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ABSTRACT

The bankruptcy of Silicon Valley Bank marked a critical turning point in global financial markets, exposing vulnerabilities in the US banking sector. This study investigates the causes of Silicon Valley Bank's failure and aims to propose early warning policies for bank failures. Using annual reports from the last four periods before to Silicon Valley Bank's bankruptcy, financial ratios based on the CAMELS rating system were computed and compared with averages for the US banking sector. The findings reveal significant weaknesses in capital adequacy, asset quality, management efficiency, profitability, and liquidity. Inadequate risk management in a rising interest rate environment, combined with a business model highly sensitive to economic fluctuations, played a decisive role in the bank's failure. The results highlight the need for stronger liquidity management, more robust risk assessment methods and diversified sectoral exposure, as well as the development of effective early warning mechanisms to mitigate the effects of interest rate volatility and sector-specific shocks.

ÖZ

Silikon Vadisi Bankası'nın iflası, ABD bankacılık sektöründeki kırılganlıkları ortaya çıkararak küresel finans piyasalarında kritik bir dönüm noktası oluşturmuştur. Bu çalışma, Silikon Vadisi Bankası'nın iflasının nedenlerini araştırmakta ve banka iflasları için erken uyarı politikaları önermeyi amaçlamaktadır. Silikon Vadisi Bankası'nın iflasından önceki son dört döneme ait yıllık raporları kullanılarak CAMELS derecelendirme yöntemine dayalı finansal oranlar hesaplanmış ve ABD bankacılık sektörü ortalamalarıyla karşılaştırılmıştır. Bulgular, sermaye yeterliliği, varlık kalitesi, yönetim verimliliği, karlılık ve likiditede önemli zayıflıkları ortaya koymaktadır. Yükselen faiz oranları ortamında yetersiz risk yönetimi, ekonomik dalgalanmalara son derece duyarlı bir iş modeliyle birleşerek bankanın başarısızlığında belirleyici rol oynamıştır. Sonuçlar, faiz oranı oynaklığının ve sektöre özgü şokların etkilerini azaltmak için daha güçlü likidite yönetimine, daha sağlam risk değerlendirme yöntemlerine ve çeşitlendirilmiş sektörel dağılıma, ayrıca etkili erken uyarı mekanizmalarının geliştirilmesine duyulan ihtiyacı vurgulamaktadır.

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INTRODUCTION

The 2008 global crisis, described as the most serious crisis faced since the Great Depression in 1929, highlighted the weaknesses in the international financial system and the unpredictable challenges facing the markets and the institutions in the financial system (Baba & Packer, 2009; IMF, 2008). Of the institutions that faced the challenges and uncertainties created by the 2008 global crisis was the Lehman Brothers, the fourth largest investment house in the United States at the time. The bankruptcy filing by Lehman Brothers on September 15, 2008, trickled the pressure and anxiety to the investment houses in Wall Street. The fall of Lehman Brothers had a dramatic impact in their domestic economy and the international economies and markets. The 2008 global crisis thus intensified the financial pressures in the international markets (Becchetti & Ciciretti, 2011; Haas & Horen, 2012; Johnson & Mamun, 2012; Pereira, 2017).

Despite the passing of nearly a century, arguments regarding the fragility of the global financial system persist. Particularly in this period, where the economic effects of the COVID-19 pandemic have not yet fully subsided, developments in the US banking system have brought the question of whether global financial crises are repeating themselves back to the forefront. Silicon Valley Bank, named after the iconic innovation hub of Silicon Valley and one of the 20 largest banks in the USA, went bankrupt due to a crisis that emerged between March 8-10, 2023 (Choe, 2023; Ciuriak, 2023). The large-scale bank failures observed in the global financial system following the bankruptcy of Silicon Valley Bank were reminiscent of the 2008 global crisis, and particularly the bankruptcy of Lehman Brothers.

Concerns about the overall financial soundness of the US banking system have become even more pronounced with the bankruptcy of the Silicon Valley bank and the subsequent series of major bank failures. Jiang, Matvos, Piskorski & Seru (2023) estimate that the book value of the market-valued assets of the US banking system has fallen below $2.2 trillion. This amount is close to the total equity capital of the US banking system, which was $2.3 trillion at the end of the first quarter of 2022, indicating that the US banking system is on the verge of bankruptcy in terms of net worth. So, the US banking system is fragile and vulnerable to potential crises (Ciuriak, 2023). Therefore, the bankruptcy of Silicon Valley Bank should be carefully examined in terms of systemic risks and evaluated within the context of its potential to lead to broader-scale financial instabilities, as seen in the case of Lehman Brothers (Ciuriak, 2023).

Measures must be taken to prevent financial stresses in the banking sector from spreading to other sectors and, consequently, to the financial markets of other countries. To determine appropriate preventative policies, it is first necessary to identify the source of the problem. Hence, the key reasons behind the bankruptcy of Silicon Valley Bank need to be understood, especially since the incident occurred in the of the pandemic. This is important to assess whether the policies related to the pandemic led to the bankruptcy of the bank, or whether the bank itself was in a precarious financial state. Thus, in the context of the aforementioned, the current study aims to analyze the financial condition of Silicon Valley Bank, along with the reasons for its bankruptcy, based on the CAMELS ratios provided in the annual reports of the bank for the last four years. The findings have been compared and interpreted against data from the US banking sector. Accordingly, the study examined whether the bank's failure stemmed from pandemic-related effects or underlying financial weaknesses and proposed early warning policies for future crises.

The research work consists of five parts. First part analyzes the bankruptcy of Silicon Valley Bank from both a systemic risk perspective and the perspective of bank-specific financial weaknesses. Second part describes the theoretical foundation of the research work. Third part describes the CAMELS rating procedure used for assessing the predictability of the bankruptcy of Silicon Valley Bank, and it also includes the results of the CAMELS rating of Silicon Valley Bank from 2019 to 2022. The findings were discussed in the fourth part by comparing them with US banking sector data and relevant studies in the literature. Finally, in the fifth part, early warning policy recommendations were made to address possible similar banking crises, based on the findings of the study.

LITERATURE REVIEW

The bankruptcy of Silicon Valley Bank and subsequent bank failures occurred in 2023. Although little time has passed since the bankruptcy, researchers have already begun to examine it based on past banking crisis experiences (Ciuriak, 2023; Federico, Napoli & Notte, 2024; Galati & Capalbo, 2024; Metrick, 2024; Qi, 2023; Tunay, 2024; Wang, 2024a; Yousaf & Goodell, 2023). While some studies on Silicon Valley Bank have focused on understanding its bankruptcy (Al-Sowaidi & Faour, 2023; Qi, 2023; Vo & Le, 2023; Wang, 2024b), others have examined its effects on financial markets (Liu, Megginson, Tran & Wei, 2024; Yousaf & Goodell, 2023) and cryptocurrencies (Jin & Tian, 2024).

Wang (2024b) categorized the internal and external variables that contributed to Silicon Valley Bank's bankruptcy. Additionally, he examined how the bank's bankruptcy affected its clients, borrowers, business owners, and investors. He underlined that the bankruptcy raised systemic risks in the banking industry and caused a crisis of confidence in international financial markets, and he recommended that the Federal Reserve act quickly to resolve the issue.

Al-Sowaidi & Faour (2023), in their study examining the causes of the bankruptcy of Silicon Valley Bank by analyzing existing data and relevant reports, observed that the bank's bankruptcy stemmed from a combination of poor management, insufficient regulatory supervision, and government intervention. It highlights the importance of effective risk management.

Vo & Le (2023) examined the rapid insolvency of Silicon Valley Bank using univariate financial analysis, finding that extensive investments in debt instruments during a low-interest-rate period led to substantial unrealized losses following the sharp rise in rates in 2022. Inadequate equity structure and weak risk management further increased the bank’s vulnerability, leading the authors to conclude that poor asset–liability management was the primary driver of the bank’s failure.

Qi (2023), in her research aimed at identifying the reasons behind the bankruptcy of Silicon Valley Bank, emphasizes the risk mitigation potential provided by a diversified customer base and underlines the importance of analysis and foresight in the decision-making process for senior executives. Furthermore, the study highlights the necessity of investigating investments and analyzing national policy in bankruptcy situations.

Numerous analytical methods can be used to assess banks' financial efficiency. Studies in the literature show that ratio analysis, data envelopment analysis (Akbalık & Sırma, 2014; Bektaş, 2013; Chortareas, Girardone & Ventouri, 2013; Hsiao, Chang, Cianci & Huang, 2010; Özdemir, 2022), CAMEL (Bhatti, Sadiq, Albarq & Juhari, 2022; Desta, 2016; Jaradat & Khaliq, 2022; Nguyen, Nguyen & Pham, 2020; Sangmi & Nazir, 2010), and CAMELS (Akhtar, Azmi, Khan, Jan & Ansari, 2024; Ganesh & Sreeramulu, 2024; Kadhim & Mohi, 2024) rating methods are commonly used to assess bank efficiency.

Song & Shahbudin (2023) used the CAMELS approach to predict the bankruptcy of Baoshang Bank.
Their study aims to assess the usefulness of the CAMELS framework and identify the causes of the bank's failure according to the system. The findings revealed that the CAMELS model could predict Baoshang Bank’s bankruptcy and that the divestment of its assets by Tomorrow Group was the primary cause of its failure. This paper enhances the literature on bank failure and predictive models through the application of the CAMELS model.

As a result, when examining the studies on the bankruptcy of Silicon Valley Bank, it is evident that while efforts have been made to understand the causes of the bankruptcy, a consensus has not yet been reached in the literature. Most studies are based solely on data from Silicon Valley Bank itself. However, no study has yet explored whether the bankruptcy was related to the economic difficulties in the banking sector due to the COVID-19 crisis or the internal financial problems of the bank. In contrast to these studies, this research presents more robust findings by comparing the financial condition of Silicon Valley Bank with data obtained from the US banking sector. In this context, the study makes an original contribution by providing empirical evidence to the still unresolved debates in the literature regarding the causes of Silicon Valley Bank's bankruptcy.

This study utilizes the CAMELS rating system, one of the most popular tools in the literature for measuring the financial health of banks. The following part explains the process of the CAMELS rating system and the findings of the study.

METHOD AND FINDINGS

Any disturbance in the banking sector, which is a key element of the economy, may provoke significant challenges in the economy of a country. To realize economic development, countries must maintain a stable banking sector. Thus, the efficiency of banks needs to be monitored. For the assessment of the efficiency of the banking industry, a number of methods can be utilized. One such rating method that has been commonly utilized for remote monitoring and assessment of the overall condition of a commercial bank is the CAMELS rating method (Bayramoğlu & Gürsoy, 2017; Christopoulos, et al., 2011; Çinko & Avcı, 2008; Karaçor, Mangır, Kodaz & Kartal, 2017).

Given the positive relationship between the CAMELS rating grade and bank competitiveness, the CAMELS rating system can be used to analyze bank competitiveness. Additionally, due to its strong focus on risk and security, the availability of indicator data, and its comprehensive perspective, CAMELS is widely accepted worldwide among various rating systems (Guan, Liu, Xie & Chen, 2019; Song & Shahbudin, 2023). As a result, the CAMELS framework provides a summary of important compliance information required by regulatory authorities. Regulators can use it to ensure that the level of supervisory concern and the type of supervisory response are adequate to generate early warnings, reducing the negative consequences for banks.

The CAMELS rating system is based on the CAMEL system. The CAMEL rating system was first implemented in 1979 as the Uniform Financial Institutions Rating System (UFIRS) in the USA and later adopted worldwide (Bauer, Berger, Ferrier & Humphrey, 1998; Christopoulos et al., 2011). CAMEL consists of five evaluation areas: Capital adequacy, Asset quality, Management quality, Earnings, and Liquidity (Bauer, Berger, Ferrier & Humphrey, 1998; Christopoulos et al., 2011; Cox & Cox, 2006). With the increasing risk exposure in globalized financial systems, supervisory authorities recognized the need to modify methods for evaluating bank efficiency, placing more emphasis on ways to manage and overcome risks (Doumpos & Zopounidis, 2009). In 1995, the CAMEL rating system was updated to the CAMELS rating system by the US Federal Reserve and the Comptroller of the Currency, adding the first 'S' for market risk (Broz, 1997; Hafer, 2005).

In essence, the CAMELS rating system aims to evaluate the financial health, operational efficiency, and long-term sustainability of banks. If a bank's assessment according to the CAMELS criteria results in poor ratings, it may signal underlying issues in the bank's financial structure and potential bankruptcy risk. In fact, the CAMELS model can predict bankruptcy with an accuracy rate of 72.5% three years in advance, 86.1% two years in advance, and 97.3% one year in advance. Additionally, the CAMELS rating system can accurately detect 93% of bankrupt banks in the US within 6 to 12 months of the onset of bankruptcy (Sebastião, 2019; Song & Shahbudin, 2023; Thomson, 1991).

The ratios and formulas used in producing the results according to the CAMELS rating system and in evaluating the status of the financial institution under review are briefly explained in Table 1 (Christopoulos et al., 2011).

Table 1 Ratios Used in the CAMELS Rating System and their Explanations

Ratios	Formula	Explanation
Capital Adequacy Ratio	$C = \frac{T_1 + T_2}{Risk - Weighted\ Assets}$ T_1 the basic and Equity, T_2 the bank's supplementary capital.	This ratio must be above 8% for a banking organization to have sufficient capital, which means that the total capital must exceed 8% of the risk-weighted assets and preferably be close to 15%.
Asset Quality Ratio	$A = \frac{N - Provisions}{Total\ Loans}$ N= *Total Non-Performing Loans>90 days*	A lower ratio indicates more accurate provisioning for such delays, which in turn enhances the quality and reliability of the bank's portfolios.
Management Quality Ratio	$M = \frac{\text{General and Administrative Expenses}}{Sales}$	A lower ratio is advantageous for the bank, as it signifies effective management.
Earnings Ratios	$E_1 = ROA = \frac{Net\ Profits}{Total\ Assets}$	The return on assets (ROA) measures the effectiveness of asset management in generating profit, calculated as the ratio of net profit to total assets. Generally, higher ratios indicate greater efficiency, with sound performance typically ranging between 1% and 2.5%.
	$E_2 = ROE = \frac{Net\ Profits}{Equity}$	The higher the return on equity (ROE), the more efficiently the bank uses its equity. The more efficient a bank is, the easier it is for it to generate money using its own equity.
Liquidity Ratios	$L_1 = \frac{Total\ Loans}{Total\ Deposits}$	This ratio shows how much of the bank's deposits are kept for lending purposes and, as a result, how reliant it is on interbank markets. Since the deposits alone are enough to cover the loans, a low ratio denotes strong liquidity and serves as loan security.
	$L_2 = \frac{Circulating\ Assets}{Total\ Assets}$	The ratio makes it possible to ascertain whether the bank's liabilities can be satisfied by its non-liquid assets. The better the bank's liquidity status, the higher the ratio.
Sensitivity to Market Ratio	$S = \frac{Total\ Securities}{Total\ Assets}$	When it indicates that the bank is responding appropriately to market risks, the lower the ratio's value, the better for the bank. Conversely, a high ratio figure suggests that the bank's holdings are vulnerable to market fluctuations.

Table 2 CAMELS Ratios of Silicon Valley Bank for the Last Four Years*

	C	A	M	E		L		S
2019	0.142	0.560	0.043	0.018	0.200	0.048	0.194	0.396
2020	0.126	0.585	0.046	0.014	0.168	0.365	0.241	0.411
2021	0.166	0.420	0.187	0.008	0.171	0.369	0.019	0.500
2022	0.162	0.475	0.030	0.007	0.121	0.378	0.013	0.575

Source: Calculated by the author from Silicon Valley Bank's annual reports (SVB, 2024).
*The data used are secondary data, and no ethics committee approval is required.

Based on the information in Table 1, the CAMELS ratios obtained from the financial data of the past four years of Silicon Valley Bank have been calculated. The ratios were calculated using secondary data from the annual reports published on the Silicon Valley Bank website (SVB, 2024).

When examining the CAMELS ratios of Silicon Valley Bank for the last four years in Table 2, the year 2020 stands out as the year when the bank's capital adequacy ratio dropped to its lowest level. It then rose to 16.6% in 2021, marking its best performance; however, it slightly decreased to 16.2% in 2022. The capital adequacy ratio remained above the 8% threshold in all years analyzed, indicating that the bank met minimum regulatory standards and possessed a financially secure structure.

The Asset Quality ratio reflects the health and risk level of a bank's credit portfolio. Silicon Valley Bank's ratio peaked at 58.5% in 2020, indicating marked deterioration. It decreased to 42.0% in 2021, suggesting better asset quality and fewer problem loans, but rose again to 47.5% in 2022, pointing to renewed weakening.

The Management Quality ratio significantly increased during 2021 to a level of 18.7%. In 2022, this rate dropped significantly to 3%, indicating a significant improvement. A low management quality ratio is an indicator of effective expense management and improved management performance. Therefore, 2022 can be seen as the best year for the bank in terms of the management quality ratio. This decrease in the management quality ratio over the years shows that the bank's management has become more efficient in controlling costs and optimizing expenses.

The ROA ratio in Table 2 shows that there has been a continuous decline in the value of ROA over the years of this study. Although it is generally accepted that an ROA of 1 to 2.5 percent is an indication of satisfactory financial performance of banks, the actual ROA of Silicon Valley Bank has been considerably lower in 2021 and 2022. This is an indication of an inefficiency in the use of assets to produce profits.

When examining the ROE ratios, they have shown a decreasing trend since 2019. Although ratios between 16% and 20% in earlier years are partially acceptable, the drop to 12.1% in 2022 signals a significant decline. This decrease suggests that the bank experienced a loss of efficiency in using its equity capital and a reduction in the effectiveness of capital management.

In 2019, Silicon Valley Bank's L_1 ratio was very low at 4.8%, but it increased steadily after 2020, reaching 37.8% in 2022, indicating a shift toward greater reliance on deposit funding. The L_2 ratio remained at reasonable levels between 19% and 24% in 2019–2020 but declined sharply to 1.9% and 1.3% in 2021 and 2022, respectively, signaling weakened liquidity management and reduced capacity to meet short-term obligations. Additionally, the sensitivity to market ratio rose from 39.6% in 2019 to 57.5% in 2022, suggesting increased vulnerability to market fluctuations.

These findings highlight the importance of improving the financial sustainability of the bank. In the next section, the findings are explored in more depth, and their interpretation is done by comparing them with the averages of the US banking sector and relevant theoretical studies.

DISCUSSION

According to the findings of the CAMELS analysis for the period 2019-2022, Silicon Valley Bank's capital adequacy ratio showed a significant improvement in 2021 after a trough in 2020, reaching 16.6%, and then declined slightly in 2022 to 16.2%. A comparison between Silicon Valley Bank's capital adequacy ratio and that of the banking industry in the US, as shown in FRED (2024) and USBANK (2024) data, showed that from 2019 to 2022, Silicon Valley Bank's capital adequacy ratio far exceeded the average capital adequacy ratio in the US banking industry, which had an average capital adequacy ratio ranging from 12% over this period. It can thus be concluded that Silicon Valley Bank had a high degree of performance in terms of capital adequacy ratio compared to other banks in the US banking industry. However, despite remaining above the acceptable minimum of 8%, the ratio reached the healthier 15% threshold only in 2021 and 2022, suggesting that pandemic-related effects increased financial fragility and that capital management inefficiencies contributed to the bank's path toward bankruptcy.

The asset quality ratio reached its highest level in 2020 at 58.5% but improved to 42% in 2021 before rising again to 47.5% in 2022. This increase observed in the last year indicates an increase in problematic assets in the bank's loan portfolio and weaknesses in provisioning. Increased credit risks due to measures taken during the COVID-19 pandemic made it difficult for the bank to manage its asset quality. One notable leading factor to Silicon Valley Bank's insolvency was this circumstance. The asset quality ratio of the US banking sector is approximately 1%, according to FDIC (2024). As a result, Silicon Valley Bank's asset quality is weaker when compared to the US banking industry. This indicates that the bank's management ought to have been more cautious about the risks because the risk of defaulting loans in the bank's portfolio was greater than the industry average. Vo & Le (2023) obtained similar

results in their study and suggested that asset management played a significant role in Silicon Valley Bank's bankruptcy.

Silicon Valley Bank's management quality ratio stood at 4.3% and 4.6% during the years 2019 and 2020. However, the ratio experienced a sudden increase during 2021 when it stood at 18.7%. This increase implies that the bank's management did not effectively control the bank's expenses during the year. However, the ratio experienced a decline during the year 2022 when it stood at 3%. This decline means that the year 2022 can be viewed as the best year of the bank so far regarding the management quality ratio. This is because a lower management quality ratio means effective management of expenses. This means that the bank's management effectively controlled the expenses during the year. This also means that the year 2022 can be viewed as the best year of the bank so far regarding the management quality ratio. Although management data is not clearly recorded across the sector, FDIC (2022) reports indicate that the overall governance quality of the US banking sector during the 2019-2022 period was supported by factors such as strong capital growth and credit quality and generally followed a positive trend. In contrast, fluctuations in governance quality observed at Silicon Valley Bank and the bank's inadequacies in long-term crisis management capacity are considered among the key determinants of the process leading to bankruptcy.

Although Silicon Valley Bank's ROA ratio showed a downward trend during the 2019-2022 period, the significant drop in 2021 is particularly noteworthy. Indicators of the profitability of the bank again highlight the weaknesses in the bank's finances, as the constantly falling value of the ROA ratio indicates that the bank is not effectively utilizing its assets in the generation of profit for the shareholders, while the falling value of the ROE ratio in 2022 indicates the loss of efficiency in the capital utilization of the bank, depicting a fall in the rate of return on the capital provided to the shareholders. According to the FDIC (2022), the ROA ratios of the US banking sector during the 2019-2022 period were 1.29%, 0.72%, 1.23%, and 1.38%, respectively, while the ROE ratios were 11.38%, 6.85%, 11.21%, and 13.73%. When Silicon Valley Bank's financial performance for the same period is evaluated in terms of some financial aspects such as ROA and ROE, it is seen that the bank failed to follow the general trends of the sector. Although the bank's financial performance was above the sector average in terms of ROE until 2021, its ROA was above the sector average until 2020. Despite the economic challenges caused by the pandemic, the recovery of the US banking sector in terms of economic growth and profitability in 2022 did not apply to Silicon Valley Bank's financial indicators; as the bank's ROA and ROE results declined in the same year. The aforementioned financial indicators of the bank reflect a lack of sustainability and resilience during the crisis.

Liquidity constituted a major weakness for Silicon Valley Bank. The bank's L_1 ratio, which was extremely low at 4.8% in 2019, increased after 2020 to 37.8% in 2022 but remained well below the US banking sector average of 60–70% over the 2019–2022 period (Aranca, 2023; Federal Reserve, 2022). The sharp decline in the L_2 ratio in 2021 and 2022 reflects weakened liquidity management and a reduced ability to meet short-term obligations, contributing significantly to the bank's insolvency. The deterioration of liquidity ratios suggests increased exposure to high-risk loans, while fluctuations in the L_2 ratio and rising sensitivity to maket ratio indicate growing vulnerability to market shocks and weakened risk management practices.

Post-pandemic uncertainty heightened Silicon Valley Bank's market risk exposure. A decline in the securities ratio and higher market risk relative to the US banking sector weakened capital and liquidity management (FDIC, 2024), while increased risk sensitivity, high-risk investments, and delayed risk responses ultimately led to the bank's bankruptcy.

CONCLUSION

Global banking systems were severely harmed by the global financial crisis and the demise of Lehman Brothers, highlighting the vulnerability of these institutions. In this regard, Silicon Valley Bank's bankruptcy raises serious worries about the future fragility of the world's financial markets since it may resemble the patterns seen during the 2008 global crisis (Ciuriak, 2023). Indeed, Jiang, Matvos, Piskorski & Seru (2023) demonstrate that the difference between the market value and book value of

the US banking system indicates a severe weakening of its financial structure and that it is on the verge of bankruptcy in terms of net assets. In this context, the US banking system has become quite fragile and vulnerable to possible crises (Ciuriak, 2023). Since it is thought that this fragility is not limited to the banking sector alone, but can spread to other sectors and countries, threatening global economic stability, the measures to be taken are of great importance.

Silicon Valley Bank's March 2023 bankruptcy occurred particularly during the COVID-19 pandemic, so it is important to understand whether this bankruptcy was solely related to the economic difficulties caused by the COVID-19 crisis or to the bank's internal financial problems. This study aims to examine the source of Silicon Valley Bank's bankruptcy using CAMELS rating system conducted with financial data obtained from the last four years of the bank. CAMELS rating system is an evaluation system based on key financial indicators such as banks' capital adequacy, asset quality, management quality, earnings, liquidity and sensitivity to market ratios. CAMELS model can accurately detect 93% of bankrupt banks in the US within 6 to 12 months of the onset of bankruptcy (Sebastião, 2019; Song & Shahbudin, 2023; Thomson, 1991). By improving the comprehension of the causes of bankruptcy, this approach will make it clearer whether regulatory agencies could have predicted the bankruptcy.

According to the CAMELS rating system findings, Silicon Valley Bank's bankruptcy was mostly predictable. The primary reasons for the bankruptcy were structural defects, inadequate capital management, declining asset quality, and elevated market risk. Since these issues existed before to the pandemic, COVID-19 was a factor that made pre-existing vulnerabilities worse rather than the main cause. The case highlights crucial lessons for banks and regulators, including the need of diversification over market concentration, effective risk assessment in an era of rising interest rates, and sound liquidity management. These results lead to the following policy recommendations.

- *Early warning and monitoring systems:* Banks should closely monitor the key indicators of the CAMELS rating system, particularly asset quality, liquidity, and capital adequacy, and establish clear thresholds to both strengthen risk management and enable timely managerial intervention.
- *Cost and management efficiency audits:* Management quality ratios should be routinely evaluated; management teams should receive required in-service training on risk awareness and crisis management; and thorough emergency and crisis management plans that cover every aspect of the banks' operations should be created.
- *Capital and liquidity management policies:* Banks should maintain capital buffers above regulatory minimums and adopt dynamic liquidity management practices to respond effectively to unexpected deposit withdrawals or credit shocks.
- *Sectoral diversification*: Banks should strengthen capital adequacy and liquidity management through stricter supervision of high-risk assets and loan portfolios, while promoting sectoral diversification to reduce excessive dependence on a single sector.
- *Transparent reporting and regulatory oversight*: Banks should regularly disclose comprehensive financial and risk information to enable effective regulatory assessments. Independent auditing firms should play an active role in assessing financial stability.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The study has three limitations. Firstly, the study period of four years (from 2019 to 2022) might not include the structural risks built up before the period of 2019. Secondly, the study only focuses on the CAMELS ratios without considering other potential risk indicators, such as off-balance-sheet risk, derivative risk, and macroeconomic stress factors. Thirdly, the comparison of the results with the sector's averages is limited by the availability of data for the quality of management indicators.

Further research potential lies in the use of various financial indicators, post-bankruptcy recovery models, and the application of machine learning algorithms for risk estimation. Further research can also be conducted

in terms of assessing the effectiveness of bank strategies in managing sectoral risks and mitigating market risks so that models can be developed to identify best practices in managing sectoral and market risks. The research can also be conducted in a way that more efficient early warning systems can be developed that can be used by banks to effectively manage sectoral risks.

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