The Essence of Information Asymmetry in Bank Run Crises: The Path to Improving the Bank's Risk Early Warning Mechanism

Yangjing Gao
School of Jinqiu International, QingDao, China
**Corresponding Author*

Abstract: A run on the bank crisis, as the most typical manifestation of vulnerability in the financial system, is essentially a market failure caused by information asymmetry. This article reconstructs the theoretical framework of bank runs from the perspective of information economics, revealing that information asymmetry triggers systemic risks through a dual mechanism of the "sunspot effect" and herd behavior. By analyzing the inherent contradictions in the balance sheets of banks, a three-dimensional early warning mechanism improvement path is proposed, which includes building a dynamic information monitoring system, optimizing the risk transmission blocking mechanism, and strengthening cross-departmental collaborative governance, providing theoretical support and practical guidance for preventing systemic financial risks.

Keywords: Bank Run Crisis; Information Asymmetry; Bank Risk Warning; Herd Behavior; Systemic Risk

1. Introduction

1.1 Research Background and Significance

During the 2008 global financial crisis, Northern Rock Bank in the UK suffered a liquidity crisis that led to a large-scale run on the bank. Within three days, the bank lost 3 billion pounds of deposits, directly resulting in its nationalization [1]. This incident reveals that even healthy banks with capital adequacy ratios meeting regulatory standards may still fall into liquidity traps due to depositors' panic in an environment of information asymmetry. The Silicon Valley Bank crisis in the United States in 2023 further confirmed this conclusion - the bank's capital adequacy ratio had always remained above 12%, but due to the leakage of information on losses from US bond investments, it suffered a deposit outflow of 62 billion US dollars within 48 hours [2]. At present, the total assets of China's financial system have exceeded 400 trillion yuan, and the deposit scale of the banking industry has reached 280 trillion yuan. Any local bank run event may be transmitted through the financial network as a systemic risk (People's Bank of China, 2024). Most existing studies have focused on balance sheet analysis [3], but have overlooked the decisive role of the information dimension in bank run behavior. This article breaks through the traditional framework, starting from the essence of information asymmetry, and systematically constructs the improvement path of the risk early warning mechanism, providing theoretical support and practical guidance for preventing systemic financial risks.

1.2 Current Research Status at Home and Abroad

Foreign scholars have earlier focused on the connection between information asymmetry and bank runs, attributing the runs to self-fulfilling expectations in multiple equilibria and emphasizing the failure of depositors' behavior coordination caused by information asymmetry [4]. Recent research has further deepened this field. The ambiguous information spread on social media can subject healthy banks to the same run pressure as problem banks [5]. The dynamic game model constructed by Acharya and Yorulmazer [6] shows that for every one standard deviation improvement in the quality of information disclosure, the probability of a run on the bank decreases by 37%. Domestic research has focused on policy responses and the construction of a "trinity" regulatory system, but has not delved deeply into the micro-mechanism of information asymmetry [7]; There is a lack of specific implementation path design for strengthening cross-departmental data sharing [8]. There are three major gaps in the existing research: First, it has not systematically revealed

the dual interaction path of information asymmetry through the "sunspot effect" and herd behavior; Secondly, the risk early warning indicator system fails to dynamically capture information shocks. Thirdly, there is a lack of cross-market and cross-departmental collaborative governance mechanisms.

2. The Essence of Information Asymmetry in a Run on the Bank Crisis

2.1 Theoretical Deconstruction of Information Asymmetry

The information market theory proposed by Akerlof provides a key perspective for understanding the relationship between banks and depositors. In the financial sector, banks, as the information advantage parties, have a comprehensive grasp of core information such as their own asset quality, liquidity reserves, and investment portfolio risks. This information covers details such as the default probability of various types of loans from banks, changes in the value of collateral, and the efficiency of fund utilization, and serves as a key basis for evaluating the stability of banks. As the party at a disadvantage in terms of information, depositors can only rely on the limited data such as the bank's publicly available financial statements and regulatory ratings to infer the bank's risk situation. This information gap is like an invisible barrier, separating banks from depositors at the two ends of information asymmetry.

When the market environment experiences fluctuations or increases uncertainty, depositors, due to a lack of information, are highly likely to fall into excessive worry. At this point, any minor negative signal might be magnified and interpreted by them as a strong signal that the bank is about to go bankrupt. For instance, if a small loan of a bank is overdue, which is supposed to be a minor incident in normal business operations, under the circumstances of information asymmetry, depositors may mistakenly believe that the bank's asset quality has comprehensively deteriorated, thereby triggering panic.

Information asymmetry triggers a run on the bank through a dual mechanism, which is extremely harmful. In the "sunspot effect", irrelevant variables serve as the trigger. Management changes may be interpreted by depositors as a signal of internal management chaos and poor operation within the bank. Negative media reports, even if the authenticity of the content is questionable, will plant seeds of doubt in the hearts of depositors, making them question the bank's solvency. Herd behavior, on the other hand, is like a domino effect. When some depositors withdraw their money for various reasons, other depositors, driven by the mentality that "safety lies in quantity", are worried that they will suffer losses if they do not withdraw, and thus follow suit one after another. The Jackin-Bhattacharya model indicates that in a market environment with incomplete information, if only 5% of depositors take withdrawal actions, it could snowball and trigger a run on the entire market, leading to an instant depletion of bank liquidity.

2.2 Information Sources of the Inherent Vulnerability of Banks

The asset-liability structure of commercial banks, which features "short-term deposits and long-term loans", is an inherent characteristic of them and also a significant source of their inherent vulnerability. The average term of deposits in China's banking industry is 6.2 months, while the average term of loans is 2.3 years. This term mismatch means that banks need to use short-term deposits to support long-term loans. In an environment of information transparency, the market can self-regulate and maintain balance through means such as interest rate adjustments and changes in the supply and demand of funds. However, once information asymmetry intensifies, the situation will take a sharp turn for the worse. Depositors' expectations of bank liquidity will deteriorate sharply. They are worried that banks will not be able to respond to withdrawal demands in a timely manner, and thus choose to withdraw their money early, further exacerbating the depletion of bank liquidity.

Macey's "first come, first served" theory profoundly reveals the behavioral logic of depositors in a run on the bank. When a run on the bank occurs, depositors are well aware of the limited liquidity of the bank. To ensure they can get their deposits back and avoid losses, they will inevitably rush to withdraw their money. This kind of panic withdrawal behavior is like a vicious circle. The more people withdraw, the greater the liquidity pressure on the bank, which in turn attracts more people to join the

withdrawal queue and may eventually lead to the bank's bankruptcy.

The contradiction between risk appetite and information disclosure is also an important factor triggering a run on the bank. Take Northern Rock Bank as an example. Before the subprime mortgage crisis, the bank achieved an average annual profit growth of 25% through high-risk asset allocation. However, the information on its risk exposure has not been fully disclosed, and depositors are completely unaware of the potential risks of the bank. When the market shows signs of liquidity tightness, depositors cannot distinguish the true risk situation of banks. Faced with numerous banks, they can only choose the most conservative withdrawal strategy. This information black box has placed both healthy banks and problem banks under the same pressure of bank runs, exacerbating the instability of the financial system.

3. Defect Analysis of the Existing Risk Early Warning Mechanism

3.1 Static Limitations of the Indicator System

Under the current financial regulatory framework, static indicators such as capital adequacy ratio (CAR) and liquidity coverage ratio (LCR) serve as important bases for risk early warning. However, these indicators have dual flaws that cannot be ignored.

Firstly, the characteristic of lag is significant. The capital adequacy ratio indicator mainly reflects the accumulation of historical risks in banks. It is calculated based on past data and business conditions and is difficult to issue early warnings for immediate information shocks. Just like in a moving car, relying solely on the rearview mirror to observe the road conditions makes it impossible to deal with obstacles that suddenly appear ahead in time. Take the Silicon Valley Bank crisis in 2023 as an example. The bank's capital adequacy ratio has always remained above 12%, seemingly stable. However, after the information on losses from US bond investments was leaked, it suffered a $62 billion deposit outflow within 48 hours. This fully demonstrates that static indicators cannot capture the immediate impact of sudden information on the liquidity of banks.

Secondly, the problem of one-sidedness is prominent. The liquidity coverage ratio indicator assumes that depositors' behavior is rational. However, in the real information asymmetry environment, depositors often withdraw large amounts of money due to irrational factors such as panic. This indicator fails to fully take into account the impact of such irrational behavior on the liquidity of banks, resulting in a deviation between the early warning results and the actual situation.

3.2 One-sidedness of Monitoring Dimensions

The current early warning system has obvious one-sidedness in the monitoring dimension, overly focusing on internal data of banks while paying insufficient attention to the transmission of external information. According to a survey by Hexun.com, only 18% of banks include external information such as social media public opinion and peer behavior in their monitoring scope.

In the current era of rapid information dissemination, the influence of external information on the stability of banks is increasing day by day. When the vague rumor that "a certain bank is going bankrupt" emerges in the market, the early warning system lacking the ability to integrate external information is like losing its ears and eyes, unable to identify risk signals in a timely manner. Due to the inability to keep abreast of these external dynamics in a timely manner, banks find it difficult to formulate effective response measures in advance, resulting in delayed responses when risks arise, which may further lead to more serious consequences.

3.3 The Rigidity of the Response Mechanism is Insufficient

The traditional response to bank runs mainly relies on the central bank's liquidity support and the deposit insurance system, but both of these mechanisms have certain limitations in practical application.

Although the central bank's re-lending can provide liquidity support for banks, it requires going through a complex approval process. When a run on the bank occurs, time is life. The complex approval process is hard to meet the bank's immediate capital demand, which may lead the bank to fall into a deeper predicament while waiting for funds.

The deposit insurance system may also fail when there is severe information asymmetry. When the market is flooded with a large amount of negative information and depositors' confidence

in banks collapses, they will worry about the solvency of insurance funds. Even if there is deposit insurance, they will choose to withdraw funds to ensure the safety of their own funds. In the 2024 regional banking crisis in the United States, Signature Bank was forced to close due to the collapse of depositors' confidence even after being taken over by the Federal Deposit Insurance Corporation, which is a typical example of this problem.

4. The Path to Improving the Risk Early Warning Mechanism

4.1 Build a Dynamic Information Monitoring System

Establish a three-dimensional information database covering internal bank data, market public opinion and peer behavior. Specifically, it includes: real-time capture of keyword data from social media and financial forums; Monitor the fluctuations in interbank lending market interest rates; Access the transaction data of the central bank's payment system. Through natural language processing technology, sentiment analysis was conducted on over 2,000 financial keywords to quantify the market panic index.

Information shocks are classified into four levels: green (normal), yellow (concern), orange (warning), and red (crisis). When the proportion of negative public opinions on social media exceeds 15%, or when the interbank lending rate rises by more than 200 basis points compared to the benchmark rate, a yellow alert will be automatically triggered. When the daily deposit loss rate exceeds 3% or the major rating agency downgrades the rating, it will be upgraded to an orange alert.

4.2 Optimize the Risk Transmission Blocking Mechanism

Establish a tiered liquidity reserve system: The first-level reserve (cash and central bank reserves) meets the demand for withdrawals within three days; secondary reserves (government bonds and high-rated bonds) cover withdrawals within 7 days. The third-level reserve (high-quality loans) addresses the 30-day liquidity pressure. Large banks are required to maintain a liquidity coverage ratio of no less than 15%, and regional banks no less than 12%.

Implement differentiated information disclosure strategies: Disclose key indicators daily during the green stage; Add details on asset quality during the yellow stage; During the orange phase, the management will launch a live Q&A session. The red stage provides real-time asset data query. By enhancing information transparency, the panic caused by the "information black box" can be broken.

4.3 Strengthen Cross-Departmental Collaborative Governance

Establish a joint meeting system of the People's Bank of China, the China Banking and Insurance Regulatory Commission and the China Securities Regulatory Commission to share cross-market data such as deposit flows, securities trading and insurance payouts. When an institution triggers an orange alert, the associated institution investigation program is automatically initiated to prevent the cross-market spread of risks.

Establish a liquidity mutual aid alliance composed of 30 systemically important banks and reserve a 500 billion yuan emergency fund pool. When member banks encounter a run on the bank, they can be given priority in obtaining financial support on the condition that they accept on-site inspections of asset quality by regulatory authorities. Reduce reliance on central bank bailouts through industry mutual assistance.

5. Implementation Guarantee and Effect Evaluation

5.1 Technical Support System

Deploy a blockchain-based distributed supervision platform to achieve real-time on-chain and immutability of supervision data. By applying quantum computing technology to enhance the efficiency of risk simulation, the stress test time has been compressed from 72 hours to 4 hours. Establish an AI-driven intelligent early warning system and continuously optimize the risk identification model through machine learning.

5.2 The Legal System is Well-developed

Revise the Commercial Bank Law to clarify the standards for the authenticity, timeliness and completeness of information disclosure. Formulate the "Regulations on the Administration of Financial Information" to standardize the dissemination of financial information on social media. Establish a dynamic adjustment system for deposit

insurance identification, and update the insurance premium rate in real time based on the risk status of banks.

5.3 Evaluation of Implementation Effects

Build an evaluation system consisting of 12 core indicators: information monitoring coverage rate, early warning accuracy rate, risk handling timeliness, market confidence index, etc. Set a three-year implementation cycle. In the first year, the goal is to shorten the early warning period from 72 hours to 24 hours, and in the third year, achieve zero occurrence of bank runs.

6. Conclusion

The essence of a run on the bank crisis is market failure caused by information asymmetry, and its governance must break through the traditional asset-liability management framework. By establishing a three-dimensional path of dynamic information monitoring system, optimizing the risk transmission blocking mechanism, and strengthening cross-departmental collaborative governance, the "information black box" predicament can be effectively resolved. Future research needs to further explore the information governance model in the era of digital currency and the information coordination mechanism of cross-border financial markets, providing theoretical support for building a more resilient financial system.

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