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The influence of liquidity and solvency ratios on profitability with asset quality as a moderating variable

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Abstract
The banking sector serves as an intermediary institution that plays a crucial role in the economy by channeling financial resources from surplus economic units to deficit economic units. Banks must maintain strong financial performance through their profitability to effectively carry out their intermediation function. However, in their efforts to enhance profitability, banks often face various risks. This study aims to examine the impact of liquidity and solvency on banking profitability. Additionally, this research investigates asset quality as a moderating factor in the relationship between these variables.
This study utilizes data from the annual financial reports of conventional commercial banks listed on the Indonesia Stock Exchange (IDX) from 2017 to 2023, resulting in a total of 98 samples. The research employs multiple regression analysis and moderated regression analysis (MRA).
The research findings indicate that liquidity has a negative effect on profitability, which contradicts the formulated hypothesis. Furthermore, solvency does not have a significant effect on profitability, and the study reveals that asset quality moderates the relationship between solvency and profitability. However, asset quality does not moderate the relationship between liquidity and profitability.

Keywords: Profitability, liquidity, solvability, asset quality, conventional commercial bank

Introduction

The banking industry tends to take more financial risks compared to other commercial industries, resulting in serious moral hazard problems often experienced by this sector (Wardhani *et al*. 2024) [22]. According to Budhathoki *et al*. (2020) [9], commercial banks need to earn sufficient profits in the long run to maintain a sound financial system. However, as noted by Zaidan *et al*. (2022) [23], when most banks strive for high profitability, they often overlook potential liquidity problems. Therefore, in addition to pursuing high profitability, banks should carefully consider the risks that may arise from their efforts to increase profitability.

Some researchers, such as Bata *et al*. (2022) [6], analyzed the effect of LDR and CAR on banking performance in Indonesia during the 2014-2018 period. Their research, conducted on 40 Conventional Commercial Banks listed on the Indonesia Stock Exchange, indicated that banks with high capital levels demonstrated a substantial effect on financial performance. High CAR indicates a bank's capacity to fund its operational activities and significantly contributes to increasing its profitability. LDR will increase ROA if the bank can maximize its income through lending to the public.

Liquidity, solvency, asset quality, and ROA are four key indicators of financial performance (Ben Abdallah & Bahloul, 2024) [7]. Liquidity refers to an asset's capability of being converted into cash. Research findings by Doan & Bui (2021) [10] show a favorable and significant relationship between liquidity and profitability. However, these results contradict the findings of Budhathoki *et al*. (2020) [10], which demonstrate an adverse relationship between liquidity and ROA, meaning that higher liquidity corresponds to lower ROA. Other research conducted by Poniman & Banjarnahor (2022) [19] suggests that fluctuations in liquidity have no effect on banking profitability.

Solvency refers to a bank's ability to meet its long-term obligations over a specified period (Ben Abdallah & Bahloul, 2024) [8]. The findings of Saiz-Sepúlveda *et al*. (2023) [20] suggest that banks with high solvency reflect stronger capitalization, which ultimately increases profitability. However, findings by Zaidan (2022) [24] indicate an inverse relationship between solvency and profitability. Different results were obtained in research by Bintoro & Rahmadhani (2021) [8], which states that banking profitability cannot be influenced by the CAR ratio.

Asset quality is a critical factor in assessing the reliability and financial soundness of the banking sector. In a study conducted by Ben Abdallah & Bahloul (2024) [9], asset quality was found to have a significant impact on profitability and to moderate the relationship between both liquidity and solvency with banking profitability. Similarly, the findings of Bata *et al*. (2022) [7] confirmed that asset quality significantly moderates the relationship between liquidity and profitability. However, research by Agustina & Pratiwi (2024) [2] did not support the moderating role of asset quality in the relationship between liquidity, solvency, and profitability.

Several previous studies present inconsistencies regarding the effect of liquidity and solvency ratios on profitability, as well as the moderating role of asset quality. These conflicting findings, or research gaps, indicate the need for further investigation. Therefore, this study aims to re-examine the influence of liquidity and solvency on profitability and to investigate the moderating effect of asset quality on the relationship between liquidity and solvency on profitability in conventional commercial banks listed on the Indonesia Stock Exchange during the period 2017-2023.

Theoretical Framework and Hypothesis Development

1. Theoretical Analysis

1.1. The Anticipated Income Theory

The theory states that banks should be able to extend term loans where principal and interest payments are predictable and scheduled according to the agreed period (Mohammad *et al*. 2021) [13]. According to Akani (2022) [3], this theory fulfills the three objectives of liquidity, safety, and profitability. The bank's liquidity and profitability are assured when the borrower saves and repays the loan regularly through installments. This fulfills the security principle as banks lend not only based on good collateral but also on the borrower's ability to repay the loan.

1.2. Pecking Order Theory

This theory outlines the hierarchy of a company's financing preferences. When internal funds are insufficient, the company will initially utilize its cash reserves or marketable securities portfolio. If external financing becomes necessary, it will issue the safest financial instruments first (Myers, 1984) [14]. Jahanzeb *et al*., as cited in Kumalo (2023) [12], stated that highly profitable companies typically rely more on internally generated resources or retained earnings to support their operations, thereby minimizing the use of debt or the issuance of equity in the capital market.

2. Previous Empirical Research

Research from Ben Abdallah & Bahloul (2024) [10] found that ROA is significantly influenced by the liquidity and solvency ratios of banks, while there is a moderating effect of asset quality variables. This research is supported by Kumalo (2023) [13]. The findings of Budhathoki *et al*. (2020) [11] present contradictory results, indicating that an increase in liquidity has a negative impact on ROA, whereas leverage and bank size have a positive influence on ROA. Meanwhile, the study conducted by Ni Kadek (2022) [15] suggests that asset quality has a moderating effect on the relationship between liquidity and solvency with profitability. However, these findings contrast with the results of Agustina & Pratiwi (2024) [3], which indicate that asset quality does not have a moderating effect on either relationship.

2.1. The Effect of Liquidity on Profitability

Budhathoki *et al*. (2020) [12] stated that liquidity is often considered one of the key determinants of bank profitability. According to the anticipated income theory, banks should be able to extend term loans where principal and interest payments are predictable and scheduled according to the agreed period (Mohammad *et al*. 2021) [14]. A higher loan-to-deposit ratio tends to enhance bank profitability, as it increases the potential to generate interest income for commercial banks (Budhathoki *et al*. 2020) [13]. The results of research by Doan & Bui (2021) [11], Ben Abdallah & Bahloul (2024) [12], Paul *et al*. (2021) [18], and Bata *et al*. (2022) [8] state that liquidity has a positive effect on profitability. Therefore, this study suggests the following hypothesis:

***H*₁:** Liquidity has a positive and significant effect on bank profitability

2.2. The Effect of Solvency on Profitability

In relation to solvency, financial institutions are required by regulators to maintain a certain percentage of capital in relation to their risk-weighted assets (Saiz-Sepúlveda *et al*., 2023) [21]. According to Pecking Order theory, highly profitable firms typically use more internally generated resources/retained earnings to support the firm at the expense of using debt or placing shares on the market (Jahanzeb *et al*., as cited in Kumalo 2023) [14]. Research by Saiz-Sepúlveda *et al*. (2023) [22], Budhathoki *et al*. (2020) [14], and Bata *et al*. (2022) [9] states that there is a positive effect of solvency in influencing profitability. Therefore, this study suggests the following hypothesis:

***H*₂:** Solvency has a positive and significant effect on bank profitability

2.3. The Effect of Asset Quality in Moderating the Relationship between Liquidity and Profitability

Asset quality is an element in banking management that requires an assessment of the company's assets to support the measurement of the level and amount of credit risk associated with its operational activities (Akani, 2022) [4]. According to the anticipated income theory, banks must be able to distribute term loans whose principal and interest payments can be estimated and scheduled according to the agreed period (Mohammad *et al*. 2021) [15]. High asset quality, reflected in low NPL rates, indicates the bank's success in managing credit well, thereby reducing the risk of liquidity problems. Research by Ben Abdallah & Bahloul (2024) [13] and Ni Kadek (2022) [16] indicates that there is a moderating effect of asset quality on the relationship between liquidity and profitability. Therefore, this study suggests the following hypothesis:

***H*₃:** Asset quality moderates the relationship between liquidity and profitability

2.4. The Effect of Asset Quality in Moderating the Relationship between Solvency and Profitability

Credit Risk Management is used to ensure that in the event of multiple defaults and late payments, the overall quality of maturing assets is good enough to repay the bank's liabilities or debts as scheduled (Bandyopadhyay & Saxena, 2023) [5]. According to Oino (2021) [16], banks with good and diversified customer loans tend to reduce solvency risk. Research by Bata *et al*. (2022) [10], Ben Abdallah & Bahloul (2024) [14], and Ni Kadek (2022) [17] states that asset quality is able to moderate the relationship between solvency and profitability. Therefore, this study suggests the following hypothesis:

***H*₄:** Asset quality moderates the relationship between solvency and profitability

Research Method

This study sampled 14 Conventional Commercial Banks listed on the Indonesia Stock Exchange for the period 2017-2023. The researchers collected a total of 86 observations, with data sourced from the annual financial statements of the selected banks.

1. Dependent Variable

According to Bata *et al*. (2022) [11], the profitability of the banking industry is reflected in the Return on Asset (ROA) indicator. In evaluating a company's performance, ROA is calculated by comparing net profit to average overall assets (Agustina & Pratiwi, 2024) [4]. Thus, ROA reflects a bank's ability to manage its assets profitably.

2. Independent Variables

The independent variables in this study are liquidity and solvency. According to Budhathoki *et al*. (2020) [15], one of the measurements of banking liquidity level is through the Loan to Deposit Ratio (LDR). This research uses the LDR measurement proxy in assessing bank liquidity. Additionally, according to Aayale *et al*. (2022) [1],

solvency implies capital adequacy in accordance with regulatory requirements. The Capital Adequacy Ratio (CAR) is used as an indicator in assessing solvency in this study.

3. Moderating Variable

The most vital asset that requires determining the level of asset quality is the loan, which can become a non-performing asset when the borrower fails to meet the payment terms (Wanjagi *et al*. 2024) [21]. According to Jean (2022) [11], the non-performing loan ratio is the most appropriate indicator to assess asset quality. Therefore, this study uses the Non-Performing Loan (NPL) ratio as a proxy for measuring asset quality.

Results

1. Descriptive Statistics

Table 1: The table below presents the results of descriptive statistical tests on the variables in this study.

Table 1: Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Profitability (ROA)	86	.50	4.22	2.2520	.92421
Liquidity (LDR)	86	60.04	126.70	86.1586	11.52697
Solvency (CAR)	86	17.31	34.20	22.6676	3.59812
Asset Quality (NPL)	86	.90	4.00	2.3910	.77321

Source: Data processed with SPSS (2025)

2. Classical Assumption Test

Table 2: below shows a summary of the classical assumption tests, consisting of normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test.

Table 2: Summary of Classical Assumption Test Results

Classical Assumption Test	Test Used	Results	Decision
Normality	Kolmogorov-Smirnov (KS)	0,200 > 0,05	The residual data are normally distributed
Multicollinearity	Tolerance	All variables > 0,10	Data for each variable are free from multicollinearity.
	VIF	All variables < 10	
Heteroscedasticity	Glejser	All variables > 0,05	All predictor variables are free from heteroscedasticity.
Autocorrelation	Durbin-Watson	2,278 > 1,860 > 1,722	The data are free from autocorrelation

Source: Data processed with SPSS (2025)

Based on the summary of the classical assumption tests shown in Table 4.2 above, all variables meet the requirements of the classical assumption tests, thus the data in this research model are suitable for use.

3. Multiple Linear Regression Test

The Adjusted R Square value obtained from the coefficient of determination test shows a value of 0.071. This means that 7.1% of variations in profitability can be explained by variations in the independent variables, namely liquidity and solvency. Meanwhile, 92.9% of variations in profitability are explained by other factors outside the regression model.

The calculated F value is 4.238 with a probability of 0.018. In accordance with the F statistical test criteria, if the significance value of the calculated F is less than 5%, the regression model is declared valid for use.

The hypothesis testing results show that the significance probability value of the liquidity variable is 0.019 or <0.05, and the magnitude of the regression coefficient is -0.021. Thus, H_1 is not supported as the liquidity variable proxied through LDR has an effect on profitability, but the direction is negative. Meanwhile, the significance probability value of solvency is 0.348 or >0.05, and the magnitude of the regression coefficient is 0.026. Therefore, H_2 is not supported as the solvency variable proxied through CAR has no significant effect on profitability.

4. Moderated Regression Analysis (MRA)

The Adjusted R Square value from the coefficient of determination test above shows a value of 0.360. This indicates that 36% of the variation in profitability can be explained by variations in the independent variables (liquidity and solvency), the moderating variable (asset quality), as well as the interactions between liquidity and asset quality, and between solvency and asset quality. The remaining 64% is explained by other variables not included in the regression model.

The results in show a calculated F value of 10.559 with a probability value of 0.000. Referring to the requirements of the F statistical test, if the calculated F probability value is lower than 5%, the regression model is considered feasible to use.

The hypothesis test results show the significance probability value of the moderation variable (LDR*NPL) is 0.270 or >0.05, and the magnitude of the regression coefficient is 0.012, which indicates that the interaction between liquidity and asset quality (LDRNPL) has no effect on profitability; therefore, H_3 is not supported. Meanwhile, the significance probability value of the moderating variable (CARNPL) is 0.016 or <0.05, and the magnitude of the regression coefficient is -0.073. These results indicate that the interaction between solvency and asset quality (CAR*NPL) has an influence on profitability; therefore, H3 is supported.

5. Interpretation of Results

5.1. The Effect of Liquidity on Profitability

The results of hypothesis testing show that liquidity has a negative effect on profitability; thus, the first hypothesis is rejected. According to Akani (2022) [5], credit or loan repayments will indeed provide regular liquidity, but there is a risk of failure for banks to obtain cash in emergency conditions. This finding is supported by the research of Budhathoki *et al*. (2020) [16], which indicates that a relatively high level of loan-to-deposit ratio (lower liquidity) results in negative ROA and reduces liquid funds to seize market opportunities, thereby impacting bank profitability negatively. Additionally, the findings of this study are also supported by the research of Agustina & Pratiwi (2024) [4] and Kumalo (2023) [15].

5.2. The Effect of Solvency on Profitability

The results of hypothesis testing show that solvency has no effect on profitability; thus, the second hypothesis is rejected. According to Bintoro & Rahmadhani (2021) [9], a high CAR ratio indicates the health of a bank's capital, so it has no direct effect on profitability. The findings of this study are supported by the research of Aldizar & Agustina (2022) [4], which states that solvency proxied through CAR has no effect on profitability.

5.3. The Effect of Asset Quality in Moderating the Relationship between Liquidity and Profitability

The results of hypothesis testing show that asset quality is not able to moderate the effect of liquidity on profitability; thus, the third hypothesis is rejected. According to Bata *et al*. (2022) [13], the average NPL value, which is still within reasonable limits, indicates that conventional banks can manage non-performing loan risk effectively. This finding is also supported by Agustina & Pratiwi (2024) [5], who state that there is no significant effect of asset quality in moderating the relationship between liquidity and profitability.

5.4. The Effect of Asset Quality in Moderating the Relationship between Solvency and Profitability

The results of hypothesis testing show that asset quality is able to moderate the effect of solvency on profitability; thus, the fourth hypothesis is accepted. Banks with good and diversified customer loans tend to reduce solvency risk (Oino, 2021) [17]. Thus, high credit risk or NPL can result in a decrease in bank capital, which will then reduce profitability (Bata *et al*. 2022) [6, 14]. These results are also supported by Ben Abdallah & Bahloul (2024) [15].

Summary, Limitations and Recommendations

This research evaluates the impact of liquidity and solvency on profitability, including the effect of asset quality as a moderating variable, on 14 conventional commercial banks listed on the Indonesia Stock Exchange for the period 2017-2023. The tests and analyses conducted show that liquidity has a negative effect on profitability, while solvency has no effect on profitability. Furthermore, asset quality is unable to moderate the effect of liquidity on profitability but is able to moderate the effect of solvency on profitability.

There are several limitations to this study. First, the research sample is limited to banks within KBMI categories 3 and 4. Second, the Adjusted R Square value is very small. As a result, this study has not fully captured all factors that affect bank profitability.

In response to these limitations, this study offers several recommendations. Further research should expand the scope by including banks from various KBMI categories so that the results can be more generalizable to the banking industry as a whole. Additionally, future research could incorporate additional predictors or control variables, such as bank size, to increase the coefficient of determination.

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