

# ***A Multi-Dimensional Integrated Analysis of Behavioural Finance and Digital Bank Runs: A Case Study of the Failure of Silicon Valley Bank***

**Yucen Wang<sup>1\*</sup>, Xinlan Li<sup>2</sup>**

<sup>1</sup>*Jinan University - University of Birmingham Joint Institute at Jinan University, Jinan University, Guangzhou, China*

<sup>2</sup>*Wenlan School of Business, Zhongnan University of Economics and Law, Wuhan, China*

*\*Corresponding Author. Email: YXW1298@student.bham.ac.uk*

**Abstract.** With the development of the digital economy, traditional theories of bank runs have shown some limitations and fail to fully explain the rapid spread of bank runs in the digital era. Taking the failure of Silicon Valley Bank (SVB) as an example, this paper reviews related research on traditional bank run theory, behavioural finance, and digital communication mechanisms to construct a new analytical framework of "traditional vulnerabilities - behavioural biases - digital dissemination". The causes of the SVB event can be understood as the combined effects of traditional vulnerabilities, depositor behaviour, and Internet-based information dissemination. Liquidity mismatch and a high proportion of uninsured deposits provide the basis for bank runs; behavioural finance mechanisms accelerate the formation and spread of panic, while the combination of digital banking and social media increases both the speed and scale of bank runs. This paper introduces the mechanism of bank runs in the digital era and provides implications for improvements in financial regulation.

**Keywords:** bank run, behavioural finance, digital banking, social media, Silicon Valley Bank

## **1. Introduction**

Bank runs are one of the core issues in financial economics. For the past few decades, this issue has plagued academia and practice. The principal cause lies in the liquidity mismatch that occurs when banks convert short-term deposits into long-term loans, as conclude, this mismatch, when applied to related fields, makes banks highly vulnerable to large-scale withdrawals.

As one plausible explanation, the classic bank run theory posits that when depositors expect others to withdraw their deposits, they may also choose to withdraw funds, and this behavior triggering a bank run and exposing the vulnerability of the banking system. This explanation is likely to provide a reasonable conclusion; however, its drawback is equally obvious, which cannot fully explain the reason for bank runs spread rapidly in the highly developed digital financial environment. Taking the failure of Silicon Valley Bank (hereafter referred to as SVB) in 2023 as an example, regulatory reports indicate that the collapse of SVB was mainly caused by multiple factors,

including a highly concentrated deposit structure, a high proportion of uninsured deposits, inadequate interest rate risk management, and weaknesses in corporate governance and risk control. Meanwhile, behavioral finance research indicates that investor and depositor decisions are influenced not only by rational factors but also by herding behavior, collective cognition, and representativeness bias, which can exacerbate capital outflows and market panic [1, 2].

Furthermore, changes in the digital environment have altered the nature of bank runs. The financial environment has been rapidly changing over the past few decades because of increasing expanding number of transactions shifting from physical financial activities to online transactions. Research shows that digital banks have increased the flexibility and liquidity of deposits by reducing withdrawal costs, thereby weakening the stickiness of traditional deposits which may shift further contributes to the uncertainty of bank runs [3]. In addition, social media enables withdrawal information to spread rapidly among users which matches with existing research that suggests increased attention on social media and online platforms may influence investor sentiment, accelerate deposit withdrawals, and thus exacerbate bank runs [4, 5].

Based on the above exploration, this paper reviews and analyses existing studies on the SVB case to examine how bank runs differ in the digital era. Aiming to provide both theoretical and practical solutions based on the analysis of the potential cause of bank runs in a digital environment.

## **2. Traditional bank run theory and its limitations**

### **2.1. Core logic and current progress of traditional bank run theory**

Recent studies on bank runs suggest that, according to traditional theories, the main causes of bank runs are liquidity mismatch and coordination failure. The Diamond–Dybvig model is one of the most influential models in this field. It assumes that depositors are relatively passive during a bank run and gradually adjust their expectations based on the behaviour of others [6]. Calomiris and others argue that information asymmetry is an important cause of bank runs, suggesting that "early redemption rights" for depositors may serve as a form of market discipline [7]. Jacklin and others examined the uncertainty of investment returns and the effect of information shocks on deposit withdrawals. When depositors receive negative signals regarding the quality of bank assets, they may be more likely to withdraw funds [8].

Currently, many empirical studies have used bank-level data to test the main predictions of traditional bank run theories. Qi and others investigated the mechanism of liquidity transformation and found that banks with a higher degree of liquidity transformation are more vulnerable to risk. In other words, uninsured deposits are more sensitive to changes in the economic environment [9].

### **2.2. The limitations of traditional theories in the digital era**

Although traditional theories provide a basic framework for understanding bank runs, they have certain limitations in explaining bank runs in the digital era.

Firstly, traditional theories cannot fully explain the speed of bank runs in the digital age. As mentioned, the Diamond-Dybvig model assumes that depositors are relatively passive during a bank run and gradually update their beliefs by observing the behaviour of others. However, the speed of bank runs in the digital era has exceeded the explanatory scope of traditional theories. Secondly, assumptions in traditional theories regarding the high cost of obtaining information and the slow speed of information dissemination are no longer fully applicable in the digital environment. In addition, assumptions about depositor rationality in traditional theories do not fully reflect actual

behaviour in the digital economy. Due to information overload and emotional contagion, depositors may behave more irrationally during periods of financial stress. Furthermore, the lack of physical boundaries in digital withdrawals has also changed the traditional mechanism of bank runs, making them more sudden and difficult to predict.

### **3. Research on bank runs from the perspective of behavioural finance**

#### **3.1. Relevant theories of behavioural finance and their applications**

In recent years, many scholars have examined bank runs from the perspective of behavioural finance, moving beyond the assumption of complete rationality in traditional theories and focusing instead on systematic psychological biases in depositors' decision-making. Based on these theories, this paper examines the reasons behind depositors' decision-making in the SVB incident.

Herd behaviour refers to the tendency of individuals to follow the actions of others rather than relying on their own judgment. According to information cascade theory, later decision-makers may base their decisions on the behaviour of earlier participants. Acharya and others developed a theoretical model showing how information contagion may lead to bank herding behaviour, suggesting that under certain information environments, herding may be a rational choice for maximizing profits [2]. However, when the number of initially pessimistic depositors reaches a certain level, panic may spread rapidly among depositors, triggering a large-scale bank run [1].

In studies of bank runs, overconfidence mainly refers to the decision-making bias of bank management, while representativeness bias suggests that banks may rely excessively on past successful experiences and overlook changes in the broader economic environment. Dai Mengting analyzed SVB's management practices, including management background and media evaluation data, and found that managers exhibited a strong sense of self-importance [1]. Regression analysis showed that managerial overconfidence was negatively associated with a bank's Z-score, suggesting that excessive overconfidence may increase the risk of bank failure.

#### **3.2. Contributions and shortcomings from the perspective of behavioural finance**

With the addition of the viewpoint of behavioural finance, some expansion has been made to the scope of theoretical research on bank runs. It overcomes the problem that depositors are fully rational in the older theory and presents the behaviour of depositors in a crisis more reasonably. At the same time, it also offers a new way to analyse the mechanism of acceleration of bank runs and provides some reasons for the SVB bankruptcy event.

However, existing research also has its shortcomings. Firstly, there is a lack of systematic research on different types of behavioural biases. Theoretical mechanisms such as herding behaviour are often discussed separately in the literature, although these psychological mechanisms interact with one another in practice. Meanwhile, the integration of behavioural finance theory and digital communication mechanisms remains limited, and the correlation analysis between the two types of research has not been sufficiently explored. Furthermore, empirical research from the perspective of behavioural finance remains relatively weak, and there are still some unresolved issues, such as the methods to measure herding behaviour of depositors and identify the critical points of information cascades.

## 4. Integrated analysis of the Silicon Valley Bank Bankruptcy event

### 4.1. Review of the Silicon Valley Bank incident

SVB declared bankruptcy in March 2023 due to the massive withdrawal of deposits. As shown in the data released by the regulatory authorities, on March 9, 2023, SVB had about \$42 billion in withdrawal requests for a single day and accounted for about 24 per cent of its total deposits. The run on the bank grew significantly in the next two days. For a long time, fixed-income investment accounted for a relatively high proportion of SVB's assets, and with the rise in interest rates, these funds fell sharply, which thus worsened the bank's liquidity crisis. The main type of deposits is uninsured deposits; therefore, in the event of a risk, these depositors will be more likely to withdraw their funds quickly.

Figure 1 shows the changes in the composition of assets of SVB during and after the receivership. The total assets were about US\$165.9 billion at the time of FDIC receivership in March 2023, and by June 2024, only around US\$2.59 billion had been converted into liquidated cash and receivables; thus, the assets of SVB are highly illiquid. At the same time, the large difference between the total book assets at the start of receivership and the final cash recovered indirectly confirms the actual economic losses caused by the bank run.

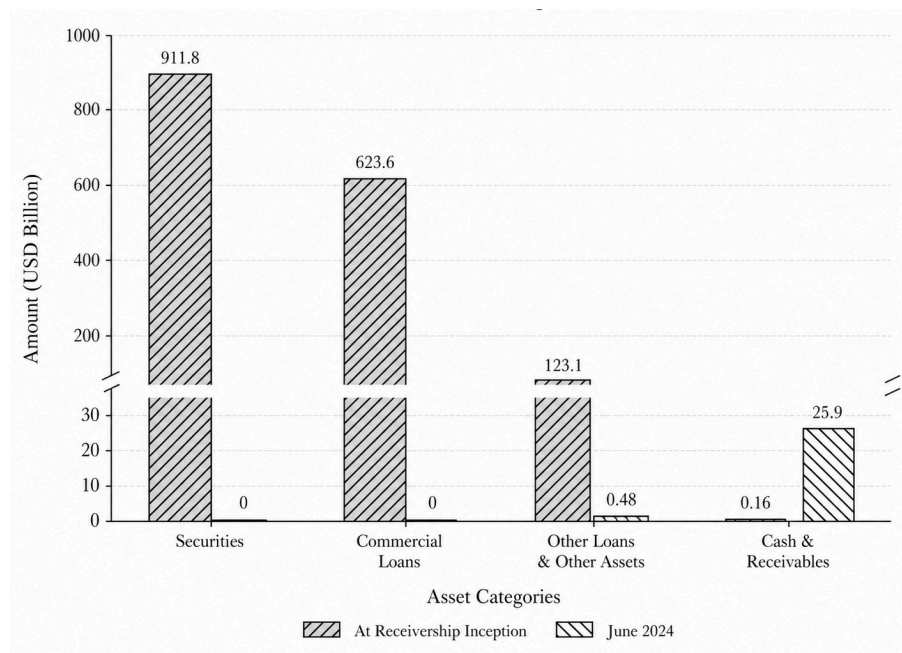


Figure 1. Changes in SVB asset composition from receivership inception to June 2024 (FDIC receivership basis)

### 4.2. An integrated explanation of the "trinity" of "tradition - behavioural finance - digital communication"

The failure of SVB showed the new type of financial risk in the digital era. The following three dimensions will be discussed to better understand the reasons for the failure of SVB in this paper.

Old vulnerability mechanism: SVB has a relatively high proportion of assets and liabilities, and the proportion of uninsured deposits is high; thus, it is more vulnerable to liquidity risk in a market downturn.

**Behavioural Finance Factors:** Due to the risk situation at SVB, some depositor behaviour is not rational and may have been influenced by the emotional nature of discussions on social media. Many depositors failed to conduct their own reasonable analysis of the situation and were thus subject to the collective thinking and emotions of the crowd [4]. This reason was one of the reasons for the banking crisis.

**Effect of the Digital Communication Mechanism:** Social media is a platform that spreads negative information quickly and can trigger panic among depositors; thus, a bank run may occur much faster than in the old days. This phenomenon shows that the digital environment is a cause of the bank crisis outbreak [10].

The integrated analysis above provides a general framework for understanding the causes of the SVB case. In addition, digital information dissemination was one of the contributing factors, as it amplified depositor sentiment and encouraged synchronized market reactions, thereby accelerating the failure of SVB.

## 5. Impact of the digital environment on the mechanism of bank runs

### 5.1. Impact of digital banking

The Diamond-Dybvig model provides a theoretical basis for the occurrence of bank runs, but this theory is based on the traditional banking business model, assuming that the withdrawal process is limited by time and space and fails to fully reflect the operational situation of banks in the digital era. In the digital banking environment, depositors can make deposits and withdrawals in real-time through devices such as mobile phones, which almost eliminates physical constraints and greatly enhances the liquidity of deposits.

In situations of information asymmetry, uninsured deposit holders are generally more likely to withdraw their funds quickly when risk signals emerge, a tendency that may become more pronounced in the digital banking environment. The synchronization of information response speed and capital flow speed is the new feature of modern bank runs, which are no longer gradual but sudden and explosive. Therefore, regulators need to establish a banking business model more suitable for the digital era and modify the framework for liquidity management and risk control according to current financial environment [5].

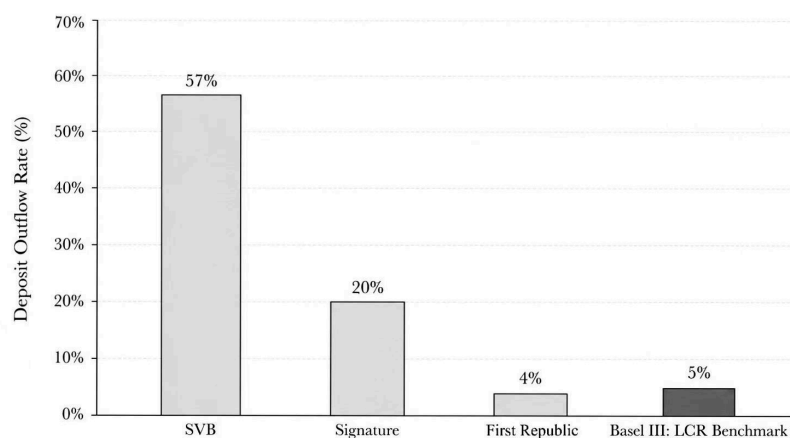


Figure 2. Comparison of deposit outflow speeds among major banks during the March 2023 banking crisis and Basel III regulatory reference value

Figure 2 shows the single-day deposit loss rate of major banks during the banking crisis in March 2023. The three banks shown in the chart are Silicon Valley Bank (SVB), Signature Bank (Signature), and First Republic Bank (First Republic), all of which collapsed or were taken into government receivership during that period. Under the Basel III liquidity coverage framework, the assumed outflow rate for stable retail deposits is about 5%, while the actual deposit loss rate of SVB is more than 10 times that regulatory assumption. This comparison indicates that the speed of bank runs in the digital era has far exceeded the expectations of the traditional regulatory framework.

## 5.2. The impact of social media and information dissemination mechanisms

Negative discussions on social platforms can quickly amplify depositors' perception of bank risks, leading to many depositors withdrawing a substantial number of deposits in a short period of time. Discussions on social media are not limited to the spread of emotions, but also accelerate the collectivization of depositors' behaviour, forming a rapid response chain of "information dissemination - behaviour imitation - withdrawal action" [11].

In addition, social media may increase information asymmetry and thus destabilise the financial market. The information that savers and investors learn from social media is not always accurate and may cause them to react too strongly or be misguided. The speed and widespread nature of social media have accelerated the spread of financial crises; as such, the speed of information dissemination is now too fast for the old banking model to cope with [12].

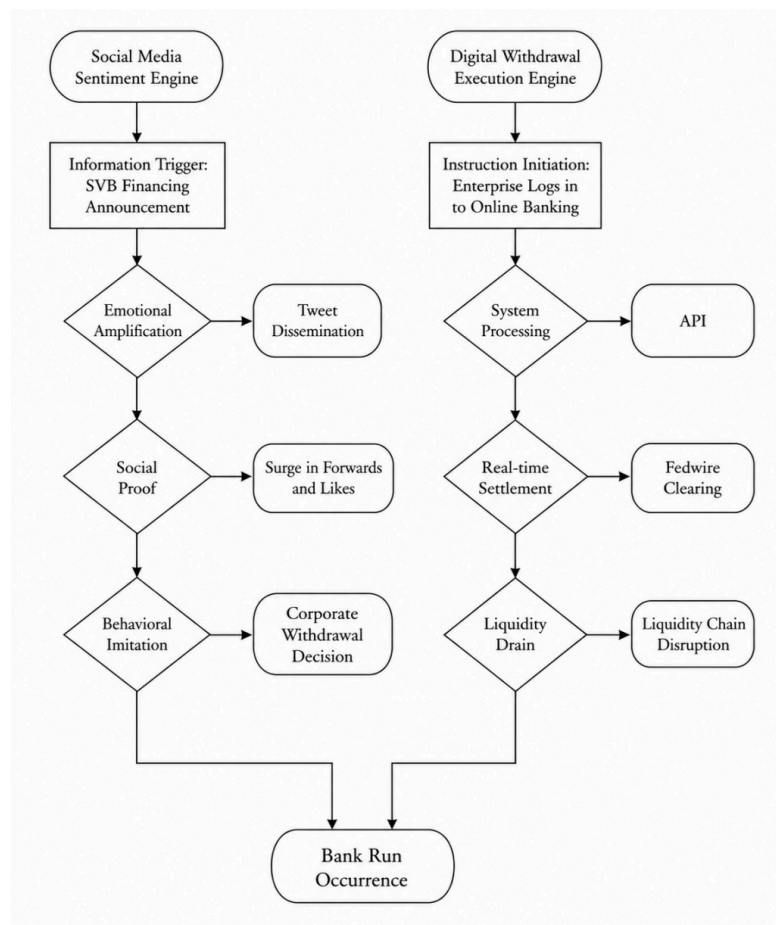


Figure 3. Acceleration mechanism of bank runs in the digital era

Figure 3 shows some research results and presents the two main drivers of bank runs in the digital era. Sentiment Engine: Social media will spread bad moods and lead to more public outrage. Execution engine: Digital banking is to increase the speed of digital banks and enable depositors to transfer funds with a single click. Digital banking significantly reduces transaction frictions and enables faster execution of withdrawal decisions. In addition, the sentiment engine and the execution engine are not independent but form a closed loop. The increase in the scale of withdrawals also makes people more afraid and, as a result, will cause them to withdraw even more.

Therefore, social media has become a new factor in financial stability and has changed the decisions of some depositors to a certain extent. Therefore, one of the new problems in financial supervision at present is how to monitor discussions about bank health on social media using technology and promptly respond to potential emotional contagion [10].

### 5.3. Current status and issues of digital research

Although many studies have investigated the effects of digital banking and social media on the mechanism of bank runs, there are still some deficiencies in the current research.

Firstly, most current research on the reasons for bank run risk has been carried out in a singular way, and there is currently no general analytical system covering all related factors. Most research has focused on only one variable, such as social media sentiment or convenience of bank withdrawals and has failed to use many factors together to explain the occurrence of bank runs [13]. Secondly, current research has not made good use of all kinds to fully understand and forecast bank run phenomena. Some studies have examined the effects of behavioural finance on bank runs, but no general risk prediction model for bank runs has been established to date.

In the future, research should be conducted to construct all-encompassing models by combining various factors from digital banking, social media, behavioural finance, information dissemination mechanisms, etc. Considering the changes in the financial environment during the digital era, adjustments need to be made to the regulatory system in order to bolster the strength of the banking system in facing risks.

## 6. Conclusion

This paper takes the collapse of Silicon Valley Bank (SVB) as its research subject and analyzes it using the "traditional vulnerabilities - behavioural biases - digital dissemination" framework of behavioral finance. This research first analyzes the issue from a theoretical perspective by examining the core logic and current progress of traditional bank run theory and the limitations of traditional theories in the digital era. Then, it analyzes relevant theories of behavioral finance and their applications, as well as their contributions and shortcomings from the perspective of behavioral finance. This research contributes to the existing literature by integrating previously scattered research directions into a unified framework. While current research still has limitations, this framework provides a more comprehensive understanding of how bank run evolved in the digital age and highlights the growing importance of behavioral and technological factors in financial stability analysis. Furthermore, by incorporating current online behavior and actual outcomes, the findings also offer insights for regulators, demonstrating that in the modern financial system, despite increasing restrictions and behavioral shifts, monitoring digital information flows and adjusting liquidity risk management frameworks remain viable solutions. This study primarily relies on secondary data and qualitative evidence which comes from published publications and exiting sources. This research method may not properly explain the result, thus limiting the examination of

the precise transmission mechanisms between the three dimensions. Future research could further attempt to propose framework using micro-level depositor data and social media sentiment indicators with quantitative modeling techniques. Specifically, data collection could apply with panel data or questionnaires to analysis, which may provide more details based on the quantitative aspects.

### Author contribution

All the authors contributed equally, and their names were listed in alphabetical order.

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