

Research on the Bankruptcy Tendency of the United States Bankrupt Commercial Banks during the 2008 financial crisis

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Abstract

With the rapid development of the financial market, banks are faced with increasingly frequent capital flows and rapidly changing business environment. It is an important prerequisite for commercial banks to control their liquidity risk to deeply study the causes of liquidity risk and clarify its economic consequences. In the financial crisis during 2007-2009, American commercial banks were directly impacted by liquidity risk. The characteristics of their bankrupted banks are of great significance to the study of how to avoid bank liquidity losses. This study found that in aspect of the probability of commercial banks bankruptcy, the larger scale the banks' current deposit is in the initial stage, the larger rate of the loan is. The larger the loan issuance ratio is in perportion, the worse the liquidity management of commercial banks' efficiency acts. And other characteristics make the bank's bankruptcy probability greater. This result has reference significance for commercial banks in China.

Keywords

liquidity risk; cash holding, financial crisis.

1. Introduction

The economic crisis began in the United States during 2007-2009, and then spread world widely in financial markets . In this financial crisis, banks faced the risks of liquidity frequently. According to the research of Imbierrowicz and Rauch, in the US financial crisis in 2008, most of the bankrupted banks failed as a consequent as the joint effect of loan losses and insufficient liquidity[2]. Therefore, it is more helpful to analyze the characteristics of the banks which suffered the outbreak of liquidity risk by research the samples of the banks that failed in the financial crisis during 2007-2009 in the US.

The effect of liquidity risk is difficult to control is due to the its continuous operation under the bankrupted condition, that means, the bank runs. This research takes the bankrupted banks in the US during the financial crisis in 2007-2009 as the research object, and analyze determines that sample banks of the above characteristics which tends to generate the banks' liquidity risk in the course of banks' daily operation more likely. It mainly uses the method of logical regression to judge and analyze the tendency of liquidity risk.

2. Literature review

2.1. Commercial banks liquidity Literature review

The Basel Committee defines the authoritative concept of liquidity in commercial banks, which is the capacity of commercial banks to acquire liabilities for additional assets in a timely manner or to repay debts on matured debts with appropriate capital price[3].

Banks should determine prudent and appropriate liquidity (including quantity, quality or demand for quantity and quality). Banks should consider their own risk collection, market and macro risks to develop strategies to prudently manage liquidity risk. Banks must establish targeted and accurate liquidity administrative regulations, including liquidity quantity, quality, or liquidity demands for quantity and quality. Banks must consider the risks generated from daily operation, industrial risks and macro risks to formulate prudent liquidity risk management strategies[4]. Liquidity risk of commercial banks is hidden in daily operation, which means that commercial banks obtain risks of liquidity from the synergy of capital liabilities and assets. However, higher liquidity will reduce the operational efficiency of banks[5].

The core statement from the CBRC on the commercial bank liquidity risk of is that the concept of commercial banks is that the banks are short of their own funds and could not provide sufficient cash holding at a relatively reasonable interest rate cost in a relatively short period of time to repay their own matured debts or perform other external payment obligations, as well as to meet the needs of commercial banks' daily business development, resulting in the risk of capital chain breakage[6].

The connotation of liquidity risk is mainly manifested in four aspects. Diamond and Dybvig revealed the inherent vulnerability of banks based on the perspective of money and financial markets from the perspective of capital liquidity conversion and liquidity reallocation. However, their assumptions about the principle of sequential withdrawal and the effectiveness of bank supervision and screening of borrowers have become the focus of academic debate because of their too strict[7]. Gorton loosened assumptions and noted that the bank run was a systematic event which is related to the bank business cycle closely [8]. Carletti, Spagnoro and Hartmann analysed the interbanks' impact of closures on bank liquidity risk in the context of the D-D liquidity model. In Allen and Gale's model, they take assets and projects investment into account. However, the inaccurate analysis of bank liquidity managers' investment risk based on asymmetric information can easily lead to investment failure and credit default, thereby increasing the risk of bank insolvency[10]. Kashya, Stein and Rajan have found that seventy percents of the loans from commercial banks are through mortgage. The mortgage loan agreement are through efforts to at least 50% of the credit line (loan commitment)[11]. Nie Qin, Li Jinlin, Ren Fei and others have constructed a two-stage stochastic liquidity risk programming model, with deduction results focusing on the optimal alignment of the bank's assets and liabilities. Results are more liabilities, and no empirical test has been conducted[12]. The objective function of the model constructed by Jin Xiu, Huang Xiaoyuan and Feng Yingjie is the bank profit minus the expected penalty cost of the management for breach of contract, and the constraints are the objective constraints such as the source of funds and the asset-liability ratio of commercial banks[13].

2.2. The liquidity risk analysis

The diversity business of banking dictates that commercial banks should consider the mutual

consequence of diversified operating activities on liquidity. Among banks' sources of liquidity, different liquidity sources have different attributes, and their impact on liquidity may have large time differences and uncertainty of inflow and outflow. Bank liquidity demand will cause bank liquidity outflow, and different liquidity demand also has different attributes, and its impact on liquidity also has great time difference and uncertainty. In addition, the use of some sources of liquidity needs to be restricted. For example, the purpose of liquidity reserve is to deal with liquidity risk and prevent bank run due to insufficient liquidity. However, the liquidity reserve itself does not have the liquidity attribute and is a mandatory liquidity buffer. Unless the bank runs risk, it may not be used at all in other circumstances. Therefore, the analysis of various businesses that affect the liquidity of banks and the uncertainty of their existence, that is, the detailed deconstruction of banking business is the basis of analyzing the formation of liquidity risk.

Liquidity risk has played a key role in all banking crises[14]. Banks are born to provide liquidity. The liquidity risk in commercial banks is the operation of banks and cannot be separated from business. Therefore, the nature of banking is the source of liquidity risk. Whether a commercial bank's liquidity management is an economic decision guided by the bank's optimal objectives depends on the coherence of the interests of management and shareholders. If the daily operation of banks is idealized, the principal-agent problem may no longer exist. However, the reality is usually complex. Because the principal-agent problem is a natural state of existence, the principal cannot observe the behavior and efforts of the agent, but can only see the output. Therefore, the agent behavior results under the principal-agent problem orientation are the products of incomplete information[15]. Even under ideal conditions, the client can master the same information as the management through various efforts, but it still cannot master whether the manager works hard and how hard he works.

Due to the effect of principal agent conflict, Figure 1 shows what is commercial banks' motivation to hold assets, how does it affect liquidity risk, and shows the risk impacts.

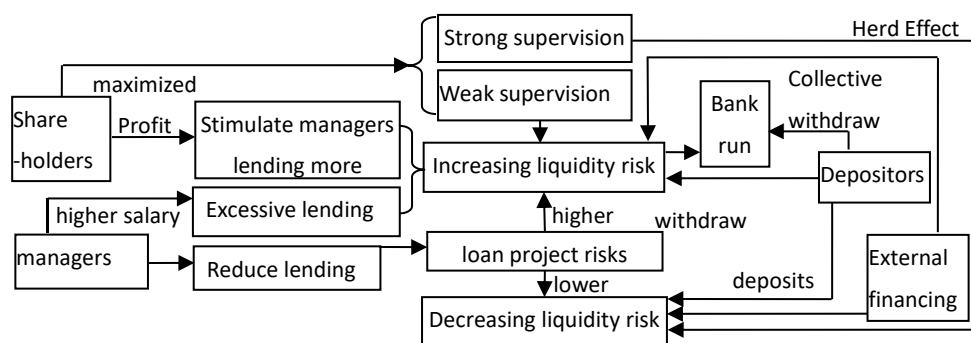


Figure 1. Cash flow and liquidity risk generation inside commercial banks

The calculation ideas of liquidity risk are shown in Table 1:

Table 1. Calculation formula of liquidity risk based on unexplained cash holding theory

Step order	Description	models
Step1	Liquidity risk drivers selection	$X_1, X_2 \dots X_n$
Step2	Liquidity models	$CH_1 = \beta_{10} + \beta_{11} \times X_{11} + \dots + \beta_{1n} \times X_{1n} + \epsilon_1^*$ $CH_2 = \beta_{20} + \beta_{21} \times X_{21} + \dots + \beta_{2n} \times X_{2n} + \epsilon_2^*$

Step3	Liquidity risks	Take the negative values of ε^*
Step4	Liquidity risks economic effects	$OP = \alpha + \alpha_1 \times \varepsilon^* + \dots + \alpha_k \times variable_{k-1} + \varepsilon$

3. Empirical research

3.1. Data selection and sample description

Table 2. Sample grouping description

Name	Group	Standard of grouping	Number
Sample	Bankrupted banks in USA	Selectting the US banks that failed in 2007-2009	95

3.2. Research variable design

A reasonable design of research variables needs to be based on the combining results of existing literature and the hypothesis test of this paper. A reasonable design of research variables needs to be based on the combining results of existing literature and the hypothesis test of this paper. Gombola, Ho and Huang found that the net bad debt write-off of loan losses was positively correlated with leverage. There is a negative correlation between profit management variables and liquidity variables[16]. Ippolito, Peydr ó b, Polo and Sette analyzed the impact of deposits and committed credit loans on liquidity, set the credit line variable, and took the bank size variable and the bank financial leverage ratio as the control variables[17]. Kunt and Huizinga set non-interest variables, income variables, non-deposit and short-term financing variables for sale to analyze their risks to bank operating activities[18].

Aebi, Schmid, and Sabato analysed whether the banks might perform greater during the financial crisis in 2007/08 , when they took risk management within the framework of corporate governanced. Bank performance is measured by ROA and ROE, and corporate governance is measured by several variables. The results show that the variable representatives the corporate governance correlate positively to the performance of banks, which means this will lead to poorer banking performance in the 2008 financial crisis[19].Based on the previous research results, the variables are designed based on the variable definition, results from empirical analysis, and the hypothesis test.

Table 3. List of abbreviations, calculations and meanings of variables

Name	Meaning	Results
LIQD	Cash flow, means: deposits with banks and other financial institution liquidative assets, derivative financial assets, etc..LIQD=cash flow divided by total assets	When the reslt of LIQD is greater, the smaller the bank liquidity risk is.
REOP	Negative residual from table 1 step 2	Liquidity risk
DEPT	Short term deposits divided by total deposits	The short term deposit propotion
TIER	Core capital divided by risk weighted assets	Basel Accord requests it is $\geq 6\%$
CRIN	Non-performing loan divided by total loans	Reflects the credit risk
CRAV	Standard deviation of return on assets	
PRLA	Loan divided by assets	ability to issue loans.
PROA	ROA	Retern of assets
PRIL	Rate of Loan	The income rate of loa
AMFY	Total loans divided by total employees number	Management efficiency
AMCA	Operating costs/ total assets	

OTFL	short-term loan rate / total liabilities	
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4. Empirical research results

4.1. Bank liquidity analysis on the operating tendency

Set bankruptcy sample data value to 1, and match Bankruptcy Bank Sample Data to 0 and use logistic regression analysis to match and evaluate the data. I use logistic regression to analyze the relationship from the probability of several factors. Logistic regression can estimate parameters under the hypothesis of maximum probability estimation. The factor significance of the logistic regression model aims to test the empirical data to tell the significance a criterion of the regression factors in the model differs from the linear regression model. The factor significance with the specific value would not have special significance of the linear regression parameter, but only through the positive and negative value of the parameter and the significance of the specific effect on the occurrence of the event. The value of the Nagelkerke R² is used to evaluate the good fit of the logistic regression equation. When the value of Nagelkerke R² is almost up to 1, it means that the model condition of the equation is robust. The logistic variance significance of the regression is assessed based on the Wald value. The value of the Wald test has different confidence intervals, but when it is closer to zero, the result means it is more statistically significant.

In the sample group, it is obvious that the probability of bankruptcy in the US banks is 100%; The dependent variable is the statistics result which means the probability of bank destruction, which is a 0 or 1 binary variable. The independent variables is listed in table 3 due to the previous analysis and are calculated and screened repeatedly. The resulting logistic regression model is shown in Table 4.

Table 4. Logistic test of inactive banks in the financial crisis

Variables	Coefficient Numbe	Wald 值	Sig.数值
Constant	-15.18	13.55	0.00
REQD	26.12	19.31	0.00
DEPT0	23.73	11.11	0.00
CREL2	-1.20	6.37	0.01
TIER	4.80	3.37	0.07
CRIN	2.35	15.46	0.00
CRAV	-4.32	14.55	0.00
PRLA	7.27	4.77	0.03
PROA	-1.60	10.18	0.00
PRIL	51.01	5.78	0.02
AMFY	0.51	9.37	0.00
AMCA	8.04	.19	0.66
OTFL	13.59	5.88	0.02
Nagelkerke R ²		0.86	
Correct %		94.20	

The Nagelkerke R² value means the fitting situation of the equation based on statistics data; The significance of the model coefficient is tested by Wald value; Percentage of model fitting is correct % which eprents the judgment accuracy result of the logical reggression model

4.2. Result analyze

Based on the regression results of the model in Table 4, the square of Nagelkerk R is -0.856, which shows that the model regression is accurate. The accuracy of the logical regression model is 94.2%, which indicates that the high accuracy of the model. As for the bankruptcy likelihood, the more liquidity risk, the more early-stage deposits, the more improper the source is, the more resource the source is, The more efficient the management (the more credit per employee, the more money per employee, in terms of stable returns on assets and good profits, banks are less likely to be bankrupt. and the liquidity risk that bankruptcies face was severe bankruptcy, banks usually stopped issuing loans and worked actively, In this context, the likelihood of bankruptcy decreases with increased borrowing and increased capital ratios.

5. Conclusion

To avoid the risk of bankruptcy resulting from a concentrated liquidity risk explosion, banks need to be energetically controlled by liquidity risks, reducing paper demand and maintaining good profitability. At the same time, it is not allowed to transfer credits for profit or put money in risk assets with low income stability. Increasing liquidity governance efficiency is an effective means of controlling credit risks. In addition to the adjustment of the financial objectives, the impact should be reasonably exploited. Short-term financing cannot materially change banks' liquidity risk. Because of the high costs of external bank financing, banks should be repaid in the near future, and cautiously using external financing tool, for it might lead to liquidity outflows. So it can't effectively limit bankruptcy.

Banks should closely monitor profitable demand even if the demand of maintaining good profitability is high. But banks do not need to provide credit for profit in risk assets with poor rate stability Improving liquidity governance efficiency is an effective instrument for managing bankruptcy risk. In addition to the adjustment of the financial objectives, the impact should be reasonably exploited. Effectively combine active and mandatory elements to manage liquidity risks at all times.

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