Financial Stability Warning Model for Beijing

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The globalization of economic improves the capital and risk allocation efficiency of the financial industry, it hides the high financial risks as well, the financial crisis turns normalizing and its linkage, infectivity and destructive effect are becoming stronger. The stable financial development means a lot because Beijing is the political and financial management center of China. Constructing the financial stability alarm target system is a way of "prevention rather than cure". Identify the risk resources through regular observation of the alarm indexes and then targeted countermeasures can be set to decline in the probability of the financial crisis, which guarantee the economy continue to develop stably. The paper starts with the analysis on the transmission mechanism of financial crisis based on Beijing current economic development conditions and dissects its potential financial risks. Moreover, construction on Beijing financial stability alarm target model is raised, which is an attempt to fill the theoretical void of local financial regulation. Last but not least, this paper raises some relative suggestions: (1) strengthen financial supervision and system construction to create a good financial environment; (2) develop the capital market and the real estate market steadily, change the climate of speculation; and (3) display the function of financial management, enhance cooperation with surrounding areas.

Keywords: financial crisis, financial stability, financial stability warning model, stability assessment, local financial regulation, binomial tree models

Introduction

The economic globalization improves the capital and risk allocation efficiency of the financial industry, it hides the high financial risks as well, the financial crisis turns normalizing and its linkage, infectivity and destructive effect are becoming stronger. Since China joined WTO in 2001, external financial and economic relations have been strengthened, and the financial risk has increased as well. Beijing's stable financial development plays a crucial role because it is the political and financial management center of the nation. During the "12th Five-Year Plan" period, Beijing government proposed to consolidate its position as a national center for financial regulation, strengthen its advantages in gathering headquarters and specialties of financial institutions, provide supporting services for headquarters, introduce those world-class emerging financial institutions, cultivate new functions such as off-shore finance, securities direct investment, trust and leasing,

enhance its function of bond issuance and settlement center and liquidation center, and finally establish the city as a financial center with international influence. As all of these goals are based on the stability of the financial industry, the system of financial stability alarm target is needed.

Constructing the financial stability alarm target system is a way of "prevention rather than cure". Identify the risk resources through regular observing the alarm indexes and then targeted countermeasures can be set to decline in the probability of the financial crisis, which guarantee the economy continue to develop stably. This paper starts with the analysis of the transmission mechanism of financial crisis based on the current economic development conditions in Beijing and dissects its potential financial risks. Moreover, construction on Beijing financial stability alarm target model is raised, which is an attempt to fill the theoretical void of local financial regulation. Last but not least, this paper raises some relative suggestions.

Transmission Mechanism of Financial Crisis in Beijing

Since the outbreak of global financial crisis in 2008, the theoretical study of the financial crisis has been paid full attention. Financial security is of great importance to a city, let alone the whole country. As the capital of the nation, the financial security of Beijing is particularly crucial to the stable financial and economic development nationwide. Based on Beijing's unique resource endowments and economic structure, we are trying to build a comprehensive and multi-channel framework of financial risk transmission in this part, to analyze the risk factors in Beijing's financial and economic development, and offer policy suggestions to improve financial crisis management.

Crisis transmission is defined when a crisis breaks out, it transmits from one country to another because of the ties between the two in both real economy and financial sectors (Fratzscher, 2002). Many scholars have researched on the transmission mechanism of financial crisis from different perspectives. Reuven and Andrew (1998) thought that the main transmission channel is international trade; Kaminsky, Lizondo, and Reinhart (1999) focused their study on credit and borrowers; Calvo and Mendoza (1997) analyzed the herding behavior in financial market; Escaith and Gonguet (2009) found the transmission mechanism of financial crisis to global production networks.

According to the theory of international balance of payment, risks transmit through two channels—trade and capital, between countries with economic ties. As the traditional channel, trade could be divided into direct-bilateral and indirect-multilateral. However, the capital channel is becoming more important due to the strengthening of financial globalization and international financial ties. The cross-border asset allocation and speculative arbitrage exacerbate the contagion and spread of crisis. In addition, the risk transmission even has huge impacts on those countries without ties in real economy, through investors' psychological expectation.

Trade Channel of Financial Crisis Transmission

Financial crisis transmits through trade spillover effect. The financial crisis in one country is often accompanied by a sharp depreciation of its currency, thus leading to deficit increase, foreign reserves shrinkage, and fundamental deterioration in its trade counterparties, then competitive currency devaluation among countries, and finally a financial turmoil. Financial crisis not only directly affects trade, but also increases trade risks by changing the terms of trade between countries, as well as the external environment of imports and exports.

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In terms of foreign trade, China is following the Asian economic model, but Beijing has its own unique characteristics. First of all, Beijing has a much larger trade scale than the country's average level, and a higher degree of internationalization, thus is more vulnerable to international environment. Trade dependence is a key indicator for measuring the degree of internationalization and external trade ties of a country or region. In 2000-2010, the total size of Beijing's imports and exports is more than 100% of GDP by average during the same period (see Figure 1), and even up to the highest 155.19%, much higher than the national level of 66%. Secondly, Beijing is a consumption-oriented city with its import greatly exceeding export, thus its trade deficit continues to expand. Its import is more than three times export in 2000-2010 by average (see Figure 2). The financial crisis has a huge impact on Beijing's trade, particularly on import due to its high degree of internationalization. As the financial crisis broke out and spread, Beijing's import and export volume sharply dropped in the second half of 2008, and reached the lowest levels in January and February of 2009 respectively, USD 815,276,000 and 349,735,000. The volume volatility of import is greater than that of export, and thus obviously more affected as well. However, thanks to the consumption and investment-oriented structure, as well as the efforts of "maintain growth, expand demand" in all levels of governments, the financial crisis did not seriously affect Beijing through trade channels.
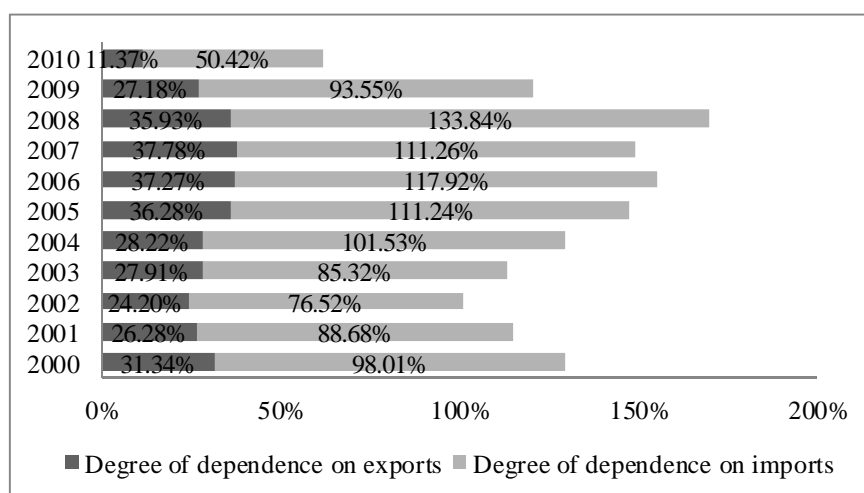

Figure 1. Trade dependence of Beijing in 2000-2010. GDP is converted from RMB to USD by annual cumulative average exchange rate from SAFE. Sources: Beijing Bureau of Statistics.
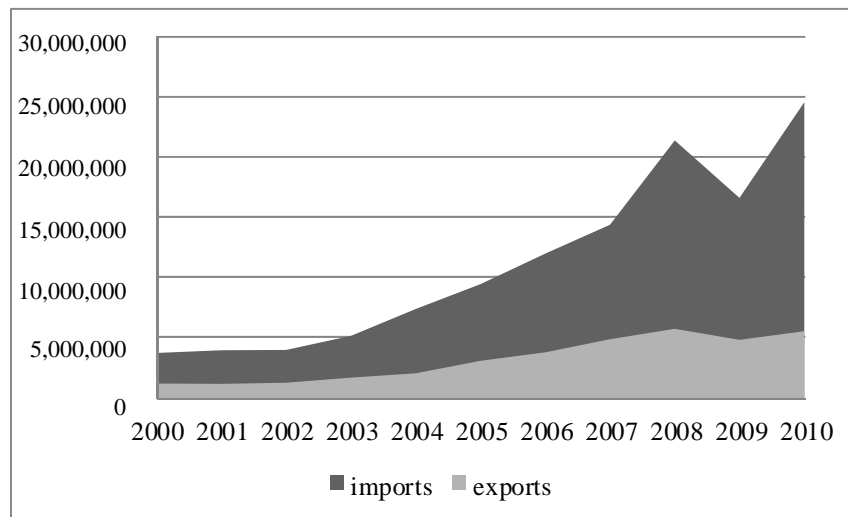
Figure 2. The imports and exports of Beijing in 2000-2010 (10 thousands of dollars). Source: Beijing Bureau of Statistics.

Capital and Market Expectation Channel of Financial Crisis Transmission

In the context of sound development of financial globalization, financial crisis forced international speculative and investment capital to outflow to safe assets. Due to the large scale of foreign capital outflow, investment in economies with high foreign dependence started to decline, whose currency depreciated, inflation rose, and finally those economies dipped into recession (ZHU & Wang, 2009). The wave of financial liberalization dating back to 1980s removed obstacles for capital flows. As China economy gradually opened up, capital flows became more frequent, and played huge important role in its economic and social development. As the political and economic center of China, Beijing is attractive to international capital. Large inflow into Beijing hides lots of risks while stimulating the economic development in the mean time. As of 2010, the number of foreign-investment enterprises amounted to 9,292, although the amount of foreign capital in the sources of funds showed a downward trend (see Table 1), but foreign capital still had significant effect in certain areas, such as stocks and real estate markets. In 2008, foreign capital utilization in real estate increased by 97.4%, with foreign direct investment growing by 131.1%. After the financial crisis, investors suffered huge capital loss in crisis countries, and liquidity shrank sharply, thus they had to sell assets to gain liquidity, resulting in a liquidity shock. Masson (1998) proposed the market expectation as a channel to transmit crisis. Capital flows could easily lead to panic and erode investment confidence, especially when the "hot money" was combined with market expectations during the crisis. The foreign capital outflow in the crisis caused the market to fall, which in turn strengthened expectation, further reduced investors' income, and affected their real purchasing power and investment ability. Thus, the crisis transmitted from abroad to domestic. It can be seen from Figure 4 that, 2008 is an important turning point of real estate market prices in Beijing, before which the prices raised much. It could be mainly attributed to the outflow of foreign capital after crisis and the decline in market expectation.

In addition, international capital flows has opened up a path for the international liquidity transmission to domestic. After the financial crisis, the money demand decreased faster than did the money supply. And, due to the leading role of global easing monetary policy, international liquidity was not inadequate but excessive. The international liquidity flew into China, and further joined in domestic liquidity, thus, to a certain extent, exacerbated economic volatility, and added to factors of instability.

Table 1

The Breakdown of Sources of Investment in Beijing in 2000-2010 (%)

Year	National budget	Domestic loans	Foreign capital	Self-financed and others
2000	7.44	25.97	3.58	63.01
2001	7.61	23.90	1.98	66.51
2002	5.23	26.20	2.00	66.57
2003	2.93	28.24	1.97	66.86
2004	3.19	21.67	3.25	71.89
2005	2.83	23.19	1.56	72.43
2006	2.57	27.35	1.55	68.54
2007	1.65	24.44	1.34	72.58
2008	2.01	26.89	1.54	69.56
2009	1.36	34.92	0.45	63.27
2010	1.19	26.64	0.53	71.64

Note. Source: Beijing Bureau of Statistics—Statistical Yearbook.

Potential Problems of Financial Security in Beijing

Turbulent International Financial Environment

With the strengthening of economic globalization, frequent outbreaks of financial crisis and cross-border transmission have increased the uncertainty of international economic and financial development. After the financial crisis in 2008, in order to stimulate economic growth and increase employment, United States launched two rounds of quantitative easing policy, leading to credit rating downgrades, more international excessive liquidity, and the transmission of crisis. As the Euro-zone sovereign debt crisis worsened, the international economic and financial upheaval intensified, and the economic friction expanded. At present, China is at an important stage of the domestic economic restructuring and the gradual financial opening up. Such a complex and changeable international situation poses enormous pressures on China's economic and financial security, and increases risk factors. As the capital, Beijing can never be an exception.

Vulnerability of Industrial Structure

At present, Beijing has basically formed an industry structure with the tertiary industry as dominant, in which finance and real estate occupy important positions. The added value in finance and real estate was 287.01 billion yuan in 2010, a 7.65% growth year over year, and accounted for 27.1% of the tertiary industry, and 20.3% of the city's GDP, which proves that finance have become a main driver for profit and economic growth. TU (2011) used impact index model after excluding seasonal effects and the ARMA model to investigate the impact of financial crisis on Beijing's industry structure, and found that the finance and real estate sectors were most vulnerable to financial crisis. The industry structure is fragile, and will be badly hit once another financial crisis occurs.

Obvious Inflation Pressure

Inflation could make price signals malfunction, lead to credit expansion in the short-term, reduce the effect of monetary policy, and arouse financial market volatility, all of which are not conducive to economic stability and growth. In addition, inflation could easily trigger social unrest and instability. Since 2011, prices in Beijing have kept increasing, such as CPI. As of November 2011, CPI reached 105.7 (see Figure 3). Now, Beijing has obvious inflation pressure, which has become a threat to local financial, economic and even social stability.
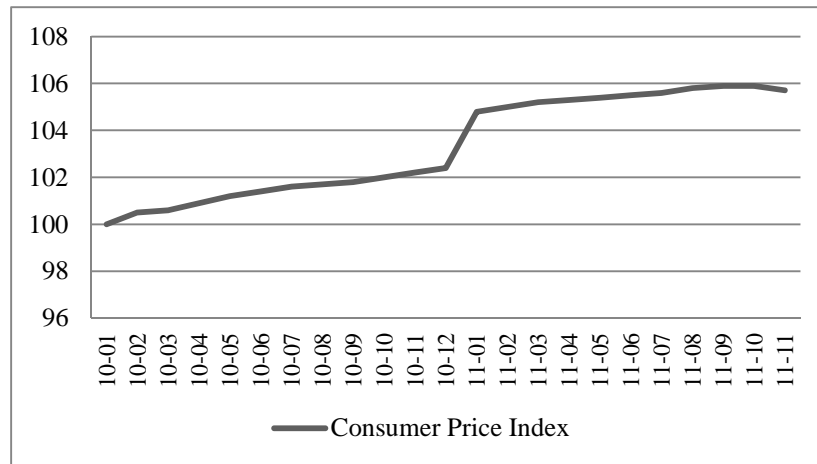
Figure 3. CPI in Beijing from 2010 to 2011. Source: Beijing Bureau of Statistics—Monthly data in 2010 and 2011.

RMB Appreciation and Price Bubble in Real Estate Market

Exchange rate is a measure for a country's external value. A reasonable exchange rate level and a sound exchange rate system are strong guarantees for this county's financial security. For a region's economic fundamentals, exchange rate fluctuations would seriously affect its terms of trade, thereby, affecting imports and exports. From 2005 to 2010, RMB has cumulatively appreciated 23.97% against USD, and 14% against the Euro. Since the subprime mortgage crisis, the international economic downturn occurred, and the trade protectionism returned. Developed countries like United States, Europe, and Japan, and developing countries like Brazil and Russia all took measures to force RMB to appreciate. The sharp appreciation of RMB and this sort of expectation, have not only deteriorated of Beijing's terms of trade, resulting in the shrinkage of foreign exchange assets, but also made Beijing the target of international hot money.
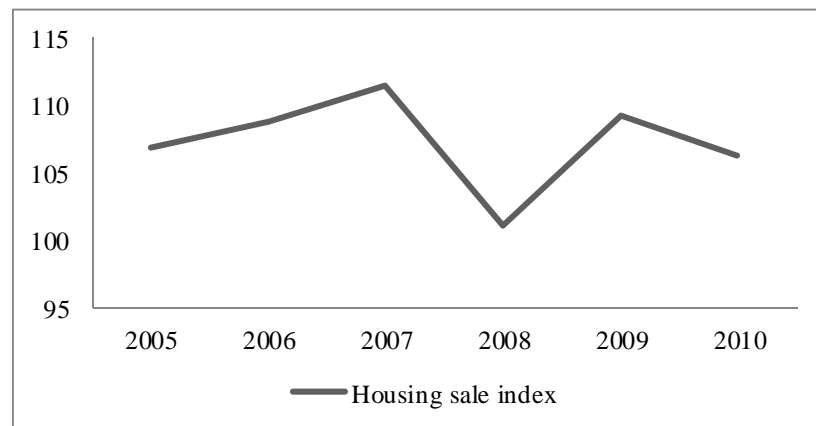

Figure 4. Housing sale index of Beijing in 2005-2010. Source: Beijing Bureau of Statistics——Year data in 2005-2010.

A large amount of international hot money flew into China, continued to push up asset prices, and increased risks in stock and real estate markets, in which the real estate bubble in Beijing was particularly serious. Since 2005, real estate prices in Beijing have increased more than 50% (see Figure 4). Among all the reasons, real demand helped, but the increase was largely attributed to the speculation of domestic and foreign capital, which seriously affected the stable development of real estate and financial markets. Although the

introduction of "National Four measures", "National Eleven measures", "New National Eight measures", especially the "Beijing Twelve measures", have contained further surge of real estate prices in Beijing to a certain extent, but have not fundamentally solved the bubble of asset prices. Commercial banks have had lots of risks from real estate loans. Therefore, the downturn in real estate market could result in larger credit risk and liquidity risk. In addition, the large outflow will be a major threat to Beijing's financial security.

Scarce Money Supply to SMEs

Serious information asymmetry between SMEs and banks is the key reason for money supply scarcity. As regional financial institutions could tap more local information, they are the main sources to meet SMEs' financing needs. (Cull, Lance, Naomi, & Jean-Laurent, 2006). In addition, regional financial guarantee system is an important way to solve the financing bottleneck of SMEs (Columbaa, Gambacortab, & Mistrulli, 2010; GU, 2011). As a result, local governments and financial system should play a more important role in solving the financing difficulties of SMEs.

Given the resource endowments of capital, talents, technology et cetera, Beijing has comparative advantages in industries of high technology and cultural creativity, which also are highly value-added and stable. However, it is SMEs that take the dominance in industries of high technology and cultural creativity. Therefore, it is particularly important for Beijing to address the problem of financing difficulties for SMEs. As of the end of 2010, the outstanding loans to SMEs in Beijing (excluding bills financing) were 728.21 billion yuan, a 25.5% growth year over year. Despite the rapid growth, there is still a big gap for financing SMEs in Beijing, and commercial banks still have discrimination against SMEs, with a high threshold to provide guarantee. The 100%-guarantee mechanism in financial guarantee institutions, and a flat rate, will not only increase banks' moral hazard and customers' adverse selection, but also miss the goal of better serving local SMEs. As formal financial institutions could not meet the financing needs of SMEs, the majority of SMEs have to turn to non-formal channels to obtain funds, that is, private finance. The generation and active development of the private finance are positive to solve SMEs' financing difficulties, but the lack of laws and regulations for private finance should be solved.

The Multi-layer Capital Market Has not Been Established Yet

In recent years, most of international financial crisis originated from capital market, thus the stability of capital market is directly related to the financial security of one country or even a region. With the gradual opening up of financial sector in Beijing, its vulnerability will be highlighted in capital market. The current stock market is filled with problems such as strong speculative atmosphere, sharp price volatility, and low efficiency of financing et cetera. Meanwhile, the bond market is seriously lagged behind. In 2010, the trading turnover of security market in Beijing amounted to 8,757,538 million yuan, in which stocks took 7,984,307 million yuan, accounting for 91.2%; funds had a quick growth, and took 171,494 million yuan; bonds took 338,428 million, only 3.9% of the stock market (see Table 2). Thus, there is a serious imbalance between stock and bond markets.

Rapid Financial Innovation Can Easily Lead to New Financial Risks

The financial sector in Beijing has maintained a rapid rate growth and innovation, based on its advantages in economics, policy, talents, and technology: (1) The market of financial factors continues to expand. The total turnover of Beijing's factor markets was approximately 1.3 trillion yuan in the first three quarters of 2011; (2) The system of "1 + 3 + N" equity investment was initially constructed, and managed funds of 1.06501 trillion

yuan to support venture capital companies; (3) As of the end of 2011 quarter three, there were 132 financial-guarantee companies, and peak amount of small loan companies to apply for establishment, which demonstrated the active participation of private capital; and (4) Actively explore pilot plans for the integration of science and technology, cultural creativity, and finance, promote the development of OTC market, carry out innovative tests for credit loans, intellectual-property-as-collateral loans, credit insurance and trade finance, and equity-as-collateral loans et cetera. These financial innovations are conducive to promoting economic growth and improving industrial structure in Beijing. However, on the other hand, it should be noted that the lag of improvement in policy, regulations, regulatory and in-house technology, and risk monitoring may lead to new financial risks.

Table 2

Turnover in Beijing Security Market (Unit: billion yuan)

Year	Total turnover	Stocks	Funds	Bonds	Warrants	Others
2007	9,797.866	7,748.783	153.496	206.009	975.674	713.904
2008	6,277.356	4,623.127	138.937	405.252	958.751	151.289
2009	9,214.802	7,833.950	225.354	179.132	882.382	93.984
2010	8,757.538	7,984.307	171.494	338.428	228.776	34.533

Note. Source: Beijing Bureau of Statistics──Statistical Yearbook 2007-2010.

Financial Stability Warning Model for Beijing

Frankel and Rose (1996), Sachs, Tomell, and Velasco (1996), Kaminsky, Lizondo, and Reinhart (1998) are early researchers of crisis warning model. According to international recognition, there are mainly three precaution index models for financial stability. They are FR porobit model, STV cross-sectional regression model, and KLR signal analysis. These models perform well in predicting, but they are not very suitable for Beijing. Firstly, using these models requires large sums of data, which are not available for Beijing. Secondly, these models generally use currency depreciation rate as the standard definition of crisis to do prediction. But Beijing has neither the power to make monetary policy nor the ability to adjust the exchange rate. Besides, exchange rate risk is not the biggest challenge of financial stability in Beijing. Finally, the function of these models is limited to the warning of crisis. They cannot dynamically show Beijing's potential financial risks, as well as different stabilization levels of financial and economic development in Beijing. Due to the above problems, we come up with a clear precaution model—binomial precaution system model.

Binomial precaution system model uses binomial method to predict the interaction between the binary outcomes of each variable. Complex interactions are prevalent in precaution index for financial stability. Also, there may be a nonlinear relationship between the indicators and the crisis probability. The model can work well in the complex interaction of indicators and can divide the samples into observations in crisis and non-crisis.

Index and Critical Value Selection

There are many traditional warning indicators of financial crisis. This model considers normative, dynamic timeliness, comparability and the importance of the impact of Beijing's financial and economic stability. The stability of the financial sector is defined as the sustainable growth of the scale, price stability, and a good realization of financial sector's functions.

We use the system dynamic analysis method to choose the critical value. Taking the financial industry

output value change rate as the dependent variable, we build the model as follows based on the transmission mechanism of the financial crisis:

$$\ln F = \alpha \ln G + \beta \ln P + \gamma R + \delta \ln C + \zeta U + \eta \ln S + \theta R^* + \ldots + \varepsilon \tag{1}$$

In model (1), $\ln F$ is the financial industry output change rate of Beijing; $\ln G$ is GDP growth rate of Beijing; $\ln P$ is CPI growth rate of Beijing; R indicates the Shanghai Interbank Offered Rate (3-month); $\ln C$ is commercial bank's loan growth rate of Beijing; U is the unemployment rate of Beijing; $\ln S$ is Beijing stock trading volume growth rate; R^* indicates the U.S. Treasury bill rate (10 years); and ε is the error term.

Due to the limitation of past data, we use Delphi method to decide the value of α、β、γ、δ、ζ、η、θ. When an independent variable's value changes as x, it leads to a substantial decline of the variable $\ln F$ and the collapse of the financial industry. Then x is the critical value of the financial crisis for this independent variable.

On the basis of analysis of the transmission mechanism of financial crisis and the potential financial risk factors in Beijing, we select three levels of indicators: external input, macroeconomic, and financial sector.

External input. Ten-year U.S. Treasury bill rate is not only the benchmark rate in international financial market, but also an important signal to reflect external shocks in China's financial market. The 10-year rate reflects the liquidity of international financial market and basic economic outlook. Therefore, the change rate of 10-year U.S. Treasury bond interest rate can be used as external-shock indicator. When its change rate reaches more than 10%, it shows that the international financial market is instable and economic uncertainty may deepen.
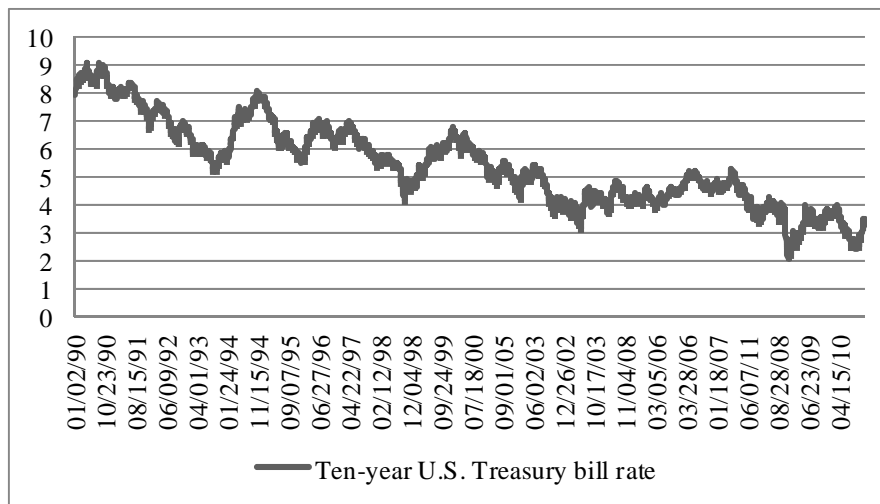

Figure 5. Ten-year U.S. Treasury bill rate trend. Source: U.S. Treasury website.

Macroeconomic Stability Indicators

(1) GDP growth rate. The gross domestic product (GDP) is the value of all final goods and services which are produced in a given period (one year) and in a specific country or region. It is a core indicator to fully reflect the economy development in a nation. GDP growth rate is the percentage increase or decrease of GDP compared to the previous year. GDP has always been the most important goal to pursue in China's economy. China's real GDP growth rate should not be lower than 8%, or the basic employment cannot be guaranteed. Beijing is the leading city of China's economic growth. Its GDP growth rate's cordon should be higher than the national average level. Based on historical analysis, we set the threshold at 10%.

(2) CPI. Inflation has always been a critical problem in China's economic stability and development. The

inflation rate is dividing the supply of currency in circulation by the demand for currency in circulation. Due to the lack of inflation data for Beijing, we use the consumer price index to measure the liquidity situation there. Consumer price index is a measure of the relative change of the price level of consumer goods and services over time. CPI can reflect the change of price households pay to purchase consumer goods and services. It is often used as the indicator to reflect inflation (or deflation). Based on the experience of Asian countries and the reality of China, the consumer price index cordon can be 5%-10%. We set the critical value at 10%.

(3) Real estate price. Real estate price index reflects the relatively change and trend of real estate price in a certain period. It includes land transaction price index, house sales price index, rental price index, and property management price index. House sales price index reflects the relatively change and trend of real estate sales price. In this paper, we choose the house sales price index as the real estate price indicator. On April 20, 2010, CBRC held the second economic and financial situation briefing. President Liu required major and medium banks to carry out real estate loan pressure test on a quarterly basis. The results showed that a 30%-40% real estate price fall could be tolerated for the banks, and the critical value is 40%.

(4) Unemployment rate. The unemployment rate can be calculated by dividing the unemployed workers by total labor force. If the rate gets too high, the expense of social security and cost to insure political stability will increase, thereby endangering the economic development. There is no uniform threshold defined for the unemployment rate worldwide. According to National Bureau of Statistics of China, from 1980 to 2008 the national unemployment rate is 3.1% on average. Li Yining, as well as many scholars, believes that the threshold of unemployment rate in China should be 4%, according to past experience.

Financial Sector Stability Index

(1) Commercial bank loan growth rate. Commercial banks have always been dominant in China's financial system. Therefore they play a crucial role in the stability of financial markets. A sign which shows that commercial banks are healthy is the steady and moderate growth rate of the size of loans. From 1979 to 2009, along with the rapid growth of China's economy, Beijing's RMB loans grow at a fast speed. The average annual growth rate reaches 22%. According to the historical experience of economic development, when the credit growth rate reaches 20% or 21%, economic growth and price levels will remain relatively stable. Thus, we set the threshold etc. as 21%.

(2) Shanghai Interbank Offered Rate (3-month). Shibor (Shanghai Interbank Offered Rate) is calculated, announced, and named on the technological platform of the National Interbank Funding Center in Shanghai. It is a simple, no-guarantee, wholesale interest rate calculated by arithmetically averaging all the interbank RMB lending rates offered by the price quotation group of banks with a high credit rating. The financial markets use the three-month Shibor as the benchmark rate. This rate reflects the liquidity in financial markets for the present year and can be guidance for the market. According to the historical data from 2006 to 2010, 2.5%-3.5% is a stable range for Shibor (3M). Shibor (3M) can well reflect the stability of financial markets (see Figure 6).

(3) Stock financing amount growth rate. As we can see from Table 1, Beijing's investment mainly comes from regional financing and other financing. So the capital market and direct financing play major roles in economic and social stability in Beijing. In this paper, we choose the growth rate of equity financing amount as warning indicator to reflect the stability of capital markets. If the amount of equity financing increases, the economic outlook will be positive. While it decreases, the economy may begin a downward trend. In addition, if the equity financing amount growth rate is too high, for example, more than 100%, it shows the overheating

of economy. Stock market may have bubbles.

(4) Stock market trading volume growth rate. The stock market is an important part of the financial markets. It not only reflects and adjusts the movement of capital, but also has an important impact on the running of the whole economy. Stock market trading volume reflects the condition of the market. In time of financial and economic stability, stock trading volume should have a steady yearly growth. If it decreases, the stock market may be in depression. But if the trading volume grows rate reaches more than 100%, it shows the overheating of stock market and bubbles existing there.
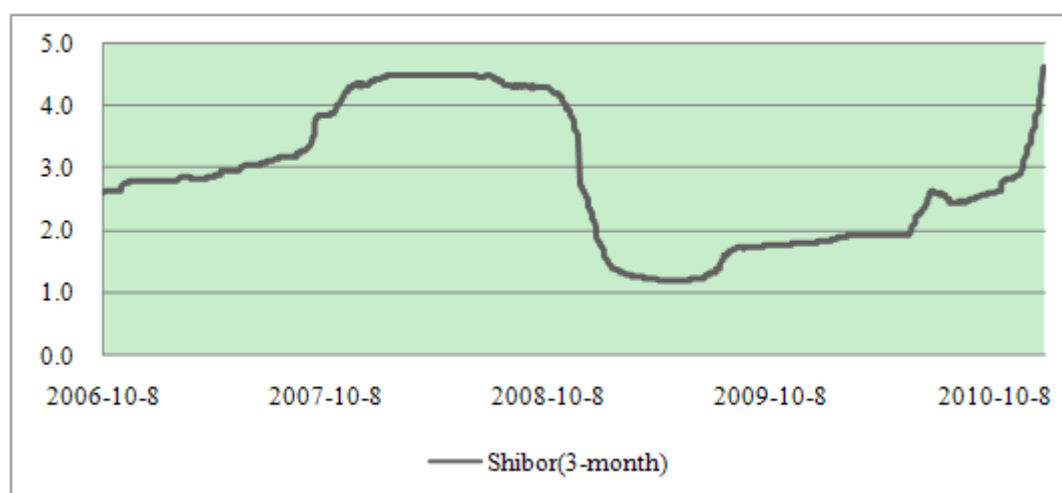

Figure 6. 2006-2010 Shibor (3-month) trend. Source: Shanghai Interbank Offered Rate Website.

The Binary Trees Assessment of Warning Model About the Capital's Financial Stability of China

According to the analysis of the conduction mechanism of the capital's financial crisis, external shocks have both a rapid, direct effect through the market expectations and an indirect effect through the real economy on the financial markets. So, there is two conduction paths: (1) One is that when the interest rate of the United States 10 years treasury bonds fluctuates fiercely—the variation surpasses 10%, external shocks will affect China, even Beijing's financial markets immediately through the market expectations, leading the domestic Shibor change and influencing both the indirect financing market and direct financing market; and (2) The other one is through the real economy to affect the financial markets. If the GDP growth rate is less than 10%, the economy is going down and the unemployment rate will increase sharply, once the real estate price collapses, there will be a substantial rise in the defect rate of banks, which causes a banking crisis easily. Even though the unemployment rate does not exceed the warning line, the economy is expected to have a pessimistic prospect, the scale of banking loans will decrease with the Shibor (3M) reducing significantly. While the GDP growth rate and that of CPI are all over 10%, the economy will be in an overheating situation with a surprising rise in the asset prices and a bubble in the stock market. If the Shibor (3M) is less than 3.5%, the scale of loans will increase appropriately, equity financing will be normal, and then the financial and economic environment is going to present a good and stable momentum.

Considering the above conduction paths, we build the binary trees warning model about the capital's financial stability (see Figure 7), where AAA, AA, A, BBB, BB, B, CCC, CC, C and DDD, DD, D, E, F represent respectively the rating of the financial stability in an indirect way, while A*, B*, C*, D*, E* and F*

are for that in a direct way.

Because of the missing of historical statistics and the fact that the early Chinese financial openness is not too high, when there is a lack of the interest rate of the United States 10 years treasury bonds, as well as the Shibor (3M), only considering using the indirect way of the real economy to make a history evaluation, we are discovering a comparison between the historical results and the assessment of the past five years (see Table 3).

Table 3

The Historical Assessment of Beijing's Financial Stability

Time	1979	1980	1981	1982	1983	1984	1985	1986	1987
Rating	A	AAA	DDD	AAA	A	AAA	B-CC	AAA	AAA
Time	1988	1989	1990	1991	1992	1993	1994	1995	1996
Rating	B-CC	B-CC	DDD	B-CC	A	B-CC	CCC-CC	B	CCC-CC
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005
Rating	A-BB	A-BB	AAA	A-BBB	AAA	A-BBB	A-BBB	AAA	AAA

Time	The assessment	The practice
2006	C*—moderately stable. The external shocks are large; stock market tends to be hot.	Banking and insurance markets are running smoothly, price in the stock market is rising with an active trading.
2007	AA—moderately stable. The economy is hot, with an excess domestic liquidity, so as the stock market.	The economy has developed in a double-digit speed for nine years, the trade surplus continues to expand, there is an excess liquidity, due to the wealth effect of the rising stock market and real estate, the commodities prices keep climbing.
2008	A*—stable. The external shocks are large, the overheat of stock market and economy is restricted, the financial markets is fundamentally steady.	An international financial crisis happens. The direct impact on the financial channels is limited. As a result of the pessimism, the Shanghai and Shenzhen stock markets crash, with market bubbles' burst.
2009	D*—less stable. The external shocks are large and the interest rate market is fluctuating, but it does not show a liquidity squeeze in the market.	In the 2nd quarter of 2009, the capital's economy has reversed, the financial markets runs steady. However, inflation is supposed to be apparent gradually, the prices of international commodities are going to rebound.
2010	AA—basically stable. The economic growth is steady and the loans increase reasonably.	The monetary policy is moderately loose, the total amount of the credit loans is appropriate, structure is in optimization. With the prices of domestic labor and raw material rising, inflation expectation continues to be strong.

In the light of the binary trees warning model about the capital's financial stability, as well as the historical assessment results, it's concluded that:

(1) Beijing and China's financial stability are both depend on the macroeconomic stability. Macroeconomic stability is an important prerequisite for financial stability.

(2) Inflation threatens the safety of finance and economy of Beijing, even the society. This city's CPI was more than 10%—the warning line, in 1988 and 1989, at that time, the economic and social stability was poor, the high price played an essential role in the serious social instability and the city's political storm.

(3) From 1993 to 1996, the economy in Beijing improved rapidly, the average of the GDP growth was 26.13%. But on the surface of the high-speed growth, there was a critical structural problem. The average of the current CPI growth rate was 18.2%, which was risky. Then in 1997, the Asian financial crisis broke out, the bubbles were burst and the economy recovered in 1999 when reaching to the AAA rating.

(4) With the development of this city's economy, the capital market gradually became the key for this area's financial stability. Between 2006 and 2007, our economy was overall overheating, this city's equity financing growth rate achieved 36,333.23% in the year of 2006, which promoted the stock market bubbles, affecting the financial and economic stability.
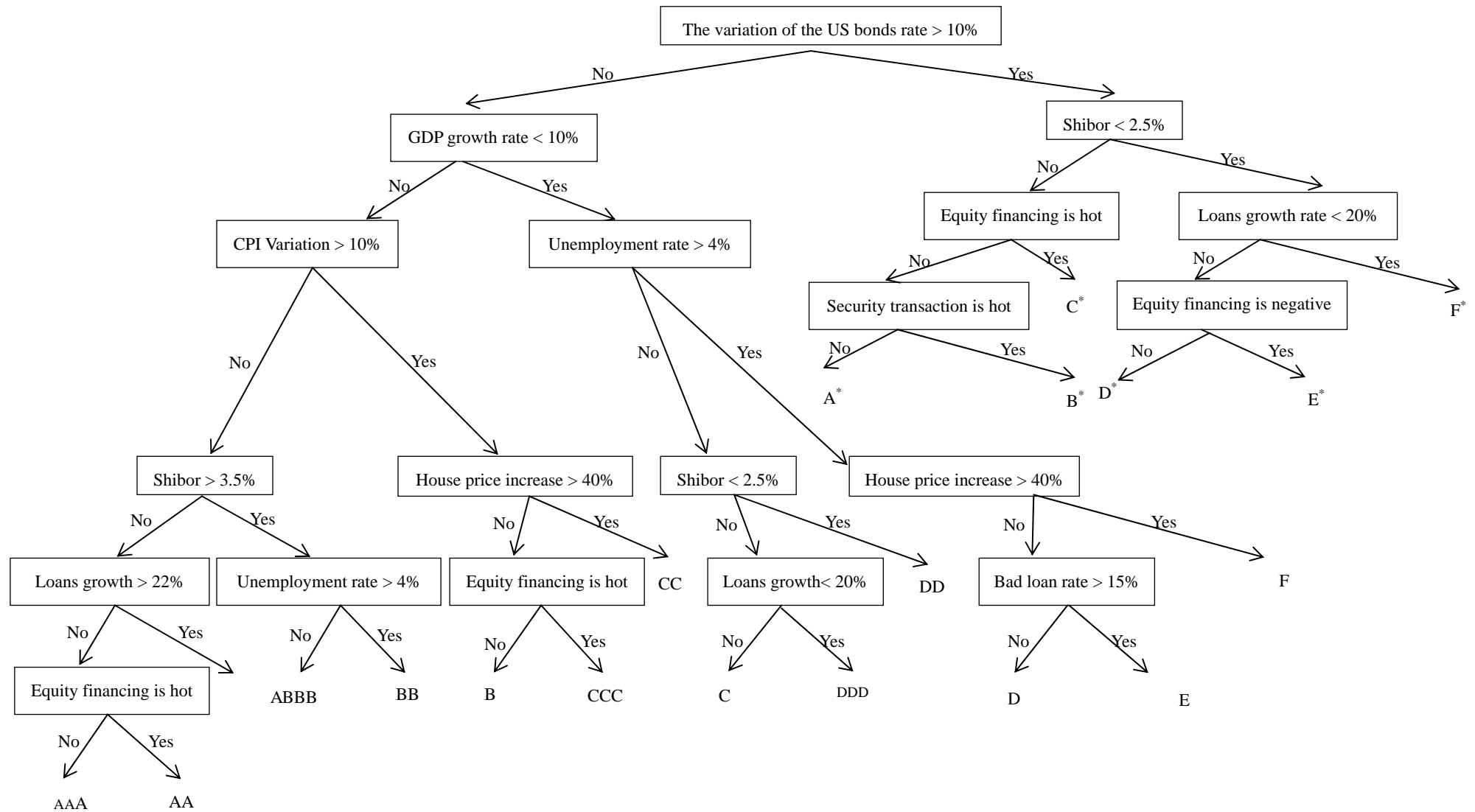
Figure 7. The binary trees assessment of warning model about the capital's financial stability.

(5) From the historical data and the note level in 2008, 2009, and 2010, we can announce that this financial crisis has a limited influence on Beijing's financial and economic stability.

Conclusions

(1) Strengthen financial supervision and system construction, create a good financial environment.

Service industry is the largest industry in Beijing, in which financial sector is the leading one. The financial industry accounted for an average of 12.8% of Beijing's GDP since 2001 and played an important role for the economic and social development of Beijing. It is not only necessary for current economic development of Beijing to pay more attention to financial industry, but also necessary for long-term strategic interests of Beijing. In recent years, Beijing's economy grows rapidly and steadily. Foreign trade, international economic and technological cooperation have got good developing tendency, high-tech and cultural industries have become the development emphases. According to The Overall Urban Planning of Beijing (2004-2020), Beijing identifies the goal for urban development as "national capital, the world city, a famous cultural city and a livable city", completely realizing modernization during the period from 2009 to 2020 and establishing a modern metropolis with distinct characteristics, and meanwhile, consolidating the center position of national financial management and building a financial center having international influence during the Twelfth Five-year Plan period. To realize all the aims, a mighty financial industry which can match with them is essential and that is why devoting major efforts to developing finance is of great importance for Beijing. Beijing has the feature of headquarters economy and headquarters finance. It is the location of the headquarters of commercial financial institutions and the national financial regulation and self-regulating norms center in our country. It is also the center of national fund settlement. So its financial security problems would influence the whole country and strengthen financial supervision has become a priority of Beijing.

Although local financial regulatory authorities lack permissions, it is significant in the daily management of the monitoring. The essence of this financial crisis is the excessive deviation between asset prices and the real economy as well as the absence of regulation. Any tiny fluctuations in the integrated global financial markets may form a significant impact through the corporations' balance sheets and investors' expectation. Preventive measures are better than remedying the situation. Therefore, the daily market monitoring and management is more important. Local financial regulatory authorities have a better understand of the local financial and economic reality, and could be able to build a more comprehensive supervision system by combining their own development situation.

(2) Develop the capital market and the real estate market steadily, change the climate of speculation.

Innovation is the driving force of economic development of Beijing, and a perfect capital market can provide innovation with strong financial support. It is an urgent task for Beijing to improve multi-level capital market system and the investment and financing structure, and to optimize the capital market functions. At present, the real estate price of Beijing is rising, the real estate market is experiencing excessive prosperity and there is serious atmosphere of speculation. Supervision of the real estate market should be strengthened in the future and investors should be helped to establish the correct investment philosophy and consequently reduce the speculation in the real estate market. With the further deepening of China's financial openness, Beijing needs to pay close attention to the flow of hot money at the moment of opening capital account to strengthen the supervision of international hot money, reduce the impact of hot money on the stock market and real estate market, in order to avoid further expansion of the capital price bubbles. It is also necessary to promote asset securitization, expand the bond market, and improve its levels, products, and term structure, in order to

revitalize the stock of credit assets, absorb foreign excess liquidity widely and improve the ability of financial market to allocate resources. Constructing an asset "pool" on the basis of asset-backed bonds has important strategic value. It manages arbitrage funds positively rather than defense hot money negatively; it is a long-term strategy to ensure the stable operation of the financial system rather than a temporary measure to prevent financial risks.

(3) Display the function of financial management, enhance cooperation with surrounding areas.

As the country's economic, political, and cultural center, Beijing is also a regional financial center, the core city of the Beijing-Tianjin-Hebei economic circle and even the Bohai Coastal region with the advantages of economic, political, geographical, and technical talent. It assembles a wealth of financial resources, bears the function of financial management and has the advantages of information for decision-making and headquarters economy. The financial security of Beijing is closely related to the economic and financial situation of the surrounding areas. Therefore, to maintain the financial stability of Beijing, not only the impact from foreign countries needs to be paid attention, the potential instability from the surrounding areas should be watched on closely. Beijing should strengthen the communication and cooperation with surrounding areas, give full play to respective advantages and make up deficiencies, in order to achieve the common development of the regional economy.

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