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The Effect of Return on Assets, Return on Equity, and Loan-to-Deposit Ratio on Capital Adequacy Ratio: Evidence from Indonesian State-Owned Banks

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Abstract

This study aims to analyze the effect of Return on Assets (ROA), Return on Equity (ROE), and Loan-to-Deposit Ratio (LDR) on the Capital Adequacy Ratio (CAR) of state-owned banks in Indonesia. Maintaining an optimal CAR is crucial for banks to ensure financial stability and compliance with regulatory requirements. To address this objective, panel data regression analysis was employed using secondary data obtained from the annual reports of state-owned banks for the 2019–2023 period. Several diagnostic tests were conducted to select the most appropriate model, and the Random Effect Model (REM) was determined to be the best fit. The empirical findings demonstrate that ROA, ROE, and LDR jointly exert a statistically significant influence on CAR, indicating that bank profitability and liquidity collectively play a role in determining capital adequacy. However, the partial results of the t-test reveal that only ROA has a significant positive effect on CAR, while ROE and LDR show no significant effect. These results highlight the importance of profitability, as measured by ROA, in strengthening capital adequacy. The findings provide valuable insights for policymakers as a reference for designing strategies to maintain banking stability, for banking institutions as input for evaluating financial health, and for investors and potential investors as a basis for assessing bank soundness before making investment decisions.

1. Introduction

According to the Decree of the Minister of Finance of the Republic of Indonesia No.792 of 1990, financial institutions are all bodies whose activities are in the financial sector, conducting collecting and channeling funds to the public, especially to finance the company's investment. Another definition of financial institutions are entities that provide financial and non-financial services to individuals and organizations, involving services to individuals and organizations, involving savers, borrowers, and lenders. lenders. These institutions act as intermediaries, collecting funds from the public and redistributing them through various financing facilities, which support economic growth and employment economic growth and employment (Manullang *et al*., 2023).

Banks play a pivotal role in the economy as they act as interconnected partners with a significant impact on economic development, growth and the well-being of society. Capital adequacy is a key focus for banks as this directly affects their ability to fund and support businesses, while protecting themselves from potential risks (Bogale, 2020; Konovalova & Caplinska, 2020). Every company needs working capital to meet operational needs such as the cost of purchasing raw materials, employee wages, and others. The capital is expected to be returned through sales in a short time. Therefore, the company must achieve the desired goals, such as increasing profits and sustainable work efficiency (Hofmann, 2021; Tsygalov & Yashchenko, 2022; Živanović *et al*., 2022).

The main factor faced by almost all banks is the increasing number of loans and non-performing loans. Non-performing loans occur when banks have difficulty collecting installment payments from debtors. Non-performing loans refer to uncollectible receivables or loans that are considered illiquid because they are difficult to repay due to certain factors (Umiyati & Faly, 2015). In the banking sector, there is a capital holding standard called the minimum capital adequacy requirement (CAR) which is set based on the standards

issued by the Bank for International Settlements (BIS) at 8 percent of risk-weighted assets (RWA).

The determination of this minimum capital is measured by calculating the Capital Adequacy Ratio (CAR) or capital adequacy ratio. CAR is a crucial indicator that reflects the bank's ability to carry out its operational activities and bear risks adequately (Kalsum & Hidayat, 2023; Rismanty & Suraya, 2023; Saputra & Angriani, 2023). CAR is used to cover all possible losses that may occur, including credit risk, operational risk, and market risk. Capital has a significant role in maintaining customer confidence in banking activities. The presence of CAR is vital to ensure the safety of savings and build confidence in the banking system (Kishore, 2022). Therefore, a bank's performance can be measured by the CAR's efficiency in utilizing capital to attract deposits, which are then used to create profits. Of the various ratios available, the profitability ratio is a key factor that affects the stability of a bank.

A company's profitability is an important indicator of its financial performance and ability to generate profits. Profitability ratios are usually categorized into three groups: sales, assets, and equity (Tamulevi\vcienė, 2016). This ratio reflects how effectively the bank is managed. Profitability is reflected in Return On Assets (ROA) and Return On Equity (ROE) and shows the bank's ability to generate profits from the activities carried out. Return On Assets (ROA) is used to show the company's ability to generate profits using its total assets (Kasmir, 2019). The greater the Return On Assets (ROA), the greater the level of profit achieved and the better the bank's position in terms of asset utilization.

Return On Equity (ROE) is a financial performance indicator that shows the extent to which management is successful in increasing profits for shareholders (Manurung & Horman, 2022). ROE is a measure of how effectively management utilizes equity to generate profits for investors. ROE is also considered a proxy for shareholder wealth or firm value. If a bank generates high profits, then this will have an impact on its own capital. Therefore, ROE return is one of the important financial ratios to measure the level of management success in maximizing returns for investors.

Table 1.
Data on ROA, ROE, LDR and CAR at BUMN Bank BRI

	Year				
	2019	**2020**	**2021**	**2022**	**2023**
CAR	21,52%	19,59%	24,27%	22,3%	24,06%
ROA	3,5%	1,98%	2,72%	3,76%	3,93%
ROE	19,41%	11,05%	16,87%	20,93%	22,94%
LDR	88,64%	83,66%	83,67%	79,17%	84,73%

Source: Bank BRI Financial Report 2019-2023

From Table 1, it can be concluded that the value of Return On Assets (ROA) at Bank BRI is quite good because it tends to increase even though in 2020 it experienced a decline. The value of Return On Assets (ROA) from 2019-2020 decreased by 1.52 percent, from 2020-2021 it increased by 0.74 percent, from 2021-2022 it increased by 1.04 percent and from 2022-2023 it increased by 0.17 percent. The Return On Equity (ROE) value in 2019-2023 has increased and decreased. The Return On Equity (ROE) value from 2019-2020 decreased by 8.36 percent, the Return On Equity (ROE) value in 2020-2021 experienced a fairly high increase of 5.82 percent, again experienced an increase in Return On Equity (ROE) in 2021-2022 of 4.06 percent and the Return On Equity (ROE) value in 2022-2023 experienced a fairly good increase of 2.01 percent.

Based on the background above, the author is interested in conducting research by taking the title "The Effect of Return on Assets, Return

on Equity, and Loan-to-Deposit Ratio on Capital Adequacy Ratio: Evidence from Indonesian State-Owned Banks"

2. Literature Review

2.1 banking

According to Law Number 10 of 1998 on Banking, banking encompasses all aspects related to banks, including their institutional framework, operations, and business activities. A bank is defined as a financial institution that mobilizes funds from the public in the form of deposits and redistributes them as credit and other financial services to improve the quality of life of society. Kasmir (2014) emphasizes that banks function primarily as financial intermediaries that accept deposits, savings, and demand deposits, then channel these funds into productive activities. Thus, banking activities center on three main functions: fund collection, fund distribution, and the provision of other banking services.

2.2 Return On Asset (ROA)

Return on Assets (ROA) measures a bank's efficiency in utilizing its total assets to generate profits. A higher ROA indicates that the bank is more effective in converting assets into net income (Hery, 2019). ROA is considered a key determinant of bank stability because higher profitability enables banks to strengthen their capital base through retained earnings, thereby positively influencing their Capital Adequacy Ratio (CAR) (Andini & Yunita, 2015).

2.3 Return On Equity (ROE)

Return on Equity (ROE) reflects the return earned on shareholders' equity and serves as a proxy for shareholder wealth and firm value (Hery, 2016). A higher ROE indicates that management is utilizing equity more efficiently to generate profits. This improved profitability contributes to an increase in retained earnings, which ultimately strengthens the bank's capital position and positively impacts CAR (Hantono, 2015).

2.4 Loan To Deposit Ratio (LDR)

The Loan-to-Deposit Ratio (LDR) measures the proportion of loans disbursed relative to the deposits collected by a bank. It reflects a bank's liquidity management and risk profile. A higher LDR indicates a greater proportion of funds being allocated to lending activities relative to deposits, which can reduce liquidity reserves but may increase profitability if managed effectively (IBI & BARa, 2017). However, excessively high LDR values may pose liquidity risks and adversely affect CAR.

2.5 capital adequacy ratio (CAR)

The Capital Adequacy Ratio (CAR) represents a bank's capital strength in relation to its risk-weighted assets (RWA). It is a critical indicator of a bank's ability to absorb potential losses and maintain financial stability (IBI & BARa, 2017). According to Bank Indonesia Regulation No. 15/12/PBI/2013, commercial banks are required to maintain a minimum CAR based on their risk profile, with a regulatory threshold of at least 8% in accordance with international Basel standards. Maintaining an adequate CAR is essential for protecting depositors, ensuring financial system stability, and sustaining public confidence.

3. Research Methods

3.1 Population And Sample

The population of this study consists of the annual financial reports of four state-owned banks—Bank Mandiri, Bank BRI, Bank BNI, and Bank BTN—covering the period from 2019 to 2023. These banks were selected as the research sample because they are listed on the Indonesia Stock Exchange (IDX) and consistently publish complete annual reports. The sample was determined based on the availability of key financial ratios (CAR, ROA, ROE, and LDR) presented in the annual reports for each year of observation.

3.2 Data Type and Source

This study uses secondary panel data, which combines cross-sectional data (four state-owned banks) and time-series data

(2019–2023). The data were obtained from the official websites of the selected banks and consist of audited annual reports published for the observation period. The financial data were extracted to calculate the Capital Adequacy Ratio (CAR), Return on Assets (ROA), Return on Equity (ROE), and Loan-to-Deposit Ratio (LDR), which serve as the variables in this study.

3.3 Analysis Model

This research uses quantitative analysis, with the model used in the research is using panel data that combines cross section and time series data. As mentioned earlier, to observe Return On Assets (ROA), Return On Equity (ROE), and Loan To Deposit Ratio (LDR) on the Capital Adequacy Ratio (CAR) of four state-owned banks Mandiri, BRI, BNI, and BTN during the period 2019-2023, panel data regression analysis was used with the following econometric model:

$$CAR_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 ROE_{it} + \beta_3 LDR_{it} + \varepsilon_{it}$$

Description:

CAR = *Capital Adequacy Ratio*
ROA = *Return On Assets*
ROE = *Return On Equity*
LDR = *Loan To Deposit Ratio*
β_0 = *Constant*
$\beta_1 .. \beta_3$ = *regression coefficient*
i = *ith state-owned bank*
t = *year t*
u = *error term*

4. Results and Discussion

4.1 Research Results

a. Regression Selection Test

Panel data regression is done with three models, namely Pooled, fixed effect, and random. Each model has advantages and disadvantages. Model selection depends on the assumptions used by researchers and the fulfillment of statistical data processing requirements. Therefore, the first step is to choose a model from the three available. The panel data that has been collected is estimated using Common / Pooled, Fixed, and Random Effect.

After the results of the common effect and fixed effect models are obtained, the chow test is then carried out. The test is needed to choose the most appropriate model between the common effect and fixed effect models.

1) Chow Test

Table 2.
Chow Test Results

Effects Test	Statistic	d.f	Prob.
Cross-section F	2.159992	(3,13)	0.1418
Cross-section Chi-square	8.088753	3	0.0442

Source: Data processed using Eviews 12

If the Cross-section Chi-square probability value > 0.05 means that H0 is accepted, which means that the most appropriate model to use is common effect. However, if the probability value is <0.05, it means that H0 is rejected, which means that the most appropriate model to use is fixed effect. The results of the chow test in the table above show that the cross section probability value is 0.0442 or <0.05, so H0 is rejected. Therefore, the model chosen is fixed effect Next we will do regression with fixed model.

2) Hausman Test

In the fixed effect and random effect tables, it is necessary to conduct a hausman test to test which model is more appropriate to use between the fixed effect and random effect models. Therefore, the Hausman test is conducted to find out.

Table 3.
Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.479975	3	0.0905

Source: Data processed using Eviews 12

If the Chi-Square probability value > 0.05 means that H0 is accepted, which means that the most appropriate regression model to use is random effect. However, if the Chi-Square probability <0.05, it means that H0 is rejected, which means that the most appropriate regression model to use is fixed effect.

Based on the Hausman test results above, it can be seen from the Cross-section random probability value which is 0.0905. This value is greater than 0.05, this means that H0 is accepted and Ha is rejected so that the model chosen is the Random Effect Model (REM).

b. Panel Data Regression Analysis Results

Table 4.
Estimation Results with Random Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	12.16889	4.481645	2.715272	0.0153
ROA	0.798358	0.332426	2.401614	0.0288
ROE	1.069882	0.564962	1.893725	0.0765
LDR	1.069882	0.042296	1.011384	0.3269
Adjusted R-squared		0.537497		
F-statistic		8,360272		
Prob(F-statistic)		0.001429		

Source: Data processed using Eviews 12

1) Interpretation of the Coefficient of Determination (R2)

The coefficient of determination (R2) shows the predictive power of the estimated model. Table 4 shows that the R2 value in the Random Effect Model (REM) model is 0.537497, meaning that 53.7% of the variation in the CAR variable can be explained by the ROA, ROE, and LDR variables. The remaining 46.3% is influenced by other variables or factors not included in the model.

2) Simultaneous Regression Coefficient Test (F Test)

The result of the F test is a significance of 0.0014 smaller than 0.05, the research shows that ROA, ROE, and LDR simultaneously have a significant influence on the Capital Adequacy Ratio (CAR) in state-owned banks. ROA and ROE are indicators of the level of corporate profits (profitability) and LDR is an indicator of the level of liquidity of a company. The proven influence of ROA, ROE and LDR together on the Capital Adequacy Ratio (CAR) or banking capital adequacy ratio indicates that the level of profitability and liquidity affects the value of CAR. Based on these results, if investors want to invest in state-owned banking companies, investors should consider the value of ROA, ROE and LDR because these three variables have a significant influence on the CAR or capital adequacy ratio of state-owned banks during the 2019-2023 period.

3) Partial Regression Coefficient Test (t test)

The tcount value of the ROA variable is 0.798 with a significance value of 0.0288 smaller than 0.05, which means that there is a positive and significant effect of the ROA variable on CAR in state-owned banks. during the period 2019-2023. The tcount value of the ROE variable is 1.069 with a significance value of 0.0765 greater than 0.05, which means that there is a positive and insignificant effect of the

ROE variable on CAR in BUMN banks during the 2019-2023 period.

The tcount value of the LDR variable is 0.042 with a significance value of 0.3269 greater than 0.05, which means that there is a positive and insignificant effect of the LDR variable on CAR in state-owned banks. BUMN banks during the period 2019-2023.

4.2 Research Discussion

1) The Effect Of ROA On CAR

Based on the test results, ROA partially has a significant positive effect on CAR. Indicating that if ROA increases, CAR will increase, and vice versa. Return On Asset (ROA) is a measurement of the company's overall ability to generate profits with the total assets available in the company. The higher this ratio means the better the condition of a company in terms of asset utilization, so that CAR which is an indicator of bank health is increasing. And vice versa, the worse the condition of a company in terms of asset utilization, the CAR will decrease.

The results of this study are supported by research Benny Agus Setiono (2023) and Fatimah (2014) which shows that ROA partially has a significant effect on CAR, but the results of the study are different from the research conducted by Salim & Rianto (2020) which shows that ROA partially has no significant effect on CAR.

2) The Effect Of ROE On CAR

Based on the test results, ROE partially has a positive and insignificant effect on CAR. indicates that if ROE increases, CAR will increase, and vice versa. Return On Equity (ROE) is a measurement of the income available to the owners of the company on the capital they invest in the company. due to a decrease in net profit after tax and total equity, so that it has an impact on the capital ratio that is not good and affects capital adequacy, when linked to Bank Indonesia regulations, the ROE value should be greater than 12%. Based on this research ROE has no effect on CAR. On that basis, that is why there is a positive and insignificant influence between ROE and CAR.

The results of this study are supported by research Harun Al Rsayid & Sosrowidigdo (2022) which shows that ROE partially does not have a significant effect on CAR, but the results of different studies are shown by research Gusvarizon et al (2024) which shows that ROE partially has a significant effect on CAR.

3) The Effect Of LDR On CAR

Based on the test results, LDR partially has a positive and insignificant effect on CAR. indicates that if LDR increases, CAR will increase, and vice versa. The insignificant effect of LDR on CAR is because third party funds which are an element in calculating LDR on the balance sheet are in liabilities, while bank capital which is an element in calculating CAR on the balance sheet is in equity. The difference in position on the balance sheet is what causes LDR to have no significant effect on CAR.

The results of this study are supported by research Fangky (2020) which shows that LDR partially has no significant effect on CAR. but different research results are shown by research Wulandari & Purbawangsa (2019) which shows that LDR partially has a significant effect on CAR.

5. Closing

5.1 Conclusion

Based on the results of the data analysis and discussion in Chapter IV, the following conclusions can be drawn:

1. **Return on Assets (ROA)** has a significant positive effect on the Capital Adequacy Ratio (CAR) in state-owned banks during the 2019–2023 period. This indicates that higher profitability, as measured by ROA, contributes to increased capital adequacy.
2. **Return on Equity (ROE)** has a positive but insignificant effect on CAR. This suggests that changes in ROE during the study period do not substantially impact capital adequacy.
3. **Loan-to-Deposit Ratio (LDR)** has a positive but insignificant effect on CAR,

indicating that variations in liquidity, as measured by LDR, do not significantly influence the bank's capital adequacy.

5.2 Suggestions

Based on the findings of this study, the following recommendations are proposed for future research and practice:

1. Future studies could include additional independent variables such as Non-Performing Loans (NPL) and Net Interest Margin (NIM) to better understand factors affecting CAR.
2. Extending the observation period could provide more robust and reliable results, capturing longer-term trends in bank performance.
3. Researchers may consider examining both state-owned and private banks, or including macroeconomic variables, to improve generalizability and provide comprehensive insights for investors, regulators, and bank management.

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