: An Empirical Estimation with International Data [J]. *The Journal of Real Estate Finance and Economics* 36 (4): 427-450.

Hu Zongyi, Liu Yanyi. 2017. Measurement and Influencing Factors of Financial Systemic Risk Based on Financial Stress Index [J]. *Finance Theory and Practice*.

Huang Miaoling, & Ye Hua. 2010. *Landscape Economic Architecture and Culture under the Irrational Prosperity of Real Estate Market* [M].

Jiang Wei, & Zhang Pengneng. 2010. *Analysis on the Legal Prevention of Personal Housing Loan Risk, Finance and Economy* [M].

Kenny, Geoff. 1999. Modelling the Demand and Supply Sides of the Housing Market: Evidence from Ireland [J]. *Economic Modeling* 16 (3): 389-409.

Landsman, Zinovly, & Sherris, Mcihael 2001. Risk Measures and Insurance Premium P rinciples. [J] *Insurance: Mathematics and Economics* 29 (1): 103-115.

Lastrapes William D. 2002. The Real Price of Housing and Money Supply Shocks: Time Series Evidence and Theoretical Simulations [J]. *Journal of Housing Economics* 11 (1): 40-74.

Lee, Nai Jia, & Ong, Seow Eng. 2005. Upward Mobility, House Price Volatility, and Housing Equity [J]. *Journal of Housing Economics* 14 (2): 127-146.

Leung, Charles. 2004. Macroeconomics and Housing: A Review of the Literature [J]. *Journal of Housing Economic*s 13 (4): 249-267.

Li Yonggang. 2014. Research on the Measurement of China's House Price Bubble [J]. *Economic System Reform*.

Li Yujie, & Wang Qingshi. 2011. Research on the Leading Role of China's Real Estate Industry in Other Industries of the National Economy [J]. *Journal of Shandong University of Finance*.

Liu Hongzhen. 2017. Preventing the "Gray Rhino" in the Financial Sector [J]. *China Finance*.

Liu Shuixing. 2011. Regional Comparison of China's Real Estate Industry and Financial Insurance Industry [J] *International Business (Journal of University of International Business and Economics)*.

Long Hao, & Huang Yikun. 2015. A Framework for Measuring the Response of Multiple Real Estate Market Players to Market Changes [J]. *Journal of Engineering Management*.

Lu Jianglin, & Lai Juan. 2011. Construction and Application of Early Warning Index System of Financial Systemic Risk in China [J]. *Journal of Jiangxi University of Finance and Economics*.

Lu Lei. 2017. China's "Gray Rhino" Economic Fluctuations and Financial Market Fluctuations [J] *China Economic Report*.

Luo Xiaoqiang, Liang Quanqi, & Yang Xiaoguang. 2017. "Gray Rhino" and "Black Swan" for Current China's Economy [J]. *Bulletin of Chinese Academy of Sciences (Chinese Version)* 32 (12): 1356-1370.

Ma Xutao, & Shen Yue. 2017. Policy Uncertainty, Monetary Policy and Bank Risk Assurance [J]. *East China Economic Management* 5: 100-106.

Ministry of Land and Resources, China. 2018. *Documents of the National Land and Resources Working Conference of the Ministry of Land and Resources* [R] January 15.

Minsky, Hyman P. 1982. The Financial-Instability Hypothesis: Capitalist Processes and the Behavior of the Economy. In: *Financial Crises: Theory, History and Policy*, by C. P. Kindleberger & J.-P. Laffargue (eds) [M]. Cambridge, Egnland Cambridge University Press: 13-30.

Ren Biyun, & Wu Yi. 2015. Research on Early Warning Index of Chinese Financial System Risk Based on AHP DEA [J]. *Economic Problems* 1: 45-49.

Rogmans, Tim, & Ghunaim, Mohammad. 2016. A Framework for Evaluating Sustainability Indicators in the Real Estate Industry [J]. *Ecological Indicators* 66: 603-611.

Shen Yue, Xu Yan, & Zheng Guanqun. 2014. Study on the Effect of Real Estate Credit Policy Based on the Risk-Taking Channel of Banks [J]. *Journal of Finance and Economics* 29: 32-42.

Shieh, Jiuun-I, Wu, Hsin-Hung, & Huang Kuan-Kai. 2010. A DEMATEL Method in Identifying Key Success Factors of Hospital Service Quality [J]. *Knowledge-Based Systems* 23 (3): 277-282.

Simister, Steve J. 1994. Usage and Benefits of Projects Risk Analysis and Management [J]. *International Journal of Project Management* 12 (1): 5-8.

Sun Qiang, & Cui Guanghua. 2017. Design and Empirical Analysis of the Systematic Risk Early Warning Index System of China's Banking Industry [J]. *Journal of Central University of Finance and Economics* 2.

Tan Zhengxun, & Wang Cong. 2015. Research on House Price Fluctuation, Monetary Policy Position Identification and Response [J]. *Economic Research*.

Tao Ping, Wen Lin, & Tao Guangjun. 2015. Research on the Impact of Currency Tightening on Commercial Credit Financing of Real Estate and Real Estate Enterprises under Different Institutional Environments [J]. *Journal of Engineering Management*.

Teoh, Siew Hong, et al. 1998. Earnings Management and the Long-Run Market Performance of Initial Public Offerings. [J]. *The Journal of Finance* 53 (6): 1935-1974.

Tu Jieping, & Lu Shuangli. 2011. A Probe into the Real Estate Credit Risk of China's Commercial Banks under the New Deal [J]. *Finance and Economy*.

Wang Na. 2015. Suggestions on the Sustainable Development of China's Second-tier Cities [J]. *Journal of Zhengzhou Institute of Aeronautical Industry Management*.

Wang Pin, & Hou Chengqi. 2017. Expected Impact, House Price Fluctuation and Economic Fluctuation [J]. *Economic Research*.

Wheaton, William C., et al. 2001. *Real Estate Risk: A Forward Looking Approach.* Torto Wheaton Research.

Williams, Terry M. 1994. Using a Risk Register to Integrate Risk Management in Project Definition [J]. *International Journal of Project Management* 12 (1): 17-22.

Wu Aimin. 2013. Research on the Effect of Real Estate Credit Policy and the Innovation of Commercial Bank Management [J]. *Southwest Finance*.

Wu Siyi, Zhang Xiekui, & Zhang Lian. 2017. Study on the Driving Effect of Rising House Prices in China on Urban Expansion: Empirical Evidence from 69 Large and Medium-Sized City Threshold Models [J]. *Journal of Guangdong University of Finance and Economics*.

Xiang Weimin. 2014. Boyan Village: Research and Policy Recommendations on the Relevance of the Backward, Forward and Circular Industries of my Country's Real Estate Industry. *Journal of Chongqing University of Technology (Social Science)*.

Xinhua News Agency. 2018. Boao Real Estate Forum [N] *Xinhua,* August 5, 2018.

Xu Xianchun, Jia Hai, Li Jiao, et al. 2015. A Study on the Effect of Real Estate Economy on China's National Economic Growth [J]. *Chinese Social Sciences* 1: 84-101 + 204.

Xu Yue. 2011. *Research on Real Estate Credit Risk Based on Risk Transfer Regulation* [D]. Nanjing University of Finance and Economics.

Yang Wenwu. 2003. *Theoretical Analysis and Empirical Research on the Establishment of China's Real Estate Industry Index System* [D]. Sichuan University.

Yi Xianrong. 2018. New Trends in Domestic Real Estate Price Regulation Policy. [N] *Zhongcai.com* August 04, 2018.

Yu Huayi, & Huang Yanfen. 2015. Cross-Regional Linkage of Income and Housing Prices under the Influence of Monetary Policy [J]. *China Soft Science*.

Yuan Bo. 2011. *Research on China's Real Estate Financial Risk Prevention* [D]. Jilin University of Finance and Economics.

Zhang Hong, Li Yang, & Chen Xuanbing. 2015. Simulation and Evaluation of Home-Purchase Limit Policy Effect Based on a Search-Matching Model [J]. *Journal of Tsinghua University (Science and Technology)* 55 (1): 68-73.

Zhang Minli, & Yang Wenpo. 2012. Fuzzy Comprehensive Evaluation Method Applied in the Real Estate Investment Risks Research [J]. *Physics Procedia* 24 (C): 1815-1821.

Zhang Qingyuan, Su Guocan, & Liang Ruobing. 2017. Who is Influencing the Transaction Price of Second-Hand Housing-Empirical Evidence from Beijing [J] *Finance and Trade Economics* 38 (2): 126-140.

Zhao Huizhen, Cheng Fei, Jin Ling, et al. 2014. Statistical Analysis of Construction Industry Development in 2013 [J]. *Journal of Engineering Management* 3: 1-10.

Zhou Jingkui. 2005. Belief, Feedback Effects and Game Equilibrium: A Game Theory. Explanation of Real Estate Speculative Bubbles [J]. *World Economy*.