

Determinants of Capital Adequacy Ratio in KBMI 4 Banks: Evidence from Profitability and Liability Structure in Indonesia (2021–2025)

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Article Information	ABSTRAK
Article history: Received Jun, 2026 Revised Jul, 2026 Accepted Jul, 2026	Penelitian ini menganalisis determinan Capital Adequacy Ratio (CAR) dan komposisi liabilitas pada empat bank KBMI 4 yang tercatat di Bursa Efek Indonesia, yaitu BBKA, BBRI, BMRI, dan BBNI, selama periode triwulanan 2021-2025. Penelitian menggunakan 80 observasi bank-triwulan yang diekstraksi dari laporan keuangan publikasi resmi dan diverifikasi pada basis individual/bank-only dengan satuan juta rupiah. Variabel dependen utama adalah CAR, sedangkan variabel independen meliputi Return on Assets (ROA), Non-Performing Loan (NPL) gross, Loan to Deposit Ratio (LDR), ukuran bank, dan komposisi liabilitas yang diproksikan dengan Deposit to Liability Ratio. Analisis dilakukan menggunakan regresi data panel dengan bank fixed effects dan robust standard errors HC1. Hasil menunjukkan bahwa ROA dan komposisi liabilitas berpengaruh positif signifikan terhadap CAR, sedangkan NPL, LDR, dan ukuran bank tidak signifikan pada model utama. Uji robustness melalui winsorization dan time fixed effects mempertahankan kesimpulan bahwa profitabilitas dan struktur pendanaan berbasis dana pihak ketiga merupakan faktor yang paling konsisten menjelaskan CAR bank KBMI 4. Kontribusi utama penelitian ini adalah menegaskan bahwa kecukupan modal bank besar perlu dibaca sebagai kualitas modal yang ditopang oleh laba dan stabilitas pendanaan, bukan hanya sebagai angka kepatuhan regulasi. Bagi investor, hasil ini menyarankan penggunaan CAR bersama ROA, struktur DPK, kualitas kredit, dan ruang ekspansi aset tertimbang menurut risiko dalam menilai kualitas fundamental saham perbankan.
Kata Kunci: Capital Adequacy Ratio; Data Panel; KBMI 4; Komposisi Liabilitas; Perbankan	
Keywords: Banking; Capital Adequacy Ratio; KBMI 4; Liability Composition; Panel Data	
	ABSTRACT This study examines the determinants of the Capital Adequacy Ratio (CAR) and liability composition among the four KBMI 4 banks listed on the Indonesia Stock Exchange (IDX), namely BBKA, BBRI, BMRI, and BBNI, over the quarterly period from 2021 to 2025. The analysis is based on 80 bank-quarter observations extracted from publicly available financial statements and verified using bank-level individual data reported in millions of Indonesian Rupiah. The primary dependent variable is the Capital Adequacy Ratio (CAR), while the independent variables include Return on Assets (ROA), Gross Non-Performing Loans (NPL), Loan-to-Deposit Ratio (LDR), bank size, and liability composition proxied by the Deposit-to-Liability Ratio (DLR). Panel data regression with bank fixed effects and HC1 robust standard errors is employed to estimate the relationships. The results indicate that ROA and liability composition have a positive and statistically significant effect on CAR, whereas NPL, LDR, and bank size are not statistically significant in the baseline model. Robustness tests using winsorization and time fixed effects confirm that profitability and a funding structure dominated by customer deposits remain the most consistent determinants of CAR among KBMI 4 banks. This study

contributes to the banking literature by demonstrating that capital adequacy in large commercial banks should be interpreted as an indicator of capital quality supported by sustainable profitability and stable funding, rather than merely as a measure of regulatory compliance. For investors, the findings suggest that CAR should be evaluated jointly with ROA, deposit-based funding structure, credit quality, and risk-weighted asset expansion capacity when assessing the fundamental performance and financial resilience of banking stocks.

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1. INTRODUCTION

Capital adequacy is a core indicator in banking supervision because capital functions as a buffer against losses, a safeguard for depositor confidence, and a basis for the expansion of risk-weighted assets. In the banking industry, the Capital Adequacy Ratio (CAR) cannot be interpreted in the same way as the equity ratio of non-financial firms. Banks mobilize substantial public funds, transform them into loans and earning assets, and must ensure that asset-side risks do not weaken capital capacity on the liability side. Accordingly, CAR analysis should integrate profitability, asset quality, intermediation liquidity, bank size, and funding structure.

The Indonesian post-Covid-19 context further strengthens the relevance of this study. Banks have faced a combination of credit recovery, interest rate normalization, competition for third-party funds, and stricter prudential supervision. Bank Indonesia (2025) reported that financial system stability in the first semester of 2025 remained well maintained, supported by banking resilience, credit quality, strong capitalization, and corporate repayment capacity. The Financial Services Authority Otoritas Jasa Keuangan (2025) also reported that, as of June 2025, the CAR of commercial banks remained solid at 25.81%, liquidity was adequate, and gross NPL declined to 2.22%. Meanwhile, the International Monetary Fund (2024, 2025) assessed Indonesia's financial system as relatively resilient, although it remains dominated by large banks; therefore, the monitoring of capital, liquidity, credit growth, and third-party fund growth remains crucial. These conditions make KBMI 4 banks a strategic object of study because of their contribution to assets, credit, third-party funds, payment systems, and policy transmission.

This study focuses on BBKA, BBRI, BMRI, and BBNI. These four banks are classified as KBMI 4 banks under the bank grouping framework based on core capital in POJK Number 12/POJK.03/2021. Although all four are large banks, their business profiles are not identical. BBKA is characterized by low-cost funding and strong liquidity, BBRI has substantial exposure to micro and MSME segments, BMRI has a broad corporate and wholesale portfolio, while BBNI has been strengthening asset quality and pursuing business transformation. These persistent interbank differences provide the methodological rationale for using fixed effects models.

The main contribution of this article lies in its use of liability composition as a key variable in explaining CAR. Empirical banking literature in Indonesia often examines CAR, LDR, NPL, and ROA separately or focuses primarily on bank profitability. However, for commercial banks, funding quality is part of the mechanism that supports capital resilience. The Deposit to Liability Ratio is used to capture the proportion of third-party funds to total liabilities. This ratio is more appropriate

for banks than conventional corporate leverage measures because public deposits constitute the raw material of intermediation, not merely financial debt.

Against this background, this study aims to analyze the effects of ROA, NPL, LDR, bank size, and liability composition on CAR among KBMI 4 banks over the quarterly period 2021–2025. The study also estimates an additional model to examine the determinants of liability composition. The empirical question addressed is whether the capital adequacy of large banks is explained primarily by profitability and funding stability, or by credit risk, intermediation liquidity, and asset scale.

2. LITERATURE REVIEW

2.1 *Capital Adequacy Ratio and Banking Stability*

The Capital Adequacy Ratio measures the ratio of regulatory capital to risk-weighted assets. This ratio reflects not only minimum compliance but also a bank's capacity to absorb losses, maintain market confidence, and support credit expansion without compromising its risk profile. Basel Committee on Banking Supervision (2026) treats risk-based capital, leverage, the Liquidity Coverage Ratio (LCR), and the Net Stable Funding Ratio (NSFR) as an integrated supervisory package because bank stability cannot be assessed solely from the amount of capital. The Basel III monitoring findings as of June 2025 also show that increases in the core capital of large banks moved in tandem with after-tax profit and adequate liquidity. Accordingly, CAR is theoretically better understood as the outcome of interactions among profitability, asset risk, and funding structure. In the Indonesian context, the OJK framework on the minimum capital adequacy requirement (KPMM) and bank grouping based on core capital provides the regulatory basis for analyzing KBMI 4 banks.

2.2. *Profitability, Credit Risk, and Liquidity*

Profitability, as measured by ROA, is expected to have a positive effect on CAR because earnings can strengthen capital through retained earnings. In large banks, consistent profitability not only increases internal capital formation capacity but also provides room for provisioning, controlled dividend payments, and expansion of risk-weighted assets. Pranoto & Arifin (2025) showed that ROA has a positive effect on CAR among Indonesian state-owned banks, whereas LDR is not always significant. This finding is consistent with the logic that profitability has a more direct channel to capital, whereas LDR is an intermediation indicator whose effect depends on credit quality, funding costs, and asset risk weights.

Gross NPL represents credit risk. An increase in NPL may reduce profits through the allowance for impairment losses and may weaken capital if credit losses persist. However, in large banks, the relationship between NPL and CAR is not always direct because these banks have stronger provisioning capacity, portfolio diversification, access to funding, and internal oversight. International Monetary Fund (2025) emphasized that indicators of Indonesian banking resilience should include credit growth, growth in third-party funds (DPK), funding risk, and the recognition of credit quality. Therefore, a negative relationship between NPL and CAR remains prudentially plausible, but its empirical significance must be tested in a model controlling for profitability, funding structure, liquidity, size, and bank fixed effects. LDR also has an ambivalent relationship with CAR: credit growth may increase interest income, but it also expands risk-weighted assets and funding requirements.

Indonesian empirical literature strengthens the argument that credit-risk and liquidity ratios should not be interpreted separately. Wahyuningsih et al. (2024) showed that risk management strategies play a role in optimizing liquidity and reducing credit risk in the Indonesian banking industry. Pradigdo et al. (2025) also showed that CAR, LDR, NIM, and NPL are frequently used jointly in studies of bank profitability, indicating the

interrelationship among capital, intermediation, margins, and asset quality. Therefore, if NPL and LDR are not significant in this study's CAR model, the result does not imply that the two ratios are unimportant; rather, it indicates that, among KBMI 4 banks, their effects may operate through earnings, provisioning, deposit structure, and more established risk management channels.

2.3. Liability Composition and Bank Funding Structure

Liability composition is proxied by the Deposit-to-Liability Ratio, calculated as third-party funds divided by total liabilities. For banks, a high proportion of third-party funds may indicate a more stable funding base, particularly when supported by low-cost current and savings accounts. Sutrisno (2025) showed that third-party funds are an important factor in the performance of Indonesian conventional banks, while Basel Committee on Banking Supervision (2026) emphasizes funding stability through liquidity metrics and the NSFR. However, third-party funds should not be regarded as funding that is always inexpensive and risk-free. Their quality must be assessed through the CASA structure, time deposits, cost of funds, depositor concentration, and interest-rate sensitivity. Because quarterly public data do not always provide these details consistently, the Deposit-to-Liability Ratio is used as a relevant aggregate proxy, although it must be interpreted cautiously.

Methodologically, the use of liability composition requires a consistent data basis. This study uses only individual/bank-only figures because combining individual and consolidated reports may alter total assets, total liabilities, and third-party funds. This consistency is necessary so that DebtComp and Size represent the same bank characteristics in each quarter. The decision also strengthens the validity of the fixed effects interpretation because the variation examined is within-bank variation based on the same reporting basis, rather than an artifact arising from differences in report consolidation.

Based on the preceding discussion, the research hypotheses are formulated as follows: H1: ROA has a positive effect on CAR; H2: NPL has a negative effect on CAR; H3: LDR affects CAR; H4: bank size affects CAR; and H5: liability composition has a positive effect on CAR.

3. RESEARCH METHOD

This study employed an associative quantitative approach using secondary data. The unit of analysis was the bank, while the time unit was the quarter. The sample comprised four KBMI 4 banks listed on the Indonesia Stock Exchange—BBCA, BBRI, BMRI, and BBNI—during 2021Q1–2025Q4. Accordingly, the dataset consisted of 80 bank-quarter observations.

Data were obtained from the official quarterly published financial statements of each bank, the Indonesia Stock Exchange website, and regulatory publications. All balance-sheet figures used to calculate third-party funds, total liabilities, and total assets were based on individual/bank-only reports and stated in millions of Indonesian Rupiah. This policy is important because mixing individual and consolidated data would create measurement bias, particularly in total assets and liabilities. For BCA, when the report presented two ROA lines, the study used the first/main ROA line in the financial ratios section to maintain consistency across periods.

Table 1. Operationalization of Research Variables

Variable	Symbol	Indicator/Formula	Scale
Capital Adequacy Ratio	CAR	Regulatory capital / ATMR × 100%	Ratio (%)
Liability composition	DebtComp	Third-party funds / total liabilities × 100%	Ratio (%)
Profitability	ROA	Bank-reported ROA	Ratio (%)
Credit risk	NPL	Bank-reported gross NPL	Ratio (%)

Variable	Symbol	Indicator/Formula	Scale
Liquidity	LDR	Loans / third-party funds × 100% or bank-reported LDR	Ratio (%)
Bank size	Size	Ln(total assets)	Logarithmic ratio

The primary empirical model is specified as follows: $CAR_{it} = \beta_0 + \beta_1ROA_{it} + \beta_2NPL_{it} + \beta_3LDR_{it} + \beta_4DebtComp_{it} + \beta_5Size_{it} + \mu_i + \varepsilon_{it}$. μ_i denotes bank fixed effects. The additional model for examining the funding structure is specified as follows: $DebtComp_{it} = \alpha_0 + \alpha_1ROA_{it} + \alpha_2NPL_{it} + \alpha_3LDR_{it} + \alpha_4Size_{it} + \mu_i + v_{it}$. The primary estimation applies bank fixed effects and HC1 robust standard errors. Cluster-robust standard errors are not used as the primary basis because there are only four bank clusters, making cluster-based standard error estimates potentially unstable.

The analysis was conducted in five stages. First, descriptive statistics and distributions by bank were examined. Second, outliers were detected using the IQR and z-score. Third, correlations and VIF were assessed to identify potential multicollinearity. Fourth, fixed effects regression was estimated. Fifth, robustness tests were conducted using IQR-based winsorization, P5–P95 winsorization, and a two-way model incorporating time fixed effects.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 2. Descriptive Statistics of Research Variables

Variable	N	Mean	Median	Std. Dev.	Min	Max	IQR Outlier	Outlier $z > 3 $
CAR	80	22,534	21,720	3,469	17,290	29,940	0	0
ROA	80	3,272	3,305	0,880	1,430	5,200	0	0
NPL	80	2,408	2,265	0,799	0,960	4,120	0	0
LDR	80	82,646	85,345	9,269	60,540	98,040	4	0
DebtComp	80	89,291	88,621	3,958	81,698	96,354	0	0
Size	80	21,043	21,056	0,237	20,549	21,524	0	0

The average CAR of the KBMI 4 banks was 22,534%, with a minimum of 17,290% and a maximum of 29,940%. This range indicates that all sampled banks maintained strong capitalization levels, while providing sufficient variation for panel testing. The average ROA was 3,272%, while the average gross NPL was 2,408%. The average LDR was 82,646%, with a minimum of 60,540% and a maximum of 98,040%. The average DebtComp was 89,291%, indicating that the liabilities of KBMI 4 banks were heavily supported by third-party funds. The average Size was 21,043, measured as the natural logarithm of total assets.

The bank-level descriptions reveal distinct profiles. BBKA had the highest average CAR and DebtComp and the lowest LDR. BBRI had the highest average NPL, consistent with the scale of its micro and MSME portfolio. BMRI had the lowest average CAR in the sample, while BBNI had the lowest average ROA. These differences reinforce the choice of fixed effects because interbank heterogeneity cannot be ignored.

4.2 Outliers and Winsorization Policy

Table 3. IQR-Based Outlier Observations

Variable	Bank	Period	Value	IQR lower bound	IQR upper bound	Z-score	Decision
LDR	BBKA	2021Q2	62,35	62,47	104,79	-2,190	Not removed
LDR	BBKA	2021Q3	61,97	62,47	104,79	-2,231	Not removed

Variable	Bank	Period	Value	IQR lower bound	IQR upper bound	Z-score	Decision
LDR	BBCA	2021Q4	61,96	62,47	104,79	-2,232	Not removed
LDR	BBCA	2022Q1	60,54	62,47	104,79	-2,385	Not removed

Four low-LDR observations for BBCA were identified as outliers based on the IQR. These observations were not removed for three reasons. First, all figures were verified against official published reports and were consistent with the individual/bank-only basis. Second, the absolute z-scores of all observations were below 3, indicating that they were not extreme outliers under the standard-deviation approach. Third, economically, these values represent BBCA's characteristics as a bank with strong liquidity and a large third-party funding base. Removing valid observations would eliminate an important characteristic of the sample and make the data appear more homogeneous than the industry reality.

The baseline model uses raw data. Winsorization is employed only as a sensitivity test, not as the primary data-cleaning procedure. This policy is more appropriate for banking research because verified extreme values often reflect specific business strategies rather than data errors.

4.3 Correlation, VIF, and Model Feasibility

Table 4. Multicollinearity Assessment

Variable	VIF	Auxiliary R ²	Interpretation
ROA	3,459	0,711	Acceptable
NPL	1,340	0,254	Acceptable
LDR	3,683	0,728	Acceptable
DebtComp	5,521	0,819	Requires attention
Size	2,090	0,522	Acceptable

The VIF results indicate that ROA, NPL, LDR, and Size are within acceptable limits. DebtComp has a VIF of 5,521 and therefore requires attention. However, this variable is retained because it is the conceptual focus of the study and can still be interpreted cautiously. The high correlation between DebtComp and LDR is also logical because both originate from banks' asset-liability structures. Therefore, the DebtComp result is not interpreted as mechanical causality, but as an empirical association between the dominance of third-party funds in liabilities and capital adequacy.

The relevance test for bank fixed effects indicates that bank fixed effects are required. In the CAR model, the fixed-effects F-test produced a p-value < 0,001. A two-way model with time fixed effects was also used as a robustness test to ensure that the main results were not driven solely by shocks in particular periods.

4.4 CAR Model Regression Results

Table 5. Fixed Effects Estimation Results: Determinants of CAR

Variable	Coefficient	Robust SE HC1	t-statistic	p-value	Decision
Constant	-18,863	33,115	-0,570	0,5707	Not significant
ROA	1,465	0,351	4,169	0,0001	Positive and significant
NPL	-0,464	0,364	-1,275	0,2066	Not significant
LDR	0,029	0,038	0,781	0,4371	Not significant
DebtComp	0,393	0,118	3,327	0,0014	Positive and significant
Size	0,076	1,542	0,049	0,9610	Not significant

Note: N = 80; Adjusted R² = 0,888; the model uses bank fixed effects and HC1 robust standard errors. Source: Data processed by the researcher, 2026.

ROA has a positive and significant effect on CAR, with a coefficient of 1,465 and a p-value of 0,0001. This means that a one-percentage-point increase in ROA is associated with an approximately 1,465-percentage-point increase in CAR after controlling for other variables and bank fixed effects. This result supports H1 and strengthens the argument that profit is a source of internal capital formation. Substantively, the finding indicates not only that more profitable banks have better operational performance, but also that profitability provides room to retain earnings, establish reserves, and support the growth of risk-weighted assets. This finding is consistent with Pranoto & Arifin (2025) and with Basel Committee on Banking Supervision (2026), which showed that the recent strengthening of capital in large banks was associated with increases in Tier 1 capital and after-tax profit.

NPL has a negative coefficient of -0,464, but the effect is not significant. Accordingly, H2 is not statistically supported. The negative direction remains consistent with the prudential logic that non-performing loans can reduce profits and capital through the establishment of allowance for impairment losses (CKPN). However, among KBMI 4 banks, NPL variation during the study period appears insufficient to explain CAR variation after controlling for profitability, liability structure, liquidity, size, and bank fixed effects. A stronger interpretation is that credit risk remains material but is not a dominant direct determinant in this model because large banks have stronger capital buffers, provisioning capacity, and portfolio diversification. This interpretation is consistent with International Monetary Fund (2024, 2025), which continues to identify credit quality and risk recognition as important priorities even though Indonesia's large banks maintain relatively strong capital and liquidity.

LDR is not significant; therefore, H3 is not supported. This result indicates that intermediation intensity does not directly determine CAR among KBMI 4 banks. The finding is not inconsistent with banking logic because the effect of LDR on CAR may operate through profitability, credit quality, credit risk weights, and funding structure. Pranoto & Arifin (2025) also showed that LDR may have a positive but insignificant effect on CAR among state-owned banks. Accordingly, LDR should not be interpreted mechanically as a factor that invariably increases or decreases CAR; among large banks, it is more informative when assessed together with the composition of third-party funds, cost of funds, credit growth, and asset quality.

DebtComp has a positive and significant effect on CAR, with a coefficient of 0,393 and a p-value of 0,0014. This result supports H5. Substantively, the greater the proportion of third-party funds to total liabilities, the higher the CAR after controlling for other factors. This finding strengthens the argument that a funding structure based on third-party funds is associated with capital resilience because stable funding can reduce cost-of-funds pressure, preserve margins, and strengthen profits as a source of internal capital. However, because DebtComp has a higher VIF than the other variables and the proxy does not distinguish CASA from high-cost deposits, the interpretation must be limited to a statistical association rather than an unconditional causal claim.

Size is not significant; therefore, H4 is not supported. After controlling for bank fixed effects, variation in asset size within the KBMI 4 group is not a primary explanation of CAR. This result is reasonable because all objects of the study are already large banks, resulting in relatively narrow scale variation compared with the overall commercial-bank population. For capital-market readers, this finding is important because bank size is not automatically synonymous with capital quality. Among large banks, differences in earnings quality, the structure of third-party funds, asset quality, and discipline in RWA growth are more informative than asset size alone.

4.5 Robustness: Winsorization and Time Fixed Effects

Table 6. Robustness Tests for the CAR Model

Variable	Raw FE β (p)	IQR Winsorized β (p)	P5–P95 β (p)	Two-way FE β (p)	Conclusion
ROA	1,465 (0,0001)	1,478 (0,0001)	1,688 (0,0000)	1,364 (0,0169)	Consistently positive and significant
NPL	-0,464 (0,2066)	-0,462 (0,2078)	-0,669 (0,0634)	-0,290 (0,4008)	Not robustly significant
LDR	0,029 (0,4371)	0,027 (0,4842)	0,015 (0,7088)	0,034 (0,5001)	Remains insignificant
DebtComp	0,393 (0,0014)	0,390 (0,0016)	0,412 (0,0011)	0,322 (0,0226)	Consistently positive and significant
Size	0,076 (0,9610)	0,107 (0,9448)	-0,616 (0,7042)	-0,881 (0,8090)	Remains insignificant

The robustness tests indicate that the main conclusions are stable. ROA and DebtComp remain positive and significant in the raw data, IQR winsorization, P5–P95 winsorization, and the two-way model incorporating time fixed effects. NPL becomes weakly significant only under P5–P95 winsorization but is again insignificant in the two-way model. Therefore, NPL cannot be regarded as a robust determinant. LDR and Size remain consistently insignificant. These robustness results strengthen the conclusion that profitability and liability composition are the two factors that most consistently explain CAR among KBMI 4 banks.

4.6 Additional Model: Determinants of Liability Composition

Table 7. Fixed Effects Estimation Results: Determinants of Liability Composition

Variable	Coefficient	Robust SE HC1	t-statistic	p-value	Decision
Constant	49,287	34,204	1,441	0,1539	Not significant
ROA	0,777	0,328	2,367	0,0206	Positive and significant
NPL	0,937	0,301	3,111	0,0027	Positive and significant
LDR	-0,134	0,038	-3,543	0,0007	Negative and significant
Size	2,380	1,639	1,452	0,1508	Not significant

Note: N = 80; Adjusted R² = 0,909; the model uses bank fixed effects and HC1 robust standard errors. Source: Data processed by the researcher, 2026.

The additional model shows that ROA has a positive and significant effect on liability composition. More profitable banks tend to maintain a funding structure based on third-party funds because profitability strengthens perceptions of stability and service capability. NPL also has a positive and significant effect on DebtComp. This direction must be interpreted cautiously because it does not mean that an increase in NPL is “good” for a bank. The result is more appropriately interpreted as a within-bank association: in certain periods when credit risk increases, the proportion of third-party funds in liabilities may continue to rise because the depositor base of large banks is relatively sticky or because banks reduce their dependence on non-deposit funding sources. This interpretation requires further research using data on CASA composition, time deposits, interbank borrowing, and securities.

LDR has a negative and significant effect on DebtComp. This result indicates that an increase in the loan-to-deposit ratio is associated with a decline in the proportion of third-party funds in total liabilities, possibly because credit expansion requires additional funding sources beyond third-party funds or because total liabilities increase through non-deposit items. Size is insignificant; therefore, asset scale within the KBMI 4 group does not sufficiently explain variation in the proportion of third-party funds after controlling for bank fixed effects. This finding corrects the previous manuscript, which had stated that Size was significant; based on the empirical results, that claim must be removed.

4.7 Integrated Discussion

The final empirical results alter the article's narrative compared with the simulation-based manuscript. The initial simulation identified NPL and Size as significant variables, whereas the verified data show that only ROA and DebtComp are consistently significant determinants of CAR. This change is a strength rather than a weakness because a scientific article must follow empirical data rather than preserve simulated results. The revision sharpens the article's contribution: the capital adequacy of KBMI 4 banks during 2021–2025 is explained more strongly by profitability and funding structure than by variation in credit risk, LDR, or asset scale within the large-bank group.

The positive and significant ROA finding indicates that profit remains the primary engine of capital strengthening. In large banks, stable profitability enables the accumulation of retained earnings, provisioning, more sustainable dividend payments, and the expansion of risk-weighted assets without immediately placing pressure on CAR. This is relevant to Basel Committee on Banking Supervision (2026), which showed that the strengthening of capital ratios among large global banks occurred alongside increases in core capital and after-tax profit. In the Indonesian context, this finding is consistent with Pranoto & Arifin (2025) for state-owned banks and strengthens the argument that CAR is not merely an outcome of capital regulation but also an outcome of earnings quality.

The positive and significant DebtComp finding adds a dimension that is less frequently discussed in Indonesian CAR studies: the quality of the liability structure. A high proportion of third-party funds can provide a funding cushion because banks are less dependent on interbank borrowing, securities, or non-deposit funding sources that are more sensitive to market conditions. Otoritas Jasa Keuangan (2025) reported that, as of June 2025, banking third-party funds continued to grow, liquidity remained above the threshold, and industry CAR remained solid. Komite Stabilitas Sistem Keuangan (2025) also reported that, as of September 2025, third-party funds grew by 11,18% year on year, CAR stood at 26,15%, and liquidity remained adequate. However, investors and management should not rely solely on the ratio of third-party funds to liabilities. A high proportion of third-party funds is more valuable when supported by a strong CASA base, controlled funding costs, a diversified depositor base, and the ability to maintain margins when interest rates change.

The insignificance of NPL and LDR should not be interpreted as evidence that credit risk and liquidity are unimportant. From a supervisory perspective, both remain primary indicators of asset quality and intermediation. However, in the KBMI 4 sample, NPL variation remained within a relatively controlled range, and the banks had substantial provisioning capacity. LDR is also more clearly reflected in the funding-structure dimension than as a direct determinant of CAR, as shown by the additional model indicating a negative effect of LDR on DebtComp. This interpretation is consistent with Wahyuningsih et al. (2024), who treated credit risk and liquidity as objects of active management through risk management strategies. Accordingly, the findings are more appropriately interpreted as evidence that CAR among KBMI 4 banks during 2021–2025 primarily moved with profitability and funding structure, while credit risk and liquidity remained supervisory variables that affected capital through indirect channels.

The low-LDR outliers for BBKA enrich the analysis by showing that extreme values are not always equivalent to data errors. Removing these observations would eliminate BBKA's distinctive characteristics as a bank with strong liquidity and a large third-party funding base. The decision to retain valid outliers demonstrates methodological discipline: outliers should be removed only when they are input errors, inconsistent with the definition, or economically inexplicable. In this case, the low LDR values provide substantive information that distinguishes BBKA from the other KBMI 4 banks and helps explain why fixed effects are required.

The managerial implication of this study is that strengthening CAR cannot be managed through capital policy alone. Banks need to maintain high-quality earnings, control funding costs, retain third-party funds, and manage intermediation prudently so that credit growth does not erode asset quality or capital. For regulators, the findings emphasize the importance of assessing CAR together with funding structure, asset quality, and liquidity indicators. A strong CAR supported by expensive or concentrated funding still requires supervision. Conversely, a strong third-party funding base may signal resilience, but it must still be linked to credit quality, maturity profile, and the bank's ability to maintain margins throughout the interest-rate cycle.

4.8 Practical Implications for Investors

From an investor perspective, these findings shift the interpretation of KBMI 4 bank stocks from merely "a high CAR means safety" to "a high-quality CAR is supported by earnings, stable funding, and controlled risk." Investors need to distinguish a high CAR arising from strong profitability and third-party funds from a high CAR resulting from weak credit growth or stagnant productive assets. In other words, CAR should be viewed as the quality of the buffer, not merely the buffer figure.

The first practical implication is that fundamental screening of bank stocks should place ROA and the composition of third-party funds as core indicators alongside CAR. Banks with stable ROA, substantial third-party funds, a strong CASA base, and controlled NPL are more likely to maintain capital without excessive dependence on corporate actions to raise additional capital. Second, LDR must be interpreted contextually. A low LDR may indicate room for credit expansion and ample liquidity, but it may also indicate suboptimal lending. Conversely, a high LDR is not necessarily unfavorable when credit quality, margins, and funding sources remain sound.

Third, investors should assess capital sustainability through three practical questions: whether earnings are sufficient to support RWA growth; whether third-party funds are sufficiently stable and inexpensive to preserve margins; and whether asset quality does not require provisioning that could erode capital. Because this study finds that Size is insignificant, investors should not use asset size as the sole proxy for bank quality. Within the KBMI 4 group, valuation differentiation should be based more appropriately on earnings quality, funding structure, risk discipline, and the ability to convert liquidity into profitable credit growth.

5. CONCLUSION

This study analyzed the determinants of CAR and liability composition among four KBMI 4 banks listed on the Indonesia Stock Exchange over the quarterly period from 2021 to 2025. Based on 80 observations verified against official reports, ROA and DebtComp had positive and significant effects on CAR. Accordingly, H1 and H5 were supported. NPL had a negative but insignificant direction, while LDR and Size were insignificant. Therefore, H2, H3, and H4 were not supported by the baseline model.

The robustness tests showed that ROA and DebtComp remained significant after winsorization and the inclusion of time fixed effects. Four low-LDR observations for BBKA were retained because they were valid according to the source documents, consistent with the individual reporting basis, and economically relevant. The additional model showed that ROA, NPL, and LDR were significantly associated with liability composition, while Size was insignificant. These results confirm that bank funding structure is an active variable in banking management, rather than merely a passive consequence of asset size.

The implication of the study is that CAR should be managed in an integrated manner through profitability and funding stability. KBMI 4 banks need to maintain high-quality earnings, a stable third-party funding base, controlled funding costs, and sound credit quality so that CAR is not only high in regulatory terms but also economically strong. For regulators, the findings support a supervisory approach that assesses CAR alongside indicators of liability structure, liquidity, and asset quality. For investors, the findings suggest that investment decisions concerning large-bank stocks should evaluate the quality of CAR, not merely its level. CAR supported by high ROA and stable deposit funding provides a stronger fundamental signal than a high CAR arising from restrained credit growth, low RWA absorption, or an expensive funding structure. The study is limited by the inclusion of only four banks, the use of aggregate ratios, the exclusion of macroeconomic variables, and potential endogeneity between CAR and funding structure. Future research may use dynamic models and incorporate CASA, NIM, BOPO, LCR, NSFR, the policy interest rate, inflation, GDP growth, and the exchange rate to provide more comprehensive results.

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