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Real Estate Financial Risk Prevention
A Study Based on the Perspective of Commercial Banks

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Abstract: *Almost more than half of the funds of the real estate industry come from bank loans in China. Once the risk exposure of the real estate industry will seriously affect bank risks, it may even lead to systemic financial risks. Using the data of China, this paper uses a combination of theoretical research and empirical analysis to reveal the relationship between real estate financial risk and real estate credit policy and real estate price fluctuations. The results of the study indicate that there is a negative correlation between the real estate financial risk of commercial banks and the macroeconomic cycle and real estate price index. Moreover, the real estate financial risk is related to the real estate credit policy. In order to effectively prevent real estate financial risks, we should optimize the macro environment of real estate finance development, establish multi-level and diversified real estate financial financing channels, and also strengthen the self-restraint and development of commercial banks to improve their risk resilience.*

Keywords: *real estate; financial risk; commercial bank; risk prevention*
JEL Classification: R23, R31

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I. Introduction

With the acceleration of China's reform and opening up in recent years, China's total social fixed asset investment and real estate investment have maintained rapid growth (Figure 1). The real estate investment in 2005 was 303 billion dollars, accounting for more than 20% of the total fixed asset investment of the whole society. The proportion in the next few years was even higher. This proportion reached 26% in 2017. Obviously, the real estate investment has become one of the main driving forces for China's economic development.

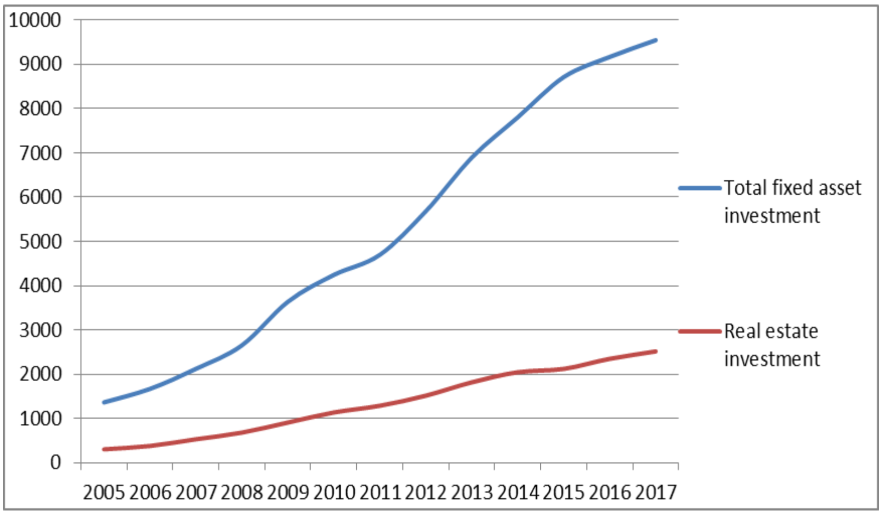

Figure 1 Total social investment and real estate investment in fixed assets (billion dollars)

Commercial banks have also tapped more revenue channels from real estate finance, along with the fact that mortgages account for a growing proportion of commercial bank loans. However, the existence of information asymmetry makes commercial banks increasingly exposed to risks. The balance of non-performing loans of commercial banks in China was 229 billion dollars to the end of 2016 and the non-performing loan ratio of real estate industry was 1.04%. With the differentiation of China's housing market and policy regulations, the proportion is likely to continue to increase. The real estate financial risks faced by commercial banks cannot be ignored. So how does the real estate industry affect the risks of commercial banks? What is the relationship between real estate financial risks and real estate credit policies and housing price fluctuations? How to prevent and resolve real estate financial risks from the perspective of commercial banks? The solution of these problems is also the purpose of this paper.

II. Literature review

Since the general source of credit for enterprises and individuals is only banks, the real estate industry is still a capital-intensive industry, the real estate industry has a large proportion of funds from various aspects of loans from banks. Especially after the subprime mortgage crisis, the relationship between the real estate industry and the banking industry has attracted more attention.

2.1 Risk identification and measurement of the real estate industry

With the continuous rise of housing prices in China, the risks of the real estate industry have attracted extensive attention from scholars. Yuan Ping and Wu Jie (2012)[1] studied the demand situation of China's real estate market, and used the comprehensive bubble coefficient index to measure the bubble of real estate industry. The conclusions show that the real estate market has changed from a slight bubble to a more severe bubble. Zhao Cong （2014）[2] comprehensively affects the external factors and internal factors of real estate. Through the changes in the demand curve and supply curve of the real estate industry in the next few years, the risk of real estate industry is approaching to China.

The different aspects of the risks of real estate industry by different scholars also show diversity. Blanchard and Fisher （1989）[3] believe that the actual house price can only be studied from the perspective of supply and demand. The house price calculated by the rate of return, land rent, etc. does not match the reality, and it is considered that the equilibrium price can be obtained through supply and demand. For comparison, the risk of the real estate industry is measured by the difference between the equilibrium price and the current price. The studies of Angbazo （1997）[4], Christian and Bichaka （2013）[5] found that the difference between the actual price and the equilibrium price of the house as well as the changes in the equilibrium price can effectively explain the housing price fluctuations. Jie Liu et al （2014）[6] and Wang Dagang （2017）[7] identified the factors affecting the real estate risk in China, quantitatively analyzed the impact of various influencing factors on real estate risk, and empirically studied the path of action of real estate risk.

2.2 Real estate industry risks to the banking industry

Shouwei Li et al （2016）[8] replaced the bank's rate of return with the bank's average net interest income (NIM), and measured the net interest rate with risk aversion (RA) and implied interest expense (IIE). Due to the single financing structure in China, the real estate industry suppliers and demanders have a large proportion of funds from bank loans. The process of rising housing prices is the process of transferring real estate risks to banks. Once the housing prices fall sharply, the risks of the real estate industry will be quickly transmitted to the banks. Davis and Zhu （2009）[9] studied the relationship between house prices and bank credit in 17 representative countries, and found that there is a one-way causal relationship between house prices and bank credit. The level of house prices affects bank credit supply. However, Bank credit supply has no significant impact on house prices. Based on the data of 2006-2015 in commercial banks, real estate markets, and macro-level quarterly and annual data, Gan and Hill （2009）[10], Mark Stephens and Christine Whitehead （2014）[11], and Zhang Yuwen （2017）[12] studied the relationship between the risk appetite of China's commercial banks and the real estate risk premium. It is concluded that there is a positive impact between China's commercial bank risk appetite and real estate risk premium, but the impact is shown as asymmetry.

2.3 Literature review and contribution of this article

Although there have been many studies on the real estate industry, the banking industry and the relationship between the two, the literature on real estate is mostly focused on the risks brought about by the changes in housing prices. The literature on the banking industry is mostly focused on analyzing the factors affecting the net interest spread. So far, there has been less literature on the risk of real estate industry contagious to the banking system, and there is relatively less literature on the relationship between real estate financial risk and real estate credit policy and housing price fluctuations. Therefore, this paper takes the logical relationship between real estate industry and commercial bank as a breakthrough to analyze the relationship between real estate financial risk and real estate credit policy and housing price fluctuations.It also proposes a path to prevent and resolve real estate financial risk from the perspective of commercial banks.

3. The development status of China's real estate finance

3.1 The overall scale of real estate finance is gradually expanding

(1) The scale of real estate development investment funds continues to expand

It can be seen from Table 1 that the real funds for real estate development enterprises in China have exceeded 300 billion dollars since 2005, and the total investment has continued to grow in the next few years. It has already far exceeded 1,000 billion dollars since 2010. As of the end of 2017, it was as high as 2,364.43 billion dollars, which was 7.29 times that of 2005. Meanwhile, the domestic loans of real estate development companies in 2017 were 382.45 billion dollars, accounting for 16% of the total funds; 33% of the total funds were self-raised funds. Obviously, as the main target of financing directly or indirectly, commercial banks have continuously expanded their investment in the real estate industry.

Table 1 real estate development enterprise funding sources in 2005-2017 (billion dollars)

Years	Total source of funds	Domestic loans	Foreign capital	Self-raised funds	Other sources of funds
2005	324.21	59.36	3.91	106.06	154.87
2006	411.14	81.16	6.06	130.25	193.65
2007	567.85	106.29	9.71	178.37	273.46
2008	600.29	115.23	11.03	232.01	242.02
2009	875.74	172.18	7.26	271.95	424.33
2010	1105.21	190.35	11.98	403.59	499.27
2011	1298.31	197.83	11.89	530.37	558.21
2012	1462.67	223.91	6.09	592.15	640.52
2013	1850.34	298.07	8.09	718.55	825.61
2014	1848.35	321.85	9.68	763.93	752.87
2015	1897.01	306.27	4.49	742.99	843.25
2016	2185.06	325.94	2.12	744.43	1112.55
2017	2364.43	382.45	2.54	770.78	1208.63

(2) The asset-liability ratio continues to grow

From the perspective of the assets and liabilities of China's real estate development enterprises from 2005 to 2016, the total assets of China's real estate industry in 2005 were 1093.84 billion dollars, total liabilities were 795.77 billion dollars, and the asset-liability ratio was 72.7%. In the next 11 years, the total amount of funds of real estate development companies continued to increase, and the asset-liability ratio continued to increase, and it has always occupied a high proportion. As of the end of 2016, the total liabilities amounted to 112.43 billion dollars, the total liabilities increased by 832.49% compared with 2005, and the asset-liability ratio rose from 72.7% to 78.3% (Table 2). In general, the debt ratio of real estate development companies in the past 12 years has exceeded 72%, and the capital risk is very high. Although China has carried out macroeconomic regulation and control of the real estate market in recent years, the overall risk has been controlled to a certain extent. However, with the continuous expansion of real estate investment, self-raised funds and other sources of funds are also constantly increasing, and this part of the funds is often also converted from the bank's mortgage loans to real estate sales income. Therefore, commercial banks are bearing huge financial risks in real estate development.

Table 2 Statement of assets and liabilities of real estate development enterprises in 2005-2016

Years	Total paid-in capital（billion dollars）	total assets（billion dollars）	total liabilities（billion dollars）	debt ratio（%）
2005	211.01	1093.84	795.77	72.7
2006	245.04	1339.36	992.07	74.1
2007	294.52	1683.00	1252.73	74.4
2008	417.60	2194.45	1587.61	72.3
2009	438.88	2578.55	1894.59	73.5
2010	557.08	3401.02	2534.81	74.5
2011	703.49	4308.48	3249.54	75.4
2012	829.32	5331.19	4009.05	75.2
2013	908.90	6443.09	4897.40	76.0
2014	1160.09	7556.82	5819.63	77.0
2015	1186.81	8363.15	6495.91	77.7
2016	1201.19	9480.81	7420.46	78.3

3.2 The price of commercial housing has risen sharply and the supply structure is unreasonable.

In the 13 years from 2005 to 2017, although the sales area of commercial housing fluctuated, it generally showed an upward trend. The average selling price of commercial housing in 2017 was 1195.76 dollars/square meters, which was 149.12% higher than that of 2005 (Table 3). Obviously, with the overall increase in sales area and average sales price, the total amount of real estate sales in China has also increased significantly. Commercial housing sales increased from 266.31 to 2025.77 billion dollars. Moreover, the proportion of residential sales to commercial housing sales continued to increase, reaching 82.45% in 2017 which reflects the strong demand for residential housing in China.

Table 3 National real estate sales area, sales and average price for 2005-2017

Years	Commercial square sales area（million square meters）	Residential area （ million square meters）	Commercial housing sales （ billion dollars）	Residential sales （ billion dollars）	Average selling price of commercial housing （dollars/square meters）	Average sales price of houses （ dollars/ square meters）
2005	554.86	495.88	266.31	220.66	480.00	445.00
2006	618.57	554.23	315.54	261.94	510.15	472.58
2007	773.55	701.36	452.87	387.36	585.45	552.27
2008	659.70	592.80	379.82	321.15	575.76	541.82
2009	947.55	861.85	672.05	582.32	709.24	675.61
2010	1047.65	933.77	798.81	668.49	762.42	715.91
2011	1093.67	965.28	887.71	730.28	811.67	756.52
2012	1113.04	984.68	976.60	810.11	877.42	822.73
2013	1305.51	1157.23	1233.76	1025.68	945.00	886.36
2014	1206.49	1051.88	1155.95	945.62	958.18	898.94
2015	1284.95	1124.12	1322.44	1102.57	1029.24	980.76
2016	1573.49	1375.40	1782.23	1500.97	1132.73	1091.36
2017	1694.08	1447.89	2025.77	1670.30	1195.76	1151.97

3.3 Real estate credit has become the main financing channel

At present, China has formed a real estate financial system based on commercial banks, supplemented by housing savings banks and housing cooperatives and non-bank real estate financial institutions. State-owned commercial banks, as the mainstay of real estate finance, account for more than 60% of all real estate loan market shares. China Construction Bank (CCB) and Industrial and Commercial Bank of China (ICBC) have become the most important loan banks among them. As of the end of 2017, the balance of CCB's personal housing loans reached 638.34 billion dollars, ranking first in the industry. As can be seen from Table 4, the balance of real estate loans in the past six years has continued to increase, reaching 4,878.79 billion dollars in 2017, and accounting for 26.81% of the balance of commercial bank loans. The balance of personal housing loans is also increasing year by year, accounting for the rising proportion of bank loans, reaching 18.23% in 2017. This can be attributed to the high interest rate and good quality of personal housing loans, which is conducive to the adjustment of commercial bank assets. Overall, on the one hand, real estate development and construction is based on indirect financing of commercial banks as the main financing channel. On the other hand, individual purchases are mainly financed by commercial bank operating loans. The main financial pillars of China's real estate industry are obvious.

Table 4 Scale of real estate credit of commercial banks in 2012-2017

Years	Renminbi loan balance （ billion dollars)	Real estate loan balance （ billion dollars）	Year-on-year growth（%）	Commercial bank real estate credit ratio（%）	Personal purchase loan balance （ billion dollars）	Year-on-year growth（%）	Commercial bank's personal housing credit ratio （%）
2012	9545.45	1834.85	12.80	19.22	1227.27	13.50	12.86
2013	10893.94	2213.64	19.10	20.32	1484.85	21.00	13.63
2014	12375.76	2631.82	18.90	21.27	1743.94	17.50	14.09
2015	14234.85	3183.33	21.00	22.36	2148.48	23.20	15.09
2016	16151.52	4042.42	27.00	25.03	2900.00	35.00	17.95
2017	18196.97	4878.79	20.90	26.81	3318.18	22.20	18.23

4. Analysis of real estate financial risk from the perspective of commercial banks

4.1 The impact of real estate finance on commercial banks

Real estate financial risk refers to the loss of assets of financial institutions due to internal reasons or changes in external objective environment. It includes not only individual financial institutions or a project risk, but also all the risks facing the real estate financial system. At present, commercial banks are widely involved in the real estate market capital chain. Real estate financial risks are often reflected in the real estate financial risks of commercial banks. The impact of real estate finance on commercial banks can be analyzed from the following three aspects.

(1) Impact of real estate enterprises

In recent years, China's real estate industry has continued to overheat and the real estate bubble phenomenon has been remarkable. From the perspective of stable market development, the government issued a series of policies for macroeconomic regulation, which led to the continuous increase in loan interest rates, the increase in the cost of loans for real estate enterprises and the narrowing of profit margins. In order to alleviate the shortage of funds, large-scale real estate enterprises slow down the development of real estate in the later stage and accelerate the sales of real estate projects; on the other hand, they can obtain a large amount of short-term funds through the expansion of financing channels or use information asymmetry for commercial lending. When real estate companies obtain sales revenues, they also use some special means to directly invest their income into later development, so they subtly pass on their own risks to commercial banks. However, some small-scale enterprises may not be able to resolve the risks when they are faced with risks due to lack of management, weak financial strength and single financing channels. The result is that commercial bank loans cannot be repaid normally.

(2) Personal impact of buyers

Commercial banks gradually developed a comprehensive housing loan business in China after the commercialization of housing. However, due to the imperfect personal credit reporting system and the defects in the personal housing loan business, the risks of commercial banks have been continuously formed and intensified. On the one hand, the personal credit system is incomplete, the bank cannot grasp the real situation of the home loaner in a timely and complete manner and take corresponding regulatory measures. On the other hand, even if the home loan borrower has a good credit when applying for a loan, the general housing loan repayment period is long, and unpredictable adverse objective factors often occur, resulting in an increase in the borrower's loan default probability. In addition, there may be cases where the lender's borrowing cost is higher than the default cost, and the general lender will choose to default. By combining the two factors, the non-performing loans of commercial banks will rise and suffer huge losses of default loans.

(3) Impact of related industries and market environment

At present, the real estate industry plays a pivotal role in China's economy. The raw material industry, construction industry and real estate development investment are linked; financial industry, business and real estate sales are linked; life consumer industry, service industry and real estate leasing are linked, and many related industries have formed a large and dense and orderly industrial network. When the real estate industry is experiencing huge fluctuations, the degree of association will be widely affected by the real estate industry. Many affiliated companies also have a loan relationship with commercial banks. Once a problem arises, the risk of commercial banks will be formed. Of course, commercial banks also have systemic risks when the overall economic environment is under tremendous damage. The overall decline of the national economy, the living standards of residents have decreased, the unemployment rate has risen, and the harsh economic environment will also affect the development of commercial banks.

4.2 Causes of Real Estate Financial Risks for Commercial Banks

(1) Single financing channel

Direct or indirect financing is the two means of financing channels in real estate development in China. Due to the high level of asset-liability ratio of real estate-related enterprises in China, the state has strict policy provisions on the listing of enterprises. Real estate enterprises have certain difficulties in listing domestic A-shares. Therefore, most real estate companies cannot satisfy the capital demand by issuing stocks. In order to fill the funding gap, real estate enterprises turned to commercial banks for indirect financing. Nowadays, real estate has the participation of commercial banks from development investment to sales. Without the support of commercial banks, real estate finance cannot develop, which leads to the centralized transfer of risks to commercial banks.

(2) Information asymmetry

Information asymmetry is common in economic activities, especially the characteristics of long period, high instability and rapid change make the information asymmetry in the real estate market more common. Due to the lack of relevant credit mechanisms, commercial banks are often at a disadvantage among the three entities of real estate developers, home buyers and commercial banks. On the one hand, commercial banks cannot make a good assessment of the benefits and risks of the development projects carried out by the real estate developers; on the other hand, they cannot fully understand the credit status, income status and living conditions of borrowing individuals. At present, there are many real estate development companies use bank loan misappropriation to damage the interests of banks. Although the amount of personal housing credit is relatively small compared to real estate development funds, the demand for personal housing credit is growing and the scale is growing rapidly with the development of various financial instruments and speculation. However, due to the fact that the credit rating of the borrower is not detailed and fraudulent loans are available, the non-performing loan ratio faced by commercial banks will also increase significantly.

(3) Limitations of commercial banks' own constraints

In addition to the increase in the non-performing loan ratio of commercial banks brought about by the real estate bubble, in terms of the banks themselves, the irrationality and non-standardization of some commercial banks are also the causes of their real estate financial risks. Among all the businesses carried out, banks are more inclined to mortgage-related businesses, mainly because the mortgage business is generally of a reasonable size, with considerable returns and good collateral quality. From the perspective of operating profit, banks often have the conditions to lower the loan threshold and relax lending conditions. Especially for government participation projects, banks are always blindly optimistic and ignore risks.

5. Empirical Study on Real Estate Financial Risk of Commercial Banks

5.1 indicator selection

Non-performing loans refer to the sum of subordinated, suspicious and loss loans and the non-performing loan ratio is the ratio of non-performing loans to total loans. The non-performing loan ratio is often used to measure the security of financial institution funds. This paper also uses this indicator to measure the size of commercial banks' real estate financial risks. In general, the higher of the NPL ratio, the greater of the risk of financial institution asset security. The formula is:

Real estate non-performing loan ratio (NPL) = (the total of real estate substandard, suspicious, loss loans) / total loan amount * 100%

The changes in real estate financial risks will be affected by factors such as real estate prices, real estate credit policies and macroeconomic cycles. Therefore, this paper selects three important related indicators: real estate price index, money supply growth rate and GDP growth rate as independent variables. This paper takes 12 years from 2005 to 2016 as the research period.

5.2 Data Processing

In order to make the data comparable, this paper uses the commercial housing sales price (p), money supply (M2), and gross domestic product (GDP) data as the base in 2005, and records it as 100. The processed data is shown in Table 5.

Table 5 Relevant indicators of China's real estate finance from 2005 to 2016

Years	Non-performing loan ratio	Real estate price index	GDP index	Money supply index
2005	12.72%	100.00	100.00	100.00
2006	6.61%	106.28	117.15	115.67
2007	4.91%	121.97	144.26	135.04
2008	3.35%	119.95	170.57	159.05
2009	1.93%	147.76	186.36	204.26
2010	1.26%	158.84	220.50	242.96
2011	0.97%	169.10	261.21	285.05
2012	0.71%	182.80	288.47	326.07
2013	0.48%	196.88	317.77	370.38
2014	0.50%	199.62	343.78	411.16
2015	0.81%	214.43	367.85	466.03
2016	1.04%	235.98	397.25	518.84

5.3 Empirical test results

The multiple regression analysis of the dependent variable non-performing loan ratio and the independent variable house price index, GDP index and money supply index is based on the following model:

$NPL=c+\alpha GDP+\beta M2+\gamma P$

The results of data regression analysis are shown in Table 6.

Table 6 Results of data regression analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.272980	0.064323	4.243895	0.0028
GDP	-0.001316	0.000499	-2.640258	0.0297
M2	0.001289	0.000341	3.776414	0.0054
P	-0.001732	0.000924	-1.873429	0.0979

R-squared	0.854609	Mean dependent var	0.029408
Adjusted R-squared	0.800087	S.D. dependent var	0.036434
S.E. of regression	0.016290	Akaike info criterion	-5.135325
Sum squared resid	0.002123	Schwarz criterion	-4.973690
Log likelihood	34.81195	Hannan-Quinn criter.	-5.195168
F-statistic	15.67469	Durbin-Watson stat	1.721164
Prob(F-statistic)	0.001034		

The linear regression equation can be obtained from the analysis results in Table 6:
NPL=0.27298-0.00132GDP+0.00129M2-0.00173P
From the empirical analysis, it can be seen that the non-performing loan ratio (NPL) of the real estate industry has a negative correlation with the GDP growth rate and the real estate price index (P), and is positively correlated with the growth rate of money supply (M2). From the t-statistics and p-values, the impact of GDP growth rate and M2 growth rate on real estate non-performing loan ratio is more significant. The impact of real estate price index changes on real estate non-performing loan ratio is not obvious.

III. Conclusions and policy recommendations

6.1 Conclusions

(1) There is a negative correlation between the real estate financial risk of commercial banks and the macroeconomic cycle. When the macroeconomic recovery or high, GDP growth will be accompanied by a decline in real estate financial risks; on the contrary, real estate financial risks will rise with the macroeconomic recession.

(2) Real estate financial risks are related to real estate credit policies. That is, the credit crunch and the decline in M2 will lead to a decline in the default rate of real estate loans, which will cause commercial banks to face risk reduction. Similarly, real estate financial risk increases with credit expansion.

(3) There is a negative correlation between commercial bank real estate financial risk and real estate price index, but price fluctuation has no significant impact on risk.

6.2 Policy recommendations

(1) Optimizing the macro environment

A good macro environment is the basic guarantee for the development of real estate finance in China. The development of all aspects of real estate development requires close monitoring of relevant laws and regulations. Therefore, China should focus on perfecting relevant laws and regulations, from the perspective of strengthening the supervision of financial institutions, but also to improve the guarantee system and personal credit system in the real estate finance field, as well as reduce the burden on the borrowers and improve the relevant property insurance mechanism. In addition, in view of the fact that information asymmetry is a major risk factor for commercial banks, it should also consider the commercial banks to jointly create a system with monitoring and early warning functions or the government to fulfill the duties of information collection, organization and release, and finally through the electronic system. The terminal achieves the channel of resource sharing effect, improves the information transmission mechanism, and reduces the degree of information asymmetry.

(2) Establish multi-level and diversified real estate financing channels

First of all, in view of the limited impact of China's housing savings banks at this stage, it is possible to implement a housing policy by setting up a national policy housing savings bank to help low- and middle-income families to buy houses, or to establish a joint-stock, policy-oriented, and specialized housing financial institution to specialize in absorbing housing savings deposits and providing housing mortgages for low- and middle-income families. Secondly, from the perspective of real estate financing securitization, in the regulation of real estate stocks and bonds in the securities market, we should also vigorously launch real estate investment funds and increase the proportion of real estate companies listed financing as well as create conditions to increase the proportion of real estate bond financing to reduce the excessive dependence of the real estate industry on commercial bank loans.

(3) Strengthen self-restraint and development of commercial banks and improve their ability to resist risks

In addition to the external macro environment faced by commercial banks, their own risk resilience is also a key factor affecting risk. On the one hand, commercial banks should cultivate or recruit more professionals in real estate appraisal, establish a creditor's credit rating system, and introduce the “5C” principle, which focuses on the five aspects of morality, capital, collateral, repayment ability, and industry environment. Early comprehensive consideration of the project to reduce operational risks from the root causes. On the other hand, in order to avoid fraudulent loans caused by vicious competition in real estate credit, commercial banks should strengthen self-discipline, keep the rationality to the real estate market, and strictly review the conditions for loan issuance, the limits and uses of funds.

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