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## The Influence of Bank Characteristics on Capital Adequacy Ratio

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### ABSTRACT

This study aims to determine the influence model on Return on Asset (ROA), Loan to Deposit (LDR), and Net Performing Loan (NPL) on Capital Adequacy Ratio (CAR) in banks in Indonesia. Capital adequacy is an important part of banking financial performance, because the achievement of an optimal Capital Adequacy Ratio (CAR) indicates that the bank has sufficient capital to fund each of its operations. Sufficient capital allows banks to easily innovate, so as to develop the company's productivity. Interestingly, CAR is influenced by various factors, so it is necessary to academically examine the factors that affect CAR. This study uses a quantitative approach with an empirical method using Bank BTN data during the 2010-2020 period using the help of SPSS software. Data processing calculations using the classical assumption test and hypothesis testing. Classical assumption test by calculating normality, heteroscedasticity, and autocorrelation tests. Hypothesis testing by calculating the t-test and the F-test. The results showed that this model contributed 81% to the change in CAR. Partially, it shows that ROA has a negative effect on CAR, meaning that the lower the ROA, the higher the CAR, LDR has a negative effect on CAR, meaning that the lower the LDR, the higher the CAR, and NPL has a negative effect on CAR, meaning that the lower the NPL, the higher the CAR. This indicates that an increase or decrease in ROA, LDR, and NPL has an impact on changes in Bank BTN's CAR.

**Keywords** : *Return on Asset (ROA); Loan to Deposit (LDR); Net Performing Loan (NPL); Capital Adequacy Ratio (CAR)*

### ABSTRACT

*Penelitian ini bertujuan untuk menentukan model pengaruh terhadap Return on Asset (ROA), Loan to Deposit (LDR) dan Net Performing Loan (NPL) terhadap Capital Adequacy Ratio (CAR) pada bank di Indonesia. Kecukupan modal merupakan bagian penting dalam kinerja keuangan perbankan, karena tercapainya Capital Adequacy Ratio (CAR) yang optimal menandakan bank tersebut memiliki modal yang cukup untuk mendanai setiap operasional nya. Modal yang cukup membuat perbankan dapat dengan mudah melakukan inovasi, sehingga dapat mengembangkan produktifitas perusahaan. Menariknya, CAR dipengaruhi oleh berbagai faktor, sehingga perlu untuk mengkaji secara akademis faktor-faktor yang berpengaruh terhadap CAR. Penelitian ini menggunakan pendekatan kuantitatif dengan metode empiris menggunakan data Bank BTN selama periode 2010-2020 menggunakan bantuan software SPSS. Perhitungan olah data dengan menggunakan uji asumsi klasik dan uji hipotesis. Uji asumsi klasik dengan menghitung uji normalitas, heteroskedastisitas dan autokorelasi. Uji hipotesis dengan menghitung uji t untuk pasrial*

*dan uji F untuk simultan. Hasil penelitian menunjukkan bahwa model ini ini berkontribusi sebesar 81% atas perubahan CAR. Secara parsial menunjukkan bahwa ROA berpengaruh negatif terhadap CAR artinya semakin rendah ROA maka semakin tinggi CAR, LDR berpengaruh negatif terhadap CAR artinya semakin rendah LDR maka semakin tinggi CAR, dan NPL berpengaruh negatif terhadap CAR artinya semakin rendah NPL maka semakin tinggi CAR. Hal ini menandakan bahwa kenaikan maupun penurunan ROA, LDR, maupun NPL berdampak pada perubahan CAR Bank BTN.*

**Keywords** : ***Imbal Hasil atas Aset (ROA); Loan to Deposit (LDR); Net Performing Loan (NPL); Rasio Kecukupan Modal Rasio Kecukupan Modal (CAR)***

## **INTODUCTION**

The banking industry plays an integral role in the modern financial system, acting as the cornerstone for mobilizing savings, channeling capital to productive sectors, and facilitating the efficient allocation of resources within the economy. Banks serve as intermediaries that collect deposits from surplus units and extend credit to deficit units, thereby supporting economic growth and financial inclusion. The significance of banking institutions in the economic architecture of a country underscores the necessity for their soundness, resilience, and effective regulatory oversight (Soenjoto, 2018). Historically, banks have evolved from simple depository institutions to complex financial conglomerates offering a broad spectrum of services. As posited by Allen and Santomero (1998), the theory of financial intermediation highlights banks not only mitigate information asymmetries but also provide liquidity transformation, risk sharing, and maturity intermediation. In fulfilling these functions, banks are exposed to various risks, including credit, market, operational, and liquidity risks. Consequently, the adequacy of capital becomes a vital indicator of a bank's ability to absorb losses and maintain solvency during times of financial distress.

According to Neuberger (1998), the behavioral theory of banking emphasizes a linear relationship between market structure and bank behavior, which in turn influences performance. This theoretical perspective implies that banks operate not in isolation but in response to evolving market forces, regulatory frameworks, and macroeconomic variables. With globalization, deregulation, and advancements in financial technology, the structure of the financial intermediation landscape has undergone profound changes. Bikker and Wesseling (2003) and Scholtens & Wensveen (2003) argue that these forces have transformed how banks manage capital, liquidity, and risk.

Study found that there is a statistically negative significant influence of CAR on both performance indicators ROE and ROA in the commercial Islamic banks in the selected MENA countries (Alnajjar & Othman, 2021). Although risk has an adverse effect and liquidity does not affect profitability, does not significantly affect profitability. While bank size enhances the beneficial moderation of credit risk on profitability, it does not mitigate the impact of CAR and liquidity. (Hasanuh, Sulistiyo, Sidik, Suartini, Ghani, Chudjuarjeen, & Manda (2024). Study found that Working capital ratios (CR, QR, WCTR, ITR, RTR, and CTR) are positively correlated with profitability ratios. Of the six working capital component ratios, five of them are significant at a 5-percentage level, except cash turnover ratios. Study aims to analyze the effect of Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), and Loan to Deposit Ratio (LDR) on Return on Equity (ROE) in banking companies listed on the Indonesia Stock Exchange (IDX) in 2023. That CAR and NPL have a significant partial effect on ROE, while LDR has no significant effect on ROE. The F-test results show that CAR, NPL, and LDR collectively have a significant effect on ROE. Meiludin Putra Satriandi, Iis Anisa Yulia, Agus Pranamulia (2023).

In Indonesian context, commercial banks operate under a regulatory framework that mandates minimum capital requirements to safeguard the stability of the financial system. The Capital Adequacy Ratio (CAR), which measures a bank's capital with its risk-weighted assets, is a key prudential tool adopted globally, including by Bank Indonesia. A higher CAR implies greater capacity to withstand financial shocks, support asset expansion, and instill confidence among

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depositors and investors. Empirical studies underscore the importance of CAR in maintaining financial stability and facilitating economic growth (Agus, 2022).

Among the financial indicators influencing CAR, Return on Assets (ROA), Loan to Deposit Ratio (LDR), and Non-Performing Loans (NPL) are of particular importance. ROA is a profitability ratio that measures a bank's efficiency in utilizing its assets to generate earnings. As noted by Yuwono and Sudaryono (2010), ROA is not only a backward-looking indicator of performance but also a forward-looking predictor of future profitability. A high ROA indicates sound asset management and effective cost control. Bank Indonesia classifies ROA above 1.22% as healthy, between 0.99% and 1.22% as moderately healthy, and below 0.77% as unhealthy.

Liquidity management, proxied by LDR, is also critical for sustainable banking operations. LDR reflects the proportion of a bank's lending activities relative to its deposit base. While a higher LDR may indicate aggressive lending strategies, it may also signal liquidity constraints if not accompanied by adequate funding sources. Effective liquidity management is essential to mitigate funding mismatches and safeguard against run-on-the-bank scenarios (Diamond & Rajan, 2001; Greuning & Bratanovic, 2009). Admati and Hellwig (2013) assert that the inability to meet withdrawal demands may trigger solvency concerns and reputational damage.

Credit quality, as measured by NPL, directly impacts the bank's asset health and provisioning requirements. A high NPL ratio signifies increased credit risk and necessitates higher loan-loss reserves, thereby reducing available capital and profitability. Barus (2016) points out that as NPL rises, banks are compelled to allocate more resources to cover potential defaults, which erodes their capital base and impairs their lending capacity. Some studies, however, suggest that NPL may not always exert a significant effect on profitability or capital adequacy, depending on the bank's size, risk appetite, and asset management strategies (Angriani, 2020).

Given these considerations, the present study seeks to empirically investigate the influence of ROA, LDR, and NPL on CAR in the case of Bank BTN, one of Indonesia's leading state-owned banks. The study covers the period 2010–2020, encompassing a decade of macroeconomic fluctuations, regulatory reforms, and institutional transformations. By adopting a rigorous quantitative approach, this research aims to contribute to the academic discourse on bank performance and provide actionable insights for policymakers, regulators, and financial practitioners striving to enhance capital adequacy and financial resilience.

## RESEARCH METHOD

This study adopts a quantitative empirical research approach to investigate the relationship between bank-specific financial indicators and the Capital Adequacy Ratio (CAR). The methodological design is structured to ensure objectivity, reproducibility, and analytical rigor in evaluating the influence of Return on Assets (ROA), Loan to Deposit Ratio (LDR), and Non-Performing Loans (NPL) on CAR.

The research used in this study is quantitative empirical by developing a research model where Return on Assets (ROA), Loan to Deposit Ratio (LDR), and Net Performing Loans (NPL) are independent variables that affect the dependent variable, namely the Capital Adequacy Ratio (CAR). According to Sugiyono (2018) qualitative research methods are research methods based on the philosophy of philosophy used to research on scientific conditions (experiments) where the researcher is the instrument, data collection techniques and qualitative analysis is more qualitative. As an instrument, data collection techniques and qualitative analysis emphasize more on meaning. This study aims to determine how the influence of internal bank characteristics-Return on Assets (ROA), Loan to Deposit Ratio (LDR), and Net Performing Loans (NPL)-on the Capital Adequacy Ratio (CAR) at Bank BTN.

According to Syahfitri et., all (2023) Empirical is a research approach that prioritizes the use of real evidence and direct observation in producing knowledge. In this approach, data is collected through observation, experimentation, or field data collection. Data data obtained is then analyzed to produce conclusions based on concrete evidence. Concrete evidence. And Empirical is an

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approach that focuses on collecting data that can be directly observed and measured. Data that can be directly observed and measured. This approach avoids judgment based on assumptions or beliefs, and prioritizes the use of measurable facts. According to Dolapcioglu and Doğanay (2022), empirical research enables the systematic observation, measurement, and evaluation of phenomena, which is particularly essential in the field of finance and banking where data-driven insights are fundamental for sound policy formulation.

This study employs an associative descriptive analysis framework, which facilitates the examination of relationships among variables without manipulating the data. The primary objective is to describe and explain the extent to which ROA, LDR, and NPL as independent variables exert a statistical influence on CAR as the dependent variable. This framework is especially appropriate for financial modeling, where causality is inferred from observed data rather than experimental manipulation.

The sampling technique is saturated sampling, namely the sampling technique by taking all secondary data collected from the annual financial statements of Bank BTN for the period 2010 to 2020. Data collection in January 2024 through the Financial Services Authority (OJK) database and the official website of Bank BTN.

The population of this study consists of the financial statements of Bank BTN (Bank Tabungan Negara), a state-owned commercial bank in Indonesia, over eleven years from 2010 to 2020. The sample selection uses a saturated sampling technique, incorporating the entire population dataset to enhance the validity of time-series analysis and to eliminate sampling bias. Time series data are particularly valuable in capturing trends, cyclicity, and structural shifts over time.

The study employs the Ordinary Least Squares (OLS) method for estimating the multiple linear regression model. The OLS technique is widely used in financial research due to its computational efficiency and well-established theoretical foundations. However, to ensure the reliability and validity of the regression results, several classical assumptions must be satisfied. Several tests used in this research:

Normality: The residuals from the regression model should be normally distributed. This is assessed using the Jarque-Bera test, and normality is essential for valid hypothesis testing. Multicollinearity: There should be no perfect linear correlation among the independent variables. Variance Inflation Factor (VIF) is used to detect multicollinearity, where a VIF value above 10 suggests a problem. Linearity: The relationship between the dependent and independent variables should be linear. This is evaluated through scatterplots and residual plots. Homoscedasticity: The variance of the residuals should be constant across observations. The Breusch-Pagan test and White test are commonly used to assess heteroscedasticity. Autocorrelation: Residuals should be independent of each other, especially in time series data. This assumption is tested using the Durbin-Watson statistic and the Breusch-Godfrey LM test. The regression model used in this study can be formally expressed as follows:

$$CAR = \alpha + \beta_1(ROA) + \beta_2(LDR) + \beta_3(NPL) + \varepsilon \quad (1)$$

Where CAR is the Capital Adequacy Ratio, ROA is Return on Assets, LDR is Loan to Deposit Ratio, NPL is Non-Performing Loans,  $\alpha$  is the intercept,  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are the coefficients of the independent variables, and  $\varepsilon$  is the error term.

Hypothesis testing is conducted using the t-test for individual parameters and the F-test for the overall significance of the model. The coefficient of determination (R-squared) is used to assess the model's explanatory power. The statistical analysis is conducted using SPSS software, which facilitates the execution of descriptive statistics, assumption diagnostics, and regression estimations. By adhering to this structured methodological framework, the study aims to generate robust empirical evidence regarding the determinants of capital adequacy in the Indonesian banking sector, thereby contributing to the literature and informing regulatory practices.

## RESULTS AND DISCUSSION

Table 1 provides descriptive statistics for the key variables analyzed in this study, namely Return on Assets (ROA), Loan to Deposit Ratio (LDR), Non-Performing Loans (NPL), and Capital Adequacy Ratio (CAR), based on annual data from Bank BTN for the 2010–2020 period as displayed in Table 1.

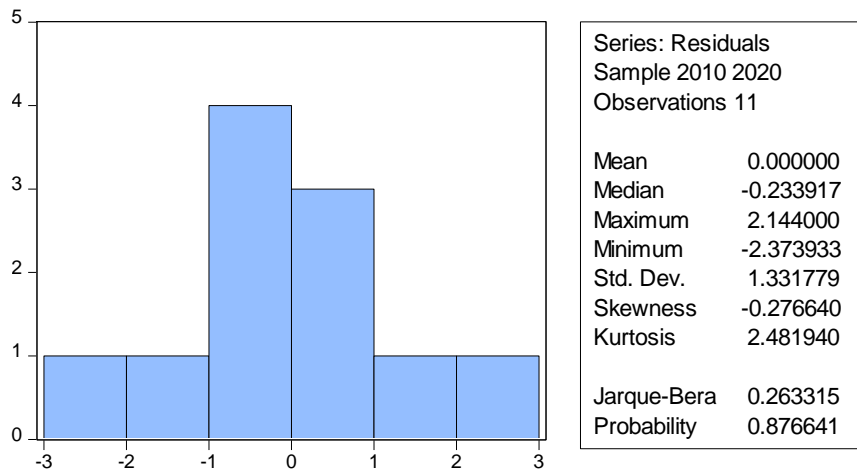
**Table 1. Annual data from Bank BTN for the period 2010-2020**

Variable	Mean	Median	Maximum	Minimum
ROA	1.4718%	1.7100%	2.0500%	0.1300%
LDR	104.537%	103.490%	113.500%	93.190%
NPL	2.3891%	2.2300%	3.1200%	1.6600%
CAR	17.3427%	17.3200%	20.3400%	14.6400%

Source: Processed Data, 2025

The descriptive statistics show that Bank BTN had relatively stable financial indicators during the observation period. The ROA average of 1.47% indicates moderate profitability. The LDR, averaging over 100%, suggests that the bank consistently loaned more than it collected from deposits, potentially indicating reliance on interbank borrowing or equity for funding. NPL values remained below the regulatory threshold of 5%, which suggests prudent credit risk management. The average CAR of 17.34% significantly exceeds the regulatory minimum, indicating strong capital adequacy as displayed in Figure 2.

**Figure 1. Normality Test**



Source: Processed Data, 2025

The Jarque-Bera test was employed to assess the normality of the residuals. The resulting probability value exceeded 5%, indicating that the residuals follow a normal distribution. Thus, the normality assumption required for OLS regression is satisfied. Heteroscedasticity Test using the Breusch-Pagan-Godfrey test yielded the following results:

- F-statistic = 0.2276 (p = 0.8744)
- Obs\*R-squared = 0.9776 (p = 0.8067)
- Scaled explained SS = 0.6347 (p = 0.8884)

All p-values are well above the 5% significance level, indicating the absence of heteroscedasticity. This confirms that the residual variance is homoscedastic, fulfilling one of the crucial OLS assumptions.

Autocorrelation Test using the Breusch-Godfrey LM test showed:

- F-statistic = 0.7974 (p = 0.5005)
- Obs\*R-squared = 2.6602 (p = 0.2645)

These results indicate no significant autocorrelation among residuals, thus meeting the independence assumption in time-series analysis. The t-test result is displayed in Table 2.

**Table 2. Partial Test (t-Test)**

Variable	Coefficient	t-Statistic	p-Value
ROA	-0.7277	-0.8625	0.0070
LDR	-0.1080	-1.0527	0.0005
NPL	-1.5958	-1.5686	0.0329

*Source: Processed Data, 2025*

The t-test results reveal that all three independent variables—ROA, LDR, and NPL—have a statistically significant and negative effect on CAR. This suggests that a reduction in profitability (ROA), liquidity management (LDR), or credit quality (NPL) is associated with an increase in capital reserves. The inverse relationship between ROA and CAR may indicate that lower profitability compels the bank to maintain a stronger capital buffer. Similarly, higher loan activity (LDR) could strain liquidity and prompt higher capital retention, while deteriorating asset quality (NPL) requires more capital to absorb potential losses. The F-test is displayed in Table 3.

**Table 3. Simultaneous Test (F-Test)**

	Result		
R-squared	0.850921	Mean dependent var	17.34273
Adjusted R-squared	0.815602	S.D. dependent var	1.797276
S.E. of regression	1.591780	Akaike info criterion	4.042871
Sum squared resid	17.73635	Schwarz criterion	4.187560
Log likelihood	-18.23579	Hannan-Quinn criterion.	3.951664
F-statistic	1.916209	Durbin-Watson stat	2.496882
Prob(F-statistic)	0.000000		

*Source: Processed Data, 2025*

The F-test results confirm that the overall regression model is statistically significant. An R-squared of 85.09% indicates that the variation in CAR is largely explained by the combination of ROA, LDR, and NPL. The adjusted R-squared value of 81.56% confirms model robustness even after adjusting for degrees of freedom. These results are in line with the findings of Africano (2016) and Barus (2016), who noted that NPL significantly weakens the capital position of banks due to increased provisioning costs. The inverse relationship between ROA and CAR reinforces the argument that lower profitability may lead banks to increase capital buffers to compensate for operational risks and safeguard against loss events. Moreover, the LDR-CAR relationship aligns with liquidity-risk theories by Diamond & Rajan (2001), which highlight the need for a balanced liquidity structure to prevent capital deterioration.

This study contributes to banking literature by confirming the interconnected roles of profitability, liquidity, and credit risk in shaping capital adequacy. The implications are vital for policymakers and bank executives: proactive credit management, controlled loan expansion, and sustainable profitability strategies are critical to ensuring robust CAR levels.

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## CONCLUSION

This study concludes that Return on Assets (ROA), Loan to Deposit Ratio (LDR), and Non-Performing Loans (NPL) each exert a significant negative influence on the Capital Adequacy Ratio (CAR) of Bank BTN during the 2010–2020 period. The empirical results demonstrate that declines in profitability, excessive loan disbursement relative to deposits, and deteriorating credit quality are all associated with increased capital requirements, reflecting the bank's need to maintain sufficient buffers against financial risks. With a robust R-squared value of 85.09%, the model affirms that internal performance indicators are critical determinants of capital adequacy. These findings support the theoretical perspectives on bank capital behavior, particularly the capital buffer and risk-based capital frameworks, and emphasize the importance of prudent financial management in ensuring institutional resilience. Consequently, strengthening profitability, managing liquidity efficiently, and maintaining high asset quality are essential strategies for sustaining adequate capital levels and enhancing the long-term stability of banking institutions.

## RECOMMENDATIONS

Based on the empirical findings and analytical interpretations derived from this study, several recommendations are proposed to enhance the capital adequacy and overall financial soundness of commercial banks, particularly Bank BTN. These recommendations are addressed to both internal stakeholders (such as bank management) and external stakeholders (such as regulators and policymakers), to foster resilience, stability, and regulatory compliance in the banking sector.

**Strengthening Profitability through Operational Efficiency.** Given the significant influence of Return on Assets (ROA) on CAR, bank management should focus on improving internal efficiency and profitability. This can be achieved by improving asset utilization to generate higher returns, controlling operating costs through streamlined processes and digital transformation, diversifying revenue sources beyond interest-based income, such as through fee-based services and digital financial solutions, and strengthening risk-based pricing strategies to ensure appropriate levels of returns on loans and investments. Improved profitability not only enhances shareholder value but also provides an internal capital buffer that reduces reliance on external capital injections.

**Implementing Prudent Liquidity Management.** The findings show that the Loan to Deposit Ratio (LDR) has a significant negative effect on CAR. Therefore, banks should maintain an optimal liquidity ratio by carefully managing the balance between lending and deposit mobilization, establishing contingency funding plans to address liquidity shocks, regularly conducting stress tests and scenario analysis of liquidity positions, and ensuring alignment with the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) outlined in the Basel III guidelines. By maintaining a healthy LDR, the bank can mitigate funding risks that may compromise capital adequacy.

**Strengthening Credit Risk Control and Reducing Nonperforming Loans (NPLs).** Nonperforming loans (NPLs) are proven to significantly reduce CAR. Therefore, banks are advised to strengthen credit assessment and due diligence processes before loan approval, adopt early warning systems (EWS) to detect and monitor potential loan defaults, implement more stringent recovery and restructuring strategies for non-performing assets, improve credit risk assessment models and integrate AI-based tools for real-time credit assessment, and provide continuous training for loan officers to uphold the quality of lending. Reducing NPLs not only improves asset quality but also frees up capital that would otherwise be reserved for loan loss provisioning.

**Maintaining a Dynamic Capital Planning Framework.** Banks should implement a forward-looking capital management strategy that is aligned with their risk appetite and business model. This includes regularly reviewing capital adequacy under baseline and adverse economic scenarios, incorporating capital buffers into strategic planning especially during periods of economic expansion or contraction, aligning internal capital targets with evolving regulatory

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standards (e.g. Basel III, OJK regulations), and establishing an internal Capital Adequacy Assessment Process (ICAAP) to holistically measure and project capital requirements.

Improving Regulatory Oversight and Policy Coordination for regulators and policymakers, these findings point to the importance of promoting dynamic capital requirements that reflect bank-specific risk profiles and macroeconomic indicators, supporting the development of integrated reporting tools to track performance indicators such as ROA, LDR, and NPL in real time, promoting financial literacy and governance reforms across the industry to improve managerial competencies across banking institutions and ensuring the implementation of effective risk-based supervision and stress testing frameworks.

In summary, capital adequacy must be approached as a multidimensional objective that integrates financial performance, risk management, and regulatory foresight. The strategic management of profitability, liquidity, and credit quality—as evidenced by ROA, LDR, and NPL—should be at the heart of every bank’s risk and capital policy. These recommendations, if implemented effectively, will not only reinforce Bank BTN’s financial resilience but also contribute to the broader stability of Indonesia’s banking system.

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