

The Effect of Capital Adequacy, Credit Risk, Liquidity Risk, and Market Risk on Financial Distress: Study of Conventional Banks Listed on IDX 2021–2023

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Abstract

This research examined how CAR, NPL, LDR, and NIM effect financial hardship in Indonesian conventional banks from 2021 to 2023. Multiple regression on 111 data showed CAR positively increased financial hardship, contradicting the original prediction. This may be related to regulatory adjustments and capital allocation issues. NPL unexpectedly had a negative effect, indicating new laws and robust capital structures offset it. LDR had a considerable positive effect, suggesting high lending liquidity concerns. NIM was not statistically significant, hence it cannot predict distress alone. The study suggests extending the timeframe and integrating macroeconomic factors in future research.

Keywords: Capital Adequacy, Credit Risk, Liquidity Risk, Market Risk, Financial Distress

INTRODUCTION

Banking institutions underpin national economies, especially in Indonesia. Law Number 10 of 1998 states that banks collect public revenues via current accounts and savings deposits to improve many people's lives. Indonesian banking systems finance huge businesses, small and medium firms, and the general population and numerous industrial sectors (Amalia & Mardani, 2018).

Banks mobilize and distribute funds to actual sectors, boosting economic growth as development agents. As service agents, banks broker payment system traffic (Astuti

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et al., 2023). Banking is risky, especially when managing public money via loan provision, securities purchases, and other fund investments (Utami & Silaen, 2018). The transition from Bank Indonesia Regulation (PBI) Number 14/26/PBI/2012 on Business Activities and Office Networks based on Core Capital to Financial Services Authority Regulation (POJK) Number 12/POJK.03/2021 on Commercial Banks changed the regulatory landscape. The categorization changed from Business Group Commercial Banks (BUKU) to Core Capital-Based Bank Groups. Compared to the previous BUKU system, the new categorization system has higher nominal core capital thresholds: KBMI 1 (up to IDR 6 trillion), KBMI 2 (IDR 6-14 trillion), KBMI 3 (IDR 14-70 trillion), and KBMI 4 ($\geq$ IDR 70 trillion).

According to CNBC Indonesia, 36 of 46 stock exchange-listed banking businesses were downgraded, while 10 maintained their ratings. The bulk of downgraded banks were BUKU II, with all falling to KBMI I. This regulation reform caused 23 BUKU II banks to become KBMI I owing to inadequate core capital below IDR 6 trillion, nine corporations to drop from BUKU III to KBMI II, and four top-tier BUKU IV banks to downgrade to KBMI III. This regulatory reform intends to boost Indonesia's banking industry's competitiveness, flexibility, and national economic contribution while promoting efficiency (Subrini et al., 2024). Banks want to maximize profits (Purba & Damayanthi, 2018). However, widespread downgrade owing to low core capital may have affected banks' profitability. Banks lose their intermediation role when banking systems degrade, restricting their capacity to finance investment and productive economic sectors (Anggraini & Susrajat, 2020).

Companies in financial trouble cannot satisfy their commitments owing to inadequate cash flow and profitability. Negative profits leave organizations without enough money to meet their commitments, a forerunner to insolvency (Sari & Subardjo, 2022). Financial strain causes major financial issues for companies (Aminah et al., 2019). Without adequate management, such situations may lead to company closure and insolvency (Septiani & Dana, 2019), costing shareholders, workers, and the economy (Al-khatib & Al-Horani, 2012). Capital deficiency, credit risk, liquidity risk, and market risk may cause financial turmoil. Capital adequacy, defined by CAR, is crucial to corporate performance. Higher CAR values show a company's ability to withstand inevitable losses, lowering financial strain (Kareem et al., 2022). Research results are varied, with some studies revealing favorable associations (Anggraini & Sudrajat, 2020) and others finding no significant impact (Dewi, 2022).

NPLs quantify credit risk by the proportion of loans with late payments. High NPLs imply inadequate credit management and may hurt bank profitability and health

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(Handayani, 2021). However, other studies shows NPL does not affect financial hardship (Kareem et al., 2022). Loan to Deposit Ratio (LDR) assesses banks' liquidity risk and capacity to repay depositors. Credit risk and loan defaults may rise with high LDR ratios (Suardika et al., 2023). Net Interest Margin (NIM) measures market risk to firm profitability. NIM levels imply more productive asset income and lower financial distress risk (Permatasari et al., 2022). This research seeks to demonstrate how capital adequacy, credit risk, liquidity risk, and market risk affect financial distress in banking companies, advancing risk management policy and academic research.

METHODOLOGY

Types and Sources of Data

Indirect data from research items is used in this quantitative investigation. In 2021–2023, traditional banking businesses listed on the Indonesia Stock Exchange provided yearly financial reports, annual reports, and other pertinent information on their websites. Documentation procedures were used to acquire and examine public financial statements and disclosures from each bank for the required period. This technique lets researchers extract trustworthy, verifiable data needed to study financial indicators and financial hardship (Sugiyono, 2018; Ghozali, 2021).

Population and Sample

This analysis includes all Indonesian conventional commercial banks from 2021 to 2023. Banks listed on the Indonesia Stock Exchange and those having available annual and financial reports for the research period were purposively selected. No data was omitted for unavailable reports from 42 eligible banks. A casewise diagnostics test found 15 severe outliers, which were trimmed to enhance data validity. The final dataset has 111 three-year observations (Sugiyono, 2018; Ghozali, 2021).

Operational Definition of Variables

This study's dependent variable (Y) is financial difficulty, which threatens a company's operations. This variable is affected by various variables and quantified using the modified Altman Z-Score model for non-manufacturing enterprises. The model, established by Edward I. Altman in 1968 and improved in 1995, is commonly used to anticipate financial trouble (Steffhannie & Sumiati, 2019). This study employed the modified Z-Score formula $Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$, where X_1 – X_4 indicate working capital, retained profits, EBITA, and book value of equity to total liabilities. Z-

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Scores over 2.6 are safe, between 1.10 and 2.6 are gray, and below 1.10 signal insolvency.

The research includes four independent factors (X) that may affect financial strain. The Capital Adequacy Ratio (CAR) measures a bank's ability to absorb risk-weighted asset losses. Divide the bank's capital by its risk-weighted assets (ATMR) and multiply by 100% (Sajuri & Soekardan, 2018). A higher CAR indicates financial resilience. NPL, which measures the bank's default management efficiency, is the second variable. Non-performing loans divided by total loans multiplied by 100% yield the ratio (Dewi, 2022). High NPLs may imply inadequate credit risk management. Third, Loan to Deposit Ratio (LDR) measures how much a bank lends its deposits. Divide all loans by third-party funds and multiply by 100% (Ukhriyawati et al., 2021). A high LDR might indicate liquidity issues if not controlled. Last, the Net Interest Margin (NIM) indicates a bank's ability to produce net interest revenue from productive assets. Net interest income divided by productive assets multiplied by 100% yields this ratio (Ukhriyawati et al., 2021). stronger NIMs imply stronger core banking profitability.

Data Analysis Techniques

This research begins with descriptive statistical analysis and uses different statistical methods. Creating understandable summaries from raw data requires descriptive statistics. Key data features are shown by central tendency and dispersion measurements including mean, standard deviation, minimum, and maximum values. Rather of testing hypotheses, descriptive statistics display and evaluate data using numerical computation to disclose key facts and qualities of the dataset, according to Ghozali (2016).

Classical assumption tests are used before multiple linear regression analysis to verify the regression model meets theoretical criteria and produces unbiased and consistent results. The traditional assumption tests include normality, multicollinearity, heteroscedasticity, and autocorrelation. Ghozali (2016) suggests normality testing to assess whether residuals are normal. A significance level higher than 0.05 indicates normal distribution in the One-Sample Kolmogorov-Smirnov test. Tolerance and VIF values assess multicollinearity. A tolerance over 0.10 and VIF below 10 imply no independent variable multicollinearity. In contrast, heteroscedasticity is examined to see whether the residual variance is consistent across observations (Ghozali, 2016). Finally, the Durbin-Watson (DW) statistic tests residual autocorrelation across time. DW values within critical boundaries indicate no autocorrelation.

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Multiple linear regression analysis examines the independent-dependent connection. This approach evaluates the simultaneous and individual impacts of numerous independent factors on a dependent variable. The regression model used in this study is: $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$, where Y represents financial distress, α is the intercept, β_1 to β_4 are the coefficients, and X_1 to X_4 represent CAR, NPL, LDR, and NIM. The error term e measures unobserved variability. This approach is crucial to determining if financial ratios affect bank financial hardship. Three fundamental evaluations comprise hypothesis testing. To assess the independent factors' impact on the dependent variable, the F-test is performed first. Ghozali (2018) states that all independent factors affect financial hardship if the significance threshold is below 0.05. Second, the t-test assesses each predictor variable's influence. A significance level below 0.05 indicates that the independent variable substantially impacts the dependent variable. Finally, the coefficient of determination (R^2) evaluates the model's explanation ability. Higher R^2 values suggest more explanation of financial distress variability by independent factors (range 0 to 1). This comprehensive analytical approach guarantees solid and trustworthy findings about banking sector financial health variables.

RESULT

Descriptive Statistical Analysis

After collecting 126 data points from IDX-listed banks from 2021 to 2023, descriptive statistical analysis was conducted. A second diagnostic test found 15 outliers, which were eliminated to ensure analytical integrity and validity. The final dataset has 111 valid observations. SPSS was used to create descriptive statistics for the study variables, including Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), Net Interest Margin (NIM), and Financial Distress. In 2023, Bank Mayapada Internasional Tbk had a minimal Capital Adequacy Ratio (CAR) of 10.78, indicating a poor capital position. In 2021, Bank Jago Tbk had the highest CAR of 169.92, indicating strong capital adequacy. The sample CAR averaged 36.7797, with a standard deviation of 26.41651. A highly consistent distribution of CAR values across sampled banks is suggested by the smaller standard deviation than the mean (Ghozali, 2016). This consistency suggests that banks maintained capital buffers similarly over the examined period.



Table 1. Descriptive Statistical Analysis

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
CAR	111	10.78	169.92	36.7797	26.41651
NPL	111	.01	10.66	2.9763	2.10882
LDR	111	29.67	373.61	85.6721	38.61881
NIM	111	.69	20.23	4.9877	3.02001
FD	111	-1.36	8.21	1.6851	1.52516

The NPL ratio, a measure of asset quality and credit risk, varied from 0.01 for Allo Bank Indonesia Tbk in 2022 to 10.66 for Bank KB Bukopin Tbk in 2021. The low minimum value indicates good credit management, whereas the high maximum value indicates significant loan risk. NPL averaged 2.9763 and had a standard deviation of 2.10882. Low standard deviation compared to the mean shows modest dispersion and suggests that most banks in the sample had comparable NPL performance, indicating sector-wide risk management (Ghozali, 2016).

From 29.67 at Bank Ina Perdana Tbk in 2021 to 373.61 at Bank Amar Indonesia Tbk in 2023, the Loan to Deposit Ratio (LDR) showed the effectiveness of using client deposits for lending. The mean LDR was 85.6721, with an SD of 38.61881. Despite larger dispersion than other variables, the standard deviation stayed below the mean, showing that although some banks had extraordinarily high or low LDRs, most operated within a tolerable range. Bank Mayapada Internasional Tbk (2021) and Bank Amar Indonesia Tbk (2023) have Net Interest Margin (NIM) ranges from 0.69 to 20.23, indicating core business profitability. With a mean of 4.9877 and a standard deviation of 3.02001, NIM values were highly concentrated, indicating sustained interest income production across sample institutions.

Finally, the Financial Distress (FD) variable, which measures the bank's ability to satisfy financial commitments, ranged from -1.36 to 8.21. According to Bank Jtrust Indonesia Tbk's 2021 score, the company is financially vulnerable, whereas Bank Amar Indonesia Tbk's 2023 score suggests financial stability. The mean FD was 1.6851, with a standard deviation of 1.52516, indicating a tight distribution. No big variations from the mean across all variables indicate that the data were well-behaved, making it suitable for inferential analysis like regression and classical assumption testing (Ghozali, 2016).



Classical Assumption Test

Secondary data included in the regression model was tested for quality and reliability using conventional assumption tests. The One-Sample Kolmogorov-Smirnov normalcy test got a significance value of 0.200, above 0.05. This means the residuals are regularly distributed, a regression analysis precondition (Ghozali, 2016). Multicollinearity was examined using tolerance and VIF values. The predictors CAR, NPL, LDR, and NIM have tolerance values over 0.10 and VIF values below 10, indicating no multicollinearity (Ghozali, 2016).

The heteroscedasticity test used a scatterplot to show that residuals were randomly distributed above and below the zero point on the Y-axis without funnel forms or waves. This pattern shows no heteroscedasticity, confirming that residual variance is consistent across observations (Ghozali, 2016). Finally, the Durbin-Watson test detected autocorrelation. A Durbin-Watson statistic of 1.798, between the crucial values $dU = 1.7657$ and $4 - dU = 2.2343$, indicates no autocorrelation in the regression model (Ghozali, 2016). These findings support the model's statistical assumptions.

Multiple Linear Regression Analysis

The multiple linear regression analysis examines how each independent variable influences financial suffering. Table 2 yields the regression equation: $Y = -0.872 + 0.032X_1 - 0.091X_2 + 0.018X_3 + 0.027X_4 + e$, where Y indicates financial hardship, X_1 , X_2 , X_3 , and X_4 are CAR, NPL, LDR, and NIM, respectively. e is the error term. If all independent variables are maintained constant at zero, financial anguish should be -0.872. Higher CAR levels enhance the financial distress index by 0.032 units, assuming other parameters stay similar ($p = 0.000$).

Table 2. Multiple Linear Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.872	0.198		-4.405	0.000
	CAR	0.032	0.003	0.556	10.227	0.000
	NPL	-0.091	0.035	-0.125	-2.564	0.012
	LDR	0.018	0.002	0.446	7.394	0.000
	NIM	0.027	0.028	0.054	0.959	0.340



NPL has a negative coefficient of -0.091 and is statistically significant ($p = 0.012$), indicating that management risk anticipation may reduce financial pain as non-performing loans rise. The LDR variable is positively linked to financial hardship ($\beta = 0.018$, $p = 0.000$), indicating that higher loan distribution compared to deposits may increase the risk of financial stress. NIM has a positive coefficient (0.027), however it is not statistically significant ($p = 0.340$), suggesting that its impact to financial hardship is weak in the study's sample. These results illuminate banking institutions' financial soundness (Ghozali, 2016).

Regression Model Feasibility Test

The model feasibility test determines whether the independent variables statistically affect the dependent variable. The ANOVA findings show an F-value of 83.815 and a significance level of 0.000, significantly below the 0.05 threshold. This demonstrates that the regression model is statistically sound and fits the variable relationship. Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Net Interest Margin (NIM) all affect banking industry financial hardship (Ghozali, 2016).

Partial Test

Multiple regression analysis with a 0.05 significance level is used in the partial test to determine how each independent variable affects the dependent variable. The regression coefficient of 0.032 and significance value of 0.000, which is below the threshold, show that CAR positively affects financial hardship, contradicting the first hypothesis (H1 rejected). NPL negatively affects financial hardship with a coefficient of -0.091 and a significance of 0.012, rejecting H2. A favorable and substantial impact of LDR (0.018, $p=0.000$) supports H3. NIM does not affect H4 (coefficient 0.027, $p=0.340$), rejecting H4.

Coefficient of Determination Test (R^2)

The model's Adjusted R-Square value is 0.751, indicating that CAR, NPL, LDR, and NIM explain 75.1% of financial distress variation (SPSS, 2025). This implies the model explains financial difficulties well. The remaining 24.9% of the difference is due to characteristics not included in the research, suggesting that other variables may potentially affect financial hardship. Thus, the model is resilient but does not fully explain the dependent variable.

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DISCUSSION

The Effect of Capital Adequacy Ratio (CAR) on Financial Distress

The first hypothesis test shows that financial hardship is positively correlated with the Capital Adequacy Ratio (CAR) with a significant value of 0.000, below the 0.05 level. CAR increases financial strain, contradicting H1, which predicted the opposite. A high CAR is usually an indicator of a bank's financial soundness, although excessive growth or overemphasis on it might cause financial crisis. The Financial Services Authority (OJK) changed bank classification from BUKU (Bank Umum Kelompok Usaha) to KBMI (Kelompok Bank Berdasarkan Modal Inti) in 2021, concentrating on core capital adequacy matching risk profiles and operational size. This new categorization has operational constraints influencing product offers, network growth, and risk-taking capability, from Group I with the lowest core capital to Group IV with the highest. Thus, classification downgrades affected several banks' operating flexibility and profitability.

Banks must oversee asset categorization and risk more closely under KBMI standards. A high CAR indicates ample capital, but inefficient allocation relative to risk exposure might prevent new regulatory compliance. Lower classified banks have fewer client facilities, limiting profit prospects. Banks save cash to retain their classified status, prioritizing risk coverage above corporate development and investment. This conservative strategy might limit revenue and operational development, increasing the risk of financial trouble due to poor performance. These results support Suhartanto et al. (2022), who found that greater CAR levels indicate financial difficulty. Ukhriyawati et al. (2021) also found that CAR reduces financial hardship in Indonesia Stock Exchange-listed banks. Kareem et al. (2022) also find that CAR reduces financial hardship, underlining the necessity for banks to combine capital adequacy with asset productivity and profitability.

The Effect of Non Performing Loan (NPL) on Financial Distress

The second hypothesis test shows a negative link between Non-Performing Loans (NPL) and financial hardship, confirmed by a regression coefficient with a significance value of 0.012, below the 0.05 threshold. Contrary to hypothesis (H2), NPL worsens financial strain. Banks use the NPL ratio to measure credit risk, but if they have solid core capital and good risk management, a rise in NPL does not always mean a bank is failing. Since 2021, the Financial Services Authority (OJK) has regulated core capital rather than operational operations under KBMI instead of BUKU. The shift attempts to improve banking resilience by increasing capital and risk management. Thus, banks are pushed

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to increase core capital, including loss reserves, liquidity, and credit risk absorption. Thus, banks may mitigate losses even while NPLs rise, minimizing financial suffering.

Capital-based supervision and risk assessment matched with internal risk management are KBMI regulatory priorities. If the Capital Adequacy Ratio (CAR) is high, reserves are adequate, and liquidity steady, rising NPL numbers may not indicate financial distress. Strong capital structures and risk buffers can help banks escape difficulty despite increased NPL levels. Mahmud et al. (2021) revealed that NPL adversely affects financial distress likelihood because credit is just a small part of total assets and banks' productive assets, backed by other accounts, generate income. In Indonesian state-owned banks, rising NPL levels reduce expected financial distress risk, according to Suhartanto et al. (2022). Ray and Nugroho (2023) also found that NPLs worsen financial hardship, emphasizing the necessity of capital strength and risk management in reducing NPLs.

The Effect of Loan to Deposit Ratio (LDR) on Financial Distress

The final hypothesis test shows a positive association between the Loan to Deposit Ratio (LDR) and financial hardship, with a regression coefficient below the 0.05 significance threshold of 0.000. LDR improves financial hardship, supporting hypothesis H3. High LDRs indicate undue dependence on short-term finance or interbank loans for liquidity. An growing LDR means more depositor money are used for lending, reducing the bank's liquid reserves. This increases the bank's liquidity risk, particularly if deposits are withdrawn simultaneously. Insufficient liquidity reserves to fulfill withdrawal requests may undermine the bank's financial stability, increasing the risk of financial crisis.

This study supports Suot et al. (2020), who found that a positive LDR indicates the bank's capacity to mobilize capital and manage loans. However, Zahroyana and Mahardika (2018) observed that a high LDR increases financial hardship since the bank must supervise bigger lending volumes to compensate for depositor withdrawals. Handayani (2021) found a positive association between LDR and financial hardship, indicating that LDR increases financial distress. As a key measure of a bank's health, a greater LDR means more lending than deposits, which lowers liquidity. As a consequence, the bank may struggle to satisfy its financial commitments on maturity dates, putting it at risk of financial crisis. These results underscore the significance of balanced liquidity to prevent financial instability.



The Effect of Net Interest Margin (NIM) on Financial Distress

The fourth hypothesis test shows that Net Interest Margin (NIM) has a positive coefficient with a significance value of 0.340, above the 0.05 threshold. This suggests that NIM does not significantly affect financial hardship. Thus, hypothesis H4, that NIM causes financial suffering, is unsupported. NIM, which measures a bank's efficiency in earning net interest income from productive assets, is often considered a key financial indicator, however it does not fully represent its financial health. Financial hardship has several causes, many of which are stronger than NIM. A greater NIM shows a bank's ability to produce interest revenue, although it may take on higher-risk borrowers to improve profits. However, rising credit risk might lower asset quality, raising the likelihood of loan losses. Because resources must be committed to address non-performing loans, net interest revenue may drop and financial distress risk rises.

This supports Febriana (2019), which demonstrated that NIM does not affect financial hardship. Exchange rate and interest rate concerns predict financial hardship more than NIM, making NIM less significant. According to Zahroyana and Mahardika (2018), NIM did not partially reduce financial suffering. Meiyana (2021) found that NIM makes no difference to financial hardship. These consistent findings show that NIM is a crucial profitability indicator, but it cannot identify financial trouble without a more complete risk and capital adequacy evaluation.

CONCLUSION

This research examined how CAR, NPL, LDR, and NIM affect financial hardship. The study examined 42 Indonesia Stock Exchange-listed conventional commercial banks from 2021 to 2023. Hypotheses were tested using multiple regression. CAR and NPL did not substantially influence financial hardship. A high CAR is usually an indication of good bank health, but it may limit the bank's capacity to issue loans and satisfy short-term commitments, causing financial difficulties. NPL, a credit risk indicator, may not indicate worsening financial circumstances under the KBMI legislation, which promotes solid capital structures and risk management. A high LDR indicates inadequate liquidity reserves and higher exposure to withdrawal risks, which might lead to default and financial difficulty. Poor asset quality may balance interest income gains, raising financial distress risk, hence NIM had no substantial impact. This three-year study is constrained by regulation changes in 2021 and external macroeconomic factors like COVID-19's economic collapse. To further understand banks financial hardship, future research should expand the study period and include macroeconomic variables.

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