

IMPACT OF CAPITAL ADEQUACY AND CREDIT RISK ON BANK PROFITABILITY, WITH LIQUIDITY AS AN INTERVENING VARIABLE

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Article History	ABSTRACT
Received:	Purpose: This study examines the relationships of capital adequacy and credit risk with bank profitability and assesses the intervening role of the loan-to-deposit ratio (LDR).
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Accepted:	Method: The study uses 120 bank-year observations from purposively selected Indonesia Stock Exchange-listed banks during 2019–2024. Capital adequacy, credit risk, and profitability are measured by CAR, NPL, and ROA, respectively. Two multiple regression models and Sobel tests assess direct and indirect relationships.
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Keywords: Capital Adequacy; Credit Risk; Profitability; Liquidity;	Findings: CAR is positively associated with ROA ($p = 0.002$), whereas NPL is negatively associated with ROA ($p < 0.001$). LDR is positively associated with ROA ($p = 0.015$). CAR and NPL are positively and negatively associated with LDR, respectively. Sobel tests indicate partial statistical mediation through LDR for CAR ($p = 0.014$) and NPL ($p = 0.034$).
Hak Cipta (c) 2026 Jurnal Sosial Ekonomi Bisnis  Artikel ini berlisensi Creative Commons Attribution- ShareAlike 4.0 International License.	Novelty: The study integrates capital adequacy and credit risk in a mediation framework for Indonesian listed banks. The findings support considering lending intensity alongside capital and loan quality when assessing profitability; higher LDR does not necessarily indicate stronger liquidity buffers. The observational design limits causal interpretation.

INTRODUCTION

The banking industry supports economic activity by collecting deposits and financing borrowers. Profitability helps banks sustain this intermediation function, although earnings alone do not establish financial soundness. Return on Assets (ROA) relates earnings to the asset base and is widely used alongside capital, asset-quality, and liquidity indicators in Indonesian banking statistics (Otoritas Jasa Keuangan, 2025). The International Monetary Fund (2024) describes Indonesia's financial system as bank-dominated and broadly resilient, while identifying continuing credit-quality and liquidity-monitoring priorities.

Capital adequacy, measured by the Capital Adequacy Ratio (CAR), represents regulatory capital relative to risk-weighted assets. The Basel Committee on Banking Supervision (2024) monitors capital and liquidity requirements as distinct elements of bank resilience. Capital may support loss absorption and continued lending, but its profitability implications depend on capital quality and bank characteristics. Alkhazali et al. (2024) find that capital quality mattered for emerging-market banks' profitability during the COVID-19 shock. Accordingly, a higher CAR should not automatically be interpreted as a proportionate increase in productive lending or earnings.

Credit risk is another important determinant of performance. The Non-Performing Loan (NPL) ratio measures realized problem loans relative to the loan portfolio rather than a forward-looking probability of default. Poor asset quality may reduce interest income and increase impairment

expenses. Recent Indonesian evidence reports a negative relationship between NPLs and profitability (Rohman et al., 2022; Saragih, 2023). Nguyen (2025) also examines the interaction between NPLs and profitability in Vietnam, highlighting the importance of bank characteristics and economic conditions.

Liquidity management concerns the capacity to meet cash-flow obligations while supporting lending. This study uses the Loan to Deposit Ratio (LDR) as a proxy for lending relative to deposit funding. A higher LDR indicates greater loan deployment per unit of deposits; it does not automatically mean stronger liquidity buffers. The distinction matters because regulatory measures such as the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) capture different funding dimensions (Veeramoothoo & Hammoudeh, 2022). The Basel Committee on Banking Supervision (2023) further highlights the importance of funding confidence and liquidity risk management during banking stress.

Recent findings are mixed. Saragih (2023) reports a positive LDR–ROA relationship and an insignificant CAR coefficient, whereas Supiyadi and Novita (2023) find a negative liquidity–profitability relationship in Indonesian state-owned banks. Attatur et al. (2024) report insignificant capital-adequacy and credit-quality effects in another Indonesian sample. International evidence also identifies nonlinear capital–liquidity relationships (Gupta et al., 2023). These differences motivate testing an indirect pathway through LDR, but do not by themselves establish that mediation exists.

Based on the above discussion, this study is important to examine the effect of capital adequacy and credit risk on banking profitability with liquidity as an intervening variable. This research is expected to contribute to the development of banking finance literature and provide practical insights for bank management in formulating strategies related to capital management, credit risk control, and liquidity management to enhance profitability.

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Theoretical Framework

This study draws on contemporary applications of capital trade-offs, risk absorption, and financial intermediation. Capital can absorb losses and sustain lending, but it can also change funding incentives and the composition of bank assets. Evans and Haq (2022) show that the capital–liquidity–creation relationship differs by bank size and crisis period. Gupta et al. (2023) further identify nonlinear relationships. These findings support examining competing mechanisms rather than assuming a universally positive capital effect.

The risk–return perspective distinguishes expected compensation for taking risk from losses after that risk materializes. NPLs primarily capture the latter. A bank may charge for credit risk when originating loans yet experience lower profitability when borrowers fail to repay. Abu Khalaf and Awad (2024) report a negative association between NPLs and profitability in MENA banks, while Ben-Ahmed et al. (2023) examine the combined profitability consequences of credit and liquidity risks.

Financial intermediation links the transformation of deposit funding into loans with income generation and funding risk. Hsieh et al. (2022) find that strongly capitalized Asian banks may retain more liquid assets without necessarily expanding lending. Garg et al. (2024) show that the association between regulatory capital and liquidity creation in Canadian banks changes during crises. Thus, holding liquid assets, creating liquidity for customers, and increasing LDR are related but distinct balance-sheet choices.

These perspectives motivate direct and indirect relationships among CAR, NPL, LDR, and ROA. In this study, the term “liquidity” refers specifically to the LDR proxy when interpreting estimated coefficients. Evidence using broader liquidity-creation measures is used to motivate the mechanism, not treated as an equivalent measurement of LDR.

Profitability in Banking

Profitability reflects a bank's ability to generate earnings from its assets and operations. It is commonly measured using Return on Assets (ROA), which captures management efficiency in utilizing total assets. Higher profitability indicates better financial performance and sustainability.

Recent research examines profitability through bank-specific, industry, and macroeconomic factors (O'Connell, 2023). Indonesian studies likewise consider capital, asset quality, lending, operating costs, and bank size, with results differing across samples and periods (Rohman et al., 2022; Attatur et al., 2024). ROA therefore provides one performance measure rather than a complete assessment of bank efficiency or resilience.

Capital Adequacy and Profitability

CAR captures the capital buffer relative to risk-weighted exposures. The Basel Committee on Banking Supervision (2024) reports capital and liquidity measures separately, reflecting their complementary prudential roles. Alkhazali et al. (2024) provide evidence that higher-quality capital supported profitability under pandemic stress. However, Indonesian findings include negative or insignificant CAR relationships (Rohman et al., 2022; Saragih, 2023). The following positive hypothesis is therefore a testable expectation for the present sample, not a settled finding across the literature.

Hypothesis 1 (H1): Capital adequacy has a positive effect on profitability.

Credit Risk and Profitability

Problem loans can weaken earnings by reducing loan receipts and requiring loss recognition. Indonesian evidence associates higher NPLs with lower profitability (Supiyadi & Novita, 2023), and MENA evidence reports a similar negative relationship (Abu Khalaf & Awad, 2024). Nguyen (2025) examines both NPL determinants and their relationship with bank profitability, emphasizing the need to account for bank and macroeconomic conditions. These studies motivate a negative association in the present model.

Hypothesis 2 (H2): Credit risk has a negative effect on profitability.

Capital Adequacy and Liquidity

Capital may enable a bank to maintain lending relative to deposit funding by absorbing losses and supporting confidence. Nevertheless, the literature offers competing predictions: Evans and Haq (2022) identify heterogeneous capital-liquidity-creation relationships, while Hsieh et al. (2022) find that stronger capitalization can coincide with holding liquid assets rather than lending more. Garg et al. (2024) also show crisis-dependent effects. H3 tests the lending-capacity interpretation, so its positive direction refers to higher LDR rather than safer liquidity.

Hypothesis 3 (H3): Capital adequacy has a positive effect on liquidity as proxied by LDR.

Credit Risk and Liquidity

Credit deterioration can interrupt repayments and constrain new lending. Ben-Ahmed et al. (2023) document interdependence between credit and liquidity risks, supporting their joint consideration. The effect on LDR remains conditional: weaker lending can reduce the ratio, while deposit withdrawals can increase it. H4 therefore represents the expectation that lending contraction dominates changes in deposit funding in the present sample. It should not be interpreted as a universal relationship between NPLs and all measures of liquidity.

Hypothesis 4 (H4): Credit risk has a negative effect on liquidity as proxied by LDR.

Liquidity and Profitability

Greater loan deployment relative to deposits may support earnings when loan returns exceed funding and expected-loss costs. Saragih (2023) finds a positive LDR-ROA association, but Supiyadi and Novita (2023) report a negative liquidity coefficient. Using a different construct, Javid

et al. (2023) find a negative liquidity-creation–profitability relationship in Pakistan. Veeramoothoo and Hammoudeh (2022) show that LCR and NSFR relationships vary across profitability levels. H5 accordingly concerns the LDR measure and does not imply that increasing this ratio without limit is desirable.

Hypothesis 5 (H5): Liquidity as proxied by LDR has a positive effect on profitability.

The Mediating Role of Liquidity

LDR may transmit part of the association of capital and credit risk with profitability through lending and deposit-funding decisions. Vu and Ngo (2023) examine liquidity creation as a mediator between bank capital and stability in Vietnam; their outcome is stability, not ROA, so their findings motivate a mechanism rather than validate the present model. Gupta et al. (2023) also emphasize nonlinearity and potential reverse causality. Following regression-based mediation reasoning, indirect paths must be evaluated explicitly rather than inferred from individually significant coefficients (Hayes, 2022).

Hypothesis 6 (H6): Liquidity mediates the relationship between capital adequacy and profitability.

Hypothesis 7 (H7): Liquidity mediates the relationship between credit risk and profitability.

RESEARCH METHODOLOGY

Population and Sample

The population of this study consists of all banking companies listed on the Indonesia Stock Exchange (IDX) during the period 2019–2024. The banking sector is selected due to its significant role in financial intermediation and economic stability. The sampling technique used in this study is **purposive sampling**, where samples are selected based on specific criteria to ensure the availability and relevance of data. The criteria for sample selection are as follows:

1. Banks listed on the IDX consistently during the period 2019–2024.
2. Banks that publish complete annual financial statements for the study period.
3. Banks that provide complete data related to Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Loan to Deposit Ratio (LDR), and Return on Assets (ROA).
4. Banks that do not experience extreme financial distress or delisting during the observation period.

Type and Source of Data

This study uses **secondary data** obtained from publicly available sources. The data are collected from:

- Annual reports and financial statements of banking companies
- Official publications from the Indonesia Stock Exchange
- Reports from Otoritas Jasa Keuangan

The data collected are quantitative in nature and presented in numerical form, allowing statistical analysis. The data collection method used in this study is **documentation**. Financial data are obtained by reviewing and recording relevant information from annual reports and financial statements of the sampled banks for the period 2019–2024.

Operational Definition of Variables

This study involves four main variables: two independent variables, one intervening variable, and one dependent variable.

1. Dependent Variable

$$ROA = \frac{\text{Laba Bersih}}{\text{Total Aktiva}} \times 100\%$$

2. Independent Variables

- **Capital Adequacy (CAR)**

$$CAR = \frac{\text{Total Modal}}{\text{ATMR}} \times 100\%$$

- **Credit Risk (NPL)**

$$NPL = \frac{\text{Kredit Bermasalah}}{\text{Total Kredit}} \times 100\%$$

3. Intervening Variable

- **Liquidity (LDR)**

$$LDR = \frac{\text{Total Kredit yang Diberikan}}{\text{Total DPK}} \times 100\%$$

Data Analysis Technique

Before performing regression analysis, classical assumption tests are conducted to ensure the validity of the model:

1. **Normality Test** – to examine whether the data are normally distributed
2. **Multicollinearity Test** – to ensure no high correlation among independent variables
3. **Heteroscedasticity Test** – to check variance consistency of residuals
4. **Autocorrelation Test** – to detect correlation among residuals

Multiple Linear Regression Model

This study uses two regression models:

Model 1 (Determinants of Liquidity):

$$LDR = \beta_1 \text{ CAR} + \beta_2 \text{ NPL} + e_1$$

Model 2 (Determinants of Profitability):

$$ROA = \beta_3 \text{ CAR} + \beta_4 \text{ NPL} + \beta_5 \text{ LDR} + e_2$$

Mediation Test

The reported analysis uses the Sobel test to assess the indirect relationships through LDR. An indirect association is the product of the predictor-to-LDR coefficient and the LDR-to-ROA coefficient, estimated on compatible scales. Regression-based mediation guidance distinguishes such an indirect association from causal mediation, which requires additional identification assumptions (Hayes, 2022). The reported Sobel results are retained; bootstrap confidence intervals would provide a useful robustness analysis in a subsequent data-based validation.

RESULTS AND DISCUSSION**Descriptive Statistics**

Descriptive statistics provide an overview of the distribution and characteristics of the research variables. Profitability is proxied by Return on Assets (ROA), while liquidity is measured using Loan to Deposit Ratio (LDR).

Table 1
Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
ROA (%)	120	0.15	3.25	1.45	0.72
CAR (%)	120	12.50	35.80	22.10	5.40
NPL (%)	120	0.80	6.90	2.80	1.30
LDR (%)	120	65.20	105.40	88.30	9.10

The descriptive statistics summarize the reported sample for 2019–2024. Mean ROA is 1.45%, with observations ranging from 0.15% to 3.25% and a standard deviation of 0.72. These figures indicate variation in asset-based profitability. Whether a particular value represents strong performance requires a comparable banking benchmark, accounting definition, and period; the sample mean alone does not establish an optimal level.

Mean CAR is 22.10%, ranging from 12.50% to 35.80%, with a standard deviation of 5.40. This distribution indicates variation in capitalization. The International Monetary Fund (2024) reports strong aggregate capital buffers in Indonesia, but that system-level assessment does not establish regulatory compliance for every bank-year in this sample. Compliance depends on the requirements applicable to each institution.

Mean NPL is 2.80%, with a maximum of 6.90% and a standard deviation of 1.30. The difference between the average and upper end points to uneven asset quality across observations. Recent Indonesian and regional studies support assessing NPLs alongside profitability and other bank characteristics rather than treating a single threshold as proof that all credit risk is well controlled (Rohman et al., 2022; Nguyen, 2025).

Mean LDR is 88.30%, ranging from 65.20% to 105.40%, with a standard deviation of 9.10. These values describe lending relative to deposit funding. LDR above 100% indicates loans exceed deposits under the ratio's definition, but does not alone establish distress because banks may use other funding sources. Conversely, an average below 100% does not demonstrate sufficient cash buffers or an optimal liquidity position.

Overall, the descriptive results indicate heterogeneity in capitalization, asset quality, lending intensity, and profitability. They do not by themselves establish bank-level resilience, funding adequacy, or causal relationships among the variables.

Classical Assumption Tests

Table 2
Normality Test

Variable	Asymp. Sig (2-tailed)
Residual	0.200

The reported Kolmogorov–Smirnov significance value is 0.200, above 0.05. The test therefore does not reject the stated residual-normality hypothesis at the 5% level. This is not proof of normality and does not establish that the model is correctly specified or that coefficients are unbiased.

Table 3
Multicollinearity Test

Variable	Tolerance	VIF
CAR	0.72	1.38
NPL	0.68	1.47
LDR	0.75	1.33

Tolerance values exceed 0.10 and VIF values are below 10. These diagnostics do not indicate severe linear multicollinearity under the stated screening thresholds. They do not imply that CAR, NPL, and LDR are statistically independent or eliminate omitted-variable concerns.

Table 4
Glejser Test

Variable	Sig.
CAR	0.412
NPL	0.528
LDR	0.367

All reported Glejser-test significance values exceed 0.05. The test therefore does not detect heteroscedasticity at the stated significance level. Failure to reject is not proof of constant residual variance, and robust inference remains a useful sensitivity check.

Table 5
Durbin-Watson Test

Model	Durbin-Watson
Regression	1.89

The reported Durbin–Watson statistic is 1.89, close to 2. However, a fixed informal interval does not establish residual independence in bank-year data. Interpretation depends on observation ordering and the model specification; within-bank serial dependence and common year shocks require appropriate panel diagnostics.

Regression Analysis

Table 6
Regression Results (Model 1)

Variable	Coefficient (β)	t-value	Sig.
Constant	45.210	4.321	0.000
CAR	0.350	3.980	0.000
NPL	-0.280	-2.540	0.013

Table 7
Model Summary (Model 1)

R	R ²	Adjusted R ²
0.542	0.294	0.280

Model 1 reports a positive CAR coefficient (0.350) and a negative NPL coefficient (−0.280), both statistically significant in the reported output. The direct interpretation is that CAR is positively associated with LDR and NPL is negatively associated with LDR, conditional on the other predictor. These results are compatible with capital supporting lending capacity and credit deterioration constraining loan deployment, but they do not separately identify deposit movements or cash-flow mechanisms.

The R² value of 0.294 suggests that approximately 29.4% of the variation in liquidity can be explained by capital adequacy and credit risk. While this indicates moderate explanatory power, it also suggests that other factors, such as macroeconomic conditions or bank size, may influence liquidity.

Table 8
Regression Results (Model 2)

Variable	Coefficient (β)	t-value	Sig.
Constant	-0.520	-1.120	0.265
CAR	0.300	3.210	0.002
NPL	-0.400	-4.150	0.000
LDR	0.250	2.480	0.015

Table 9
Model Summary (Model 2)

R	R ²	Adjusted R ²
0.787	0.620	0.608

Model 2 reports a positive CAR coefficient (0.300; $p = 0.002$). This is consistent with the proposed positive capital–profitability association in this sample. Evidence that capital quality can support earnings under stress offers one interpretation (Alkhazali et al., 2024), although the coefficient does not demonstrate an optimal capital level.

The NPL coefficient is negative (-0.400) and statistically significant in the reported output. This is consistent with the earnings costs of problem loans discussed in recent Indonesian research (Supiyadi & Novita, 2023). Because provisions and interest-income channels are not estimated separately, these mechanisms remain interpretations rather than direct findings of the model.

LDR has a positive reported coefficient (0.250; $p = 0.015$), indicating that greater lending relative to deposits is associated with higher ROA, conditional on CAR and NPL. This result should not be described as evidence that larger liquidity buffers improve profitability, because LDR does not directly measure those buffers.

The R² value of 0.620 indicates that 62% of the variation in profitability is explained by the model, demonstrating strong explanatory power. This suggests that capital adequacy, credit risk, and liquidity are key determinants of bank profitability.

Hypothesis Testing

Table 10
Hypothesis Testing Results

Hypothesis	Relationship	Result
H1	CAR $\rightarrow$ ROA	Supported
H2	NPL $\rightarrow$ ROA	Supported
H3	CAR $\rightarrow$ LDR	Supported
H4	NPL $\rightarrow$ LDR	Supported
H5	LDR $\rightarrow$ ROA	Supported
H6	CAR $\rightarrow$ LDR $\rightarrow$ ROA	Supported
H7	NPL $\rightarrow$ LDR $\rightarrow$ ROA	Supported

The reported coefficients and significance levels support H1–H5 in the specified models, and the reported Sobel tests support H6–H7. These conclusions refer to statistical associations in the supplied results; they do not establish causal effects or validate alternative model specifications.

Mediation Test (Sobel Test)

Table 11
Mediation Test Results

Relationship	Sobel Z	Sig.	Conclusion
CAR → LDR → ROA	2.45	0.014	Significant
NPL → LDR → ROA	2.12	0.034	Significant

The reported Sobel statistics are 2.45 ($p = 0.014$) for CAR → LDR → ROA and 2.12 ($p = 0.034$) for NPL → LDR → ROA. The tests indicate significant indirect associations in the reported analysis. Because the signs of the NPL → LDR and LDR → ROA coefficients imply a negative indirect effect, the positive NPL Sobel value is interpreted as a reported magnitude pending confirmation from the original output. Significant direct and indirect associations are consistent with partial statistical mediation, subject to the estimator and identification limitations discussed by Hayes (2022).

Discussion

The findings indicate associations among capitalization, asset quality, lending intensity, and profitability. The contribution is the simultaneous examination of direct relationships and indirect relationships through LDR. Interpretation requires distinguishing the study's LDR proxy from liquidity buffers and broader measures of liquidity creation used in recent research.

First, the positive CAR–ROA coefficient is compatible with capital supporting loss absorption and lending continuity. Alkhazali et al. (2024) emphasize capital quality and bank heterogeneity during pandemic stress. However, the present result differs from the negative CAR relationship reported by Rohman et al. (2022) and the insignificant effects in Saragih (2023) and Attatur et al. (2024). Differences in samples, periods, and controls offer possible explanations. A positive linear coefficient alone does not show that banks operate within an optimal capital range; that claim would require a model designed to estimate such a range.

Second, the negative NPL–ROA coefficient is consistent with the adverse earnings implications of deteriorating loan quality. It aligns with evidence from Indonesian state-owned banks (Supiyadi & Novita, 2023) and MENA banks (Abu Khalaf & Awad, 2024). Nguyen (2025) also examines the links between NPLs, profitability, and economic conditions. Nevertheless, the importance of credit risk is not identical across all settings: O'Connell (2023) reports an insignificant credit-risk effect in the UK specification. Bank characteristics and accounting treatment should therefore be considered before generalizing the present coefficient.

Third, the positive LDR–ROA association resembles Saragih's (2023) finding but does not establish that liquidity risk is low. Evidence using alternative measures reinforces this distinction. Javid et al. (2023) report a negative relationship between liquidity creation and profitability, while Veeramoothoo and Hammoudeh (2022) find heterogeneous effects of regulatory liquidity ratios across profitability levels. Managers should assess loan deployment together with funding stability and cash-flow coverage rather than maximize LDR as a standalone objective.

Fourth, the reported CAR–LDR–ROA pathway suggests that lending relative to deposits may account for part of the association between capital and earnings. The literature cautions against a uniform capital–liquidity mechanism. Evans and Haq (2022) find effects that vary by size and crisis period; Hsieh et al. (2022) distinguish liquid-asset retention from lending; and Garg et al. (2024) identify crisis-dependent relationships. Gupta et al. (2023) additionally document nonlinearity. These studies support further investigation of the pathway, not a claim that higher CAR necessarily improves liquidity safety.

The NPL–LDR–ROA pathway has a negative implied direction because the first reported path is negative and the second is positive. Reduced lending after credit deterioration is one possible

explanation, but the model does not separately test loan supply, deposit withdrawals, or funding costs. Ben-Ahmed et al. (2023) motivate considering credit and liquidity risks jointly. Vu and Ngo (2023) provide related mediation evidence using liquidity creation and bank stability, with different measures and a different outcome from the present study.

Other determinants may include operating efficiency, bank size, interest rates, and macroeconomic conditions (O'Connell, 2023). Further analysis should account for bank and year effects, examine reverse causality, and compare LDR with other liquidity measures. The indirect effects should also be evaluated with compatible coefficient scales and resampling that respects repeated observations within banks. These steps would strengthen the interpretation of the mediation relationships (Hayes, 2022).

The managerial implication is to evaluate capital, loan quality, funding composition, and profitability together. Capital buffers do not remove the need for liquidity planning, and profitability does not guarantee protection against rapid funding outflows. The Basel Committee on Banking Supervision (2023) highlights the importance of these interdependencies in its assessment of the 2023 banking turmoil.

For Indonesia, the International Monetary Fund (2024) identifies strong aggregate buffers alongside priorities for loan-quality recognition and risk assessment. Otoritas Jasa Keuangan (2025) provides contextual banking indicators that can support comparisons with the study period. Such aggregate publications complement, rather than replace, verification against each sampled bank's annual report and applicable requirements.

The study adds a sample-specific examination of LDR as an intervening variable. Its limitations include reliance on observational bank-year data and a restricted set of predictors. The number of banks, panel composition, coefficient scaling, and original mediation output need to be documented to make the reported estimates reproducible. Claims about causality, optimal liquidity, or universal capital effects are therefore not warranted by the reported regressions alone.

CONCLUSION AND RECOMMENDATIONS

This study examines the impact of capital adequacy and credit risk on bank profitability, with liquidity as an intervening variable, using data from banks listed on the Indonesia Stock Exchange during 2019–2024. The results indicate that capital adequacy positively affects profitability, while credit risk negatively affects profitability.

CAR is positively associated with LDR, NPL is negatively associated with LDR, and LDR is positively associated with ROA in the reported models. The reported Sobel tests indicate partial statistical mediation through LDR. These relationships concern lending relative to deposits and should not be interpreted as proof that higher LDR means stronger liquidity buffers. Banks should coordinate capital planning, credit-quality control, and funding-risk management. Future work should validate the estimates against the underlying bank-year dataset and assess alternative liquidity measures, panel dependence, and the uncertainty of indirect effects.

DECLARATION OF ARTIFICIAL INTELLIGENCE USAGE

Artificial intelligence tools assisted language refinement, reference checking, citation checking, and editorial consistency. The authors remain responsible for the research design, source data, analysis, interpretation, and verification of the final manuscript.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper. This research was conducted independently without any commercial or financial relationships that could be construed as a potential conflict of interest

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