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The Effects of Risk Management, Funding Efficiency, and Regulatory Compliance on Financial Stability

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Abstract

This study aims to analyze the effects of risk management, funding efficiency, and regulatory compliance on the financial stability of the banking sector in Indonesia during 2020-2024. This study addresses inconsistent findings in research regarding the determinants of financial stability and examines these factors simultaneously in the Indonesian banking context. A quantitative approach was employed using panel data regression. Secondary data were obtained from reports of banking companies listed on the Indonesia Stock Exchange during 2020-2024. Data analysis was conducted using EViews 12, including descriptive statistics, panel data model selection, classical assumption tests, t-test, F-test, and coefficient of determination. The results show that risk management has no significant effect on financial stability, while funding efficiency and regulatory compliance significantly affect financial stability. Simultaneously, all three independent variables significantly affect financial stability. These findings highlight the importance of funding efficiency and regulatory compliance in strengthening banking resilience and supporting financial stability.

Keywords: Financial Stability, Funding Efficiency, Indonesian Banking, Regulatory Compliance, Risk Management.

INTRODUCTION

The banking sector occupies a strategic position in a country's economy. As a financial intermediary, banks collect funds from the public and redistribute them to productive sectors through lending activities. This function makes banking health and stability essential prerequisites for economic growth, efficient resource allocation, and the smooth functioning of the payment system (Mishkin 2019). In Indonesia, the importance of banking is even more pronounced because banking assets account for more than 70%

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of the total assets of the national financial system. Therefore, maintaining banking financial stability has become a major concern for the government, Bank Indonesia, and the Financial Services Authority (OJK 2024).

Financial stability in the banking sector refers to the ability of banks to perform their intermediary functions, manage various types of risks, meet their financial obligations, and remain resilient amid domestic and external economic shocks (Cihak and Hesse 2023). Maintaining such stability is crucial because it strengthens public confidence in financial institutions, supports investment, and promotes sustainable economic development. Conversely, financial instability may reduce public confidence, increase the risk of bank failure, disrupt financial intermediation, and potentially trigger broader financial crises. Thus, financial stability should not merely be viewed as an indicator of individual bank performance but also as a determinant of the sustainability of the financial system as a whole.

The condition of Indonesia's banking sector demonstrates both resilience and continuing challenges. In recent years, the banking industry has maintained relatively strong performance, as reflected in credit growth, increasing third-party funds, and generally adequate capitalization. Nevertheless, banks continue to face pressures arising from credit risk, high operational and regulatory compliance costs, and emerging operational risks associated with rapid digital transformation (International Monetary Fund 2025). This contrast indicates that banking financial stability cannot be assumed to be automatically maintained but must continuously be evaluated through the internal conditions and policies of individual banks.

Banks are exposed to various risks, including credit, liquidity, market, operational, legal, and reputational risks. Among these, credit risk is particularly important because it directly affects asset quality and is commonly reflected in the Non-Performing Loan (NPL) ratio. Although Indonesia's banking NPL ratio has generally remained within regulatory limits, economic uncertainty and global dynamics may increase credit risk and potentially weaken bank stability (Melo et al. 2024). Effective risk management is therefore essential for maintaining financial resilience and preventing deterioration in banking performance.

The development of banking financial stability during 2020-2024 can be observed through the Z-Score, which represents the ability of banks to withstand the risk of financial distress and bankruptcy. The fluctuations in Z-Scores among ten Indonesian banks during this period indicate different levels of financial resilience. While some banks experienced improvements in stability, others demonstrated declining or relatively unstable conditions. This variation suggests that banking financial stability in Indonesia has not been maintained uniformly. Since these banks operate within a relatively similar macroeconomic and industrial environment, differences in stability may partly reflect

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differences in internal management and strategic policies. This condition provides an important basis for examining internal factors that determine banking financial stability.

This study focuses on three internal factors: risk management, proxied by NPL; funding efficiency, proxied by the Current Account Saving Account (CASA) ratio; and regulatory compliance, proxied by the Capital Adequacy Ratio (CAR). These variables are selected because they are closely related to internal banking decisions and managerial policies. Poor credit risk management may increase NPL and consequently deteriorate asset quality. However, the extent to which NPL affects overall financial stability requires empirical examination because financial stability is also influenced by other internal factors (Altunbas et al. 2023). Meanwhile, a low CASA ratio indicates greater dependence on relatively expensive sources of funds, which may reduce profit margins and increase liquidity vulnerability. Regulatory compliance, particularly through adequate capitalization, is also essential because insufficient CAR may increase banks' exposure to unexpected losses and undermine market confidence (Cihak and Hesse 2023).

Previous studies have examined these factors individually. Effective risk management helps banks identify, measure, and control risks and consequently supports financial stability and sustainable financial growth (Angela et al. 2025). Funding efficiency has also been associated with financial resilience, as banks with more efficient funding structures tend to be better positioned to withstand market pressures (Abdou 2024). Furthermore, stronger regulatory compliance may limit excessive risk-taking and enhance market confidence in banking performance (Khandelwal et al. 2023). Nevertheless, previous findings remain inconsistent, with some studies reporting significant relationships while others finding weak or insignificant effects, particularly under adverse economic conditions. In addition, many studies measure regulatory compliance through Good Corporate Governance (GCG), which emphasizes structural aspects rather than actual prudential compliance, such as capital adequacy measured by CAR.

The research gap lies in the limited empirical evidence examining risk management (NPL), funding efficiency (CASA), and regulatory compliance (CAR) simultaneously as determinants of banking financial stability measured by Z-Score, particularly within the Indonesian banking sector during 2020-2024. This period is important because it encompasses significant challenges related to credit quality, funding structures, and capital resilience. Therefore, examining these three internal factors simultaneously provides a more comprehensive perspective on the determinants of banking financial stability.

Accordingly, this study aims to analyze the influence of risk management, funding efficiency, and regulatory compliance on the financial stability of the Indonesian banking

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sector, both individually and simultaneously. The study contributes to the literature by integrating NPL, CASA, and CAR into a single empirical framework using Z-Score as a measure of financial stability during 2020-2024. The findings are expected to provide practical implications for bank management in formulating targeted internal policies and for regulators in developing more responsive regulatory frameworks to strengthen the resilience of Indonesia's banking sector.

Objectives

This article intends

1. To analyze the effect of risk management on financial stability in the Indonesian banking sector.
2. To analyze the effect of funding efficiency on financial stability in the Indonesian banking sector.
3. To analyze the effect of regulatory compliance on financial stability in the Indonesian banking sector.
4. To examine the simultaneous effect of the three variables on financial stability in the Indonesian banking sector.

LITERATUR REVIEW

Resource-Based Theory

Resource-Based Theory (RBT), introduced by Wernerfelt (1984) and further developed by Barney (1991), explains that organizational performance and competitive advantage are influenced by how effectively a company manages its internal resources and capabilities. Resources that are valuable, rare, difficult to imitate, and non-substitutable can create sustainable competitive advantage. In the banking context, risk management, funding efficiency, and regulatory compliance represent important internal capabilities that can determine a bank’s ability to maintain financial stability.

Risk Management

Risk management refers to the policies and procedures used by banks to identify, measure, monitor, and control various risks, particularly credit, liquidity, market, and operational risks. In this study, risk management is proxied by Non-Performing Loan (NPL), which reflects credit quality and the potential for problem loans. Effective risk management enables banks to minimize potential losses and maintain operational sustainability. Previous research indicates that increasing NPL may weaken financial stability, although its effect can vary under different economic conditions.

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Funding Efficiency

Funding efficiency refers to a bank's ability to optimize its funding sources while minimizing funding costs without disrupting its intermediation function. In this study, funding efficiency is proxied by Current Account Saving Account (CASA), which reflects the bank's ability to optimize current and savings accounts as relatively low-cost sources of funding. An efficient funding structure helps banks maintain liquidity, reduce funding costs, and improve profitability. Previous research emphasizes the importance of banking efficiency and capital in strengthening bank resilience and stability.

Regulatory Compliance

Regulatory compliance refers to the extent to which a bank's activities and policies conform to requirements established by financial authorities. In this study, regulatory compliance is proxied by the Capital Adequacy Ratio (CAR), which reflects a bank's ability to maintain sufficient capital to absorb potential risks. Compliance with capital requirements helps banks absorb losses, maintain public confidence, and strengthen financial resilience. Previous research indicates that regulatory compliance and adequate capitalization play an important role in maintaining banking financial stability.

Banking Financial Stability

Financial stability reflects a bank's ability to perform its intermediation function, meet its obligations, and withstand various financial pressures and risks without disrupting its operations. In this study, financial stability is measured using the Z-Score, which indicates a bank's resilience to financial distress and bankruptcy risk. Strong financial stability is important because deterioration in a bank's financial condition may reduce public confidence, disrupt financial intermediation, and increase risks to the broader financial system.

Prior Research and Hypothesis Development

Previous studies indicate that internal banking factors are associated with financial stability. Risk management, funding efficiency, and regulatory compliance are considered complementary internal capabilities that strengthen bank resilience. Khandelwal et al. (2023) found that effective regulation and risk management can reduce excessive risk-taking, while Ischak et al. (2024) emphasized that higher funding efficiency strengthens banking resilience amid economic volatility. Lee (2023) also showed that regulatory compliance can improve transparency and strengthen the integrity of the financial system.

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Based on the theoretical foundations and previous empirical findings, this study examines the effects of risk management, funding efficiency, and regulatory compliance on the financial stability of banks in Indonesia. The following hypotheses are proposed:

H1: Risk management, funding efficiency, and regulatory compliance simultaneously affect banking financial stability in Indonesia.

H2: Risk management affects banking financial stability in Indonesia.

H3: Funding efficiency affects banking financial stability in Indonesia.

H4: Regulatory compliance affects banking financial stability in Indonesia.

RESEARCH METHOD

Research Approach

This study uses a quantitative approach with a causal research design to examine the effects of risk management, funding efficiency, and regulatory compliance on financial stability in the banking sector in Indonesia. The study covers the 2020-2024 period and applies panel data regression to identify relationships between the independent and dependent variables.

Population, Sample, and Data Source

The population comprises 47 conventional commercial banks registered with the Financial Services Authority (OJK) and officially reporting to Bank Indonesia during 2020-2024. The sample was selected using purposive sampling based on three criteria: (1) conventional commercial banks that operated actively throughout 2020-2024, (2) banks with complete audited annual reports for every year of the study period, and (3) banks that were not subject to operational suspension, merger, or acquisition that could cause data inconsistencies. Based on these criteria, 10 banks were selected, resulting in 50 observations from 10 banks over five years.

The study uses secondary data collected through documentation. Data were obtained from annual and financial reports of banking companies, OJK publications, Bank Indonesia's Statistik Perbankan Indonesia (SPI), the Indonesia Stock Exchange (IDX), and supporting financial databases such as IDN Financials and RTI Business.

Variable Measurement

The variables were measured using financial ratios obtained from published banking financial reports. Risk management (X1) is measured using the Non-Performing Loan (NPL) ratio, which reflects the quality of a bank's credit portfolio and the level of problem loans. Funding efficiency (X2) is measured using the Current Account Saving Account (CASA) ratio, which reflects the proportion of relatively low-cost funds obtained from current accounts and savings. Regulatory compliance (X3) is measured using the Capital Adequacy Ratio (CAR), which reflects the bank's ability to maintain adequate

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capital in accordance with regulatory requirements. Financial stability (Y) is measured using the Z-Score, which reflects the bank's resilience to financial distress.

Table 1. Operational Definition of Variables

Variable	Indicator
Risk Management (X1)	Non-Performing Loan (NPL)
Funding Efficiency (X2)	Current Account Saving Account (CASA)
Regulatory Compliance (X3)	Capital Adequacy Ratio (CAR)
Financial Stability (Y)	Z-Score

Data Analysis Technique

The data were analyzed using panel data regression with EViews 12. The analysis included descriptive statistical analysis, panel model selection using the Chow and Hausman tests, classical assumption tests consisting of multicollinearity and heteroskedasticity tests, and hypothesis testing using the t-test and F-test. The coefficient of determination (R^2) was also used to evaluate the explanatory power of the regression model.

RESULT

Overview of Research Objects

The study examines 10 conventional commercial banks listed on the Indonesia Stock Exchange and operating during the 2020–2024 period, namely Bank Central Asia (BCA), Bank Mandiri, Bank Negara Indonesia (BNI), Bank Rakyat Indonesia (BRI), Bank CIMB Niaga, Bank Danamon Indonesia, Bank OCBC NISP, Bank Permata, Bank Pan Indonesia (Panin Bank), and Maybank Indonesia. These banks represent major banking institutions with diverse ownership structures and business segments, including retail, MSME, commercial, and corporate banking. Their operations involve deposit collection, credit distribution, financial services, and increasingly digital banking, while maintaining risk management, adequate capitalization, funding efficiency, and regulatory compliance. The ten banks were selected based on the availability and completeness of audited annual financial reports throughout 2020-2024, resulting in 50 observations for the panel-data analysis.

Panel Data Model Selection

The panel data model selection was conducted to determine the most appropriate regression model for analyzing the relationship between risk management, funding

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efficiency, regulatory compliance, and banking financial stability. The selection was based on the Chow Test and Hausman Test. The Chow Test was used to determine whether the Common Effect Model or Fixed Effect Model was more appropriate, while the Hausman Test was used to determine whether the Fixed Effect Model or Random Effect Model was preferable. The results are presented in Table 2.

Table 2. Results of Panel Data Model Selection

Test	Probability	Selected Model
Chow Test	0.0000	Fixed Effect Model
Hausman Test	0.0094	Fixed Effect Model

Source: Primary Data (2026)

Based on Table 2, the Chow Test produced a probability value of 0.0000, which is lower than 0.05. Therefore, the Fixed Effect Model is more appropriate than the Common Effect Model. Furthermore, the Hausman Test produced a probability value of 0.0094, which is also lower than 0.05. Thus, the Fixed Effect Model is more appropriate than the Random Effect Model. Based on both tests, the Fixed Effect Model (FEM) was selected as the most appropriate model for this study.

Multicollinearity Test

The multicollinearity test was conducted to determine whether there is a high correlation among the independent variables included in the regression model. The Variance Inflation Factor (VIF) was used as the measurement criterion, where a VIF value below 10 indicates that the model does not have a multicollinearity problem.

Tabel 3. Results of the Multicollinearity Test

Variable	VIF	Conclusion
NPL (X1)	1.156264	No multicollinearity
CASA (X2)	1.347136	No multicollinearity
CAR (X3)	1.183161	No multicollinearity

Source: Primary Data (2026)

As shown in Table 3, all independent variables have VIF values below 10. NPL has a VIF value of 1.156264, CASA has a VIF value of 1.347136, and CAR has a VIF value of 1.183161. Therefore, it can be concluded that there is no multicollinearity among

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the independent variables. This indicates that NPL, CASA, and CAR can be included simultaneously in the regression model without causing a multicollinearity problem.

Hypothesis Testing

Hypothesis testing was conducted to determine the partial effects of risk management (NPL), funding efficiency (CASA), and regulatory compliance (CAR) on banking financial stability. The partial test was performed using the t-test at a significance level of 5%. A variable is considered to have a significant effect when its probability value is less than 0.05.

Table 4. Results of Hypothesis Testing

Variable	Coefficient	t-statistic	Prob.	Conclusion
NPL (X1)	37.07099	0.517267	0.6080	Not significant
CASA (X2)	33.47383	3.186586	0.0029	Significant
CAR (X3)	72.81305	2.504100	0.0168	Significant

Source: Primary Data (2026)

Based on the results of the hypothesis testing presented in the table, the findings can be described as follows:

1. The t-test results show that X1 has a positive coefficient of 37.07099. The calculated t-value of 0.517267 is lower than the critical t-value of 2.0106, and the significance value of 0.6080 is greater than 0.05. Therefore, H1 is rejected. This indicates that X1 does not have a significant effect on Y.
2. X2 has a positive coefficient of 33.47383. The calculated t-value of 3.186586 is greater than the critical t-value of 2.0106, and the significance value of 0.0029 is lower than 0.05. Therefore, H2 is accepted. This indicates that X2 has a positive and significant effect on Y.
3. X3 has a positive coefficient of 72.81305. The calculated t-value of 2.504100 is greater than the critical t-value of 2.0106, and the significance value of 0.0168 is lower than 0.05. Therefore, H3 is accepted. This indicates that X3 has a positive and significant effect on Y.

DISCUSSION

1. **The Simultaneous Effect of Risk Management, Funding Efficiency, and Regulatory Compliance on the Financial Stability of Banks in Indonesia**

Based on the simultaneous test (F-test), risk management, funding efficiency, and regulatory compliance simultaneously affect the financial stability of banks in

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Indonesia. This finding indicates that bank financial stability is not determined by a single internal factor but rather by the interaction of the bank's ability to control risks, manage funding sources, and comply with capital regulations. Therefore, the integrated management of these three aspects can strengthen banks' internal conditions in facing financial risks and pressures.

Risk management plays a role in controlling potential losses, funding efficiency helps banks obtain funds at relatively lower costs, while regulatory compliance through adequate capital provides banks with greater capacity to absorb risks. When these three factors operate simultaneously, banks are better able to maintain liquidity, profitability, asset quality, and capital resilience. This finding is consistent with Lee (2023), who explains that regulatory compliance can increase transparency and confidence in the financial system, thereby supporting banking stability. Kayani et al. (2023) also state that efficient funding and liquidity management can strengthen banks' resilience in facing economic pressures. Furthermore, Shafitranata et al. (2025) found that banking financial stability is influenced by various interrelated internal factors, including risk management, funding, and regulatory compliance.

This finding can be explained through the Resource-Based Theory (RBT), which states that a firm can achieve competitive advantage through effective management of valuable internal resources and capabilities. In the banking context, risk management, funding efficiency, and regulatory compliance represent strategic internal capabilities that support business sustainability. Therefore, this study indicates that financial stability is the result of the combination of banks' internal capabilities rather than the contribution of a single factor independently.

2. The Effect of Risk Management on the Financial Stability of Banks in Indonesia

The partial test results indicate that risk management, proxied by the Non-Performing Loan (NPL) ratio, does not affect the financial stability of banks. Therefore, the hypothesis stating that risk management affects financial stability is not supported by this study. This finding is consistent with Putra (2025) and Rahadian et al. (2025), who also found that risk management did not have a significant effect on banking financial stability.

The insignificant effect of NPL may be attributed to the fact that NPL only represents one aspect of risk, namely credit risk, whereas bank financial stability is influenced by various other factors, including capital adequacy, profitability, liquidity, and operational efficiency. In addition, the relatively controlled NPL levels among

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the sampled banks resulted in limited variation across banks. This condition reduces the ability of NPL to explain differences in financial stability significantly.

This finding is supported by Shafitranata et al. (2025), who stated that banking financial stability is formed by various interrelated internal indicators. Fatoni et al. (2019) similarly found that banks' financial conditions are influenced by various fundamental aspects, meaning that NPL does not always have a significant effect on financial stability. Bahiyyah et al. (2025) further emphasized that bank stability does not depend solely on credit risk but also on the ability of banks to maintain capital, liquidity, and operational performance.

From the perspective of Resource-Based Theory (RBT), the ability to manage credit risk represents an important internal capability for banks. However, because NPL levels were relatively well controlled among the sampled banks, differences in credit risk management capabilities were not sufficiently large to distinguish financial stability between banks. Thus, NPL primarily functions as an instrument for controlling credit quality rather than as a dominant determinant of bank financial stability.

3. The Effect of Funding Efficiency on the Financial Stability of Banks in Indonesia

The partial test results show that funding efficiency, proxied by the Current Account Saving Account (CASA) ratio, affects the financial stability of banks. This means that a higher CASA proportion is associated with better financial stability. This finding is consistent with Ditta et al. (2024) and Altunbas et al. (2023), who found that funding efficiency plays an important role in strengthening banking conditions and financial stability.

A high CASA ratio indicates the bank's ability to collect low-cost funds from current accounts and savings accounts. These funding sources generally involve lower costs than deposits, thereby reducing banks' funding expenses. Lower funding costs provide banks with greater opportunities to improve profitability and strengthen their ability to meet financial obligations. In addition, efficient funding management enables banks to maintain liquidity and withstand financial pressures.

This finding is supported by Kayani et al. (2021), who stated that efficient funding and liquidity management can improve banking stability. Abbas et al. (2021) also found that funding efficiency can reduce funding costs and strengthen banks' financial resilience. Similarly, Hayati et al. (2024) demonstrated that strengthening funding stability and effective liquidity management can improve banks' ability to maintain financial stability.

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This finding is consistent with Resource-Based Theory (RBT), as the ability of banks to collect low-cost funds through CASA represents a valuable strategic internal capability. Banks with higher CASA ratios benefit from lower funding costs, stronger liquidity, and greater opportunities to improve profitability. These conditions ultimately support stronger and more sustainable financial stability.

4. The Effect of Regulatory Compliance on the Financial Stability of Banks in Indonesia

The partial test results show that regulatory compliance, proxied by the Capital Adequacy Ratio (CAR), affects the financial stability of banks. Therefore, the hypothesis stating that regulatory compliance affects financial stability is supported by this study. The better a bank's ability to meet capital adequacy requirements, the stronger its ability to maintain financial stability.

CAR reflects a bank's ability to provide sufficient capital to absorb various risks. Adequate capital functions as a buffer when banks experience potential losses, allowing their operations to continue while maintaining public confidence. In addition, adequate capital encourages banks to apply prudential principles in managing credit, assets, and liquidity.

This finding is supported by Yakubu and Bunyaminu (2021), who stated that compliance with capital regulations can improve banking financial stability because banks have greater capacity to manage financial risks. Oino (2021) also found that capital adequacy plays an important role in enabling banks to absorb potential losses and reduce the risk of financial disruption. Consistent with these findings, Mateev et al. (2021) demonstrated that sound capital regulation and banking supervision can strengthen the resilience of financial institutions in dealing with various risks.

From the perspective of Resource-Based Theory (RBT), the ability to meet capital adequacy requirements represents a valuable internal capability because it reflects the financial strength of a bank. Adequate capital enables banks to manage risks, maintain stakeholder confidence, and sustain their operations. Therefore, the greater a bank's ability to comply with capital requirements, the stronger its capacity to maintain financial stability in the long term.

Overall, this study demonstrates that banking financial stability in Indonesia is influenced by a combination of internal capabilities. Simultaneously, risk management, funding efficiency, and regulatory compliance affect financial stability. However, partially, only funding efficiency and regulatory compliance have a significant effect, while risk management, as proxied by NPL, does not have a significant effect. These findings contribute to the understanding that strengthening

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banking stability cannot rely solely on credit risk management but must also be supported by efficient funding management and adequate capital in accordance with regulatory requirements.

CONCLUSION

Based on the results of the study examining the effects of risk management, funding efficiency, and regulatory compliance on the financial stability of banks in Indonesia during the 2020-2024 period, it can be concluded that these three factors simultaneously have a significant effect on banking financial stability. Partially, risk management has a positive but insignificant effect, indicating that changes in credit risk as measured by NPL are not sufficient to significantly explain changes in financial stability. In contrast, funding efficiency has a positive and significant effect, demonstrating that the ability of banks to optimize low-cost funding sources contributes to stronger financial stability. Regulatory compliance also has a positive and significant effect, indicating that adequate capital and compliance with banking regulations strengthen banks' ability to absorb risks and maintain financial resilience. These findings imply that banking stability requires integrated internal management, particularly through efficient funding and adequate capital. However, this study is limited by the variables and indicators used, especially the use of NPL as a single proxy for risk management and the 2020-2024 observation period. Future research is therefore encouraged to incorporate additional variables, such as profitability, liquidity, and macroeconomic factors, use more comprehensive risk-management indicators, and extend the observation period to obtain a broader understanding of the determinants of banking financial stability.

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