East Asian Journal of Multidisciplinary Research (EAJMR)
Vol. 4, No. 3, 2025 : 1007 – 1020

The Effect of Capital Adequacy and Credit Risk on Profitability With Liquidity as a Mediating Variable in Banking Companies Listed on the Indonesia Stock Exchange for the Period 2021-2023

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A R T I C L E I N F O

Keywords: Capital Adequacy, Credit Risk, Profitability, Likuidity

Received : 01, January
Revised : 13, January
Accepted: 14, February

A B S T R A C T

The purpose of this study was to determine the effect of capital adequacy and credit risk on profitability with liquidity as a mediating variable. The study's data were examined using the regression analysis method and the sobel test for the mediating variable. The population used in this study is annual data from capital adequacy, credit risk, profitability and liquidity of banks in Indonesia for the period 2021-2023, namely 46 companies. The results of this research are Capital adequacy and credit risk have no significant effect on profitability, while liquidity has a positive and significant effect on profitability. On the other hand, capital adequacy has a significant positive effect on liquidity, while credit risk has a negative effect on liquidity. Capital adequacy also has a significant positive effect on profitability through liquidity, while credit risk has no effect on profitability through liquidity.

DOI prefix: https://doi.org/10.55927/eajmr.v4i3.29
ISSN-E: 2828 -1519
https://mtiformosapublisher.org/index.php/eajmr

INTRODUCTION

Banks are one of the financial institutions that have an important role in a country's economy as an intermediary institution. Under Law No. 10 of 1998 on banking, A bank is a financial institution that collects money from the public through deposits and provides it as loans or other financial services to promote societal welfare. As stated in Indonesian Law Number 10 of 1998, dated November 10, 1998, a bank is described as a business entity that collects public funds through deposits and allocates them as credit and other financial services to improve the quality of life for the community (Widya & Purwanto, 2019).

The ability of a bank to generate profits from its operations over a period of time is called bank profitability. Factors that can affect profitability in the bank industry are credit, deposits, liquidity, bank size, capital and overhead management (Peling & Sedana, 2021). This study focuses on using the variables of capital adequacy, credit risk, and liquidity because they are factors that can assess the health of banks, besides that banks have the main activity of collecting and distributing public funds.

Capital adequacy can be defined as the ability of a bank to cover losses that may occur in lending or trading securities (Kasmir & et al., 2014)). If a bank has a large capital, then the bank can operate easily, so that at critical times, the bank can remain stable because it has a large capital in Bank Indonesia. The capital adequacy ratio in this study is represented by the Capital Adequacy Ratio (CAR). A high amount of CAR indicates that the banking business is increasingly stable due to increasingly stable public confidence, because the bank has the capacity to bear the risk of each risk return asset. Research related to the effect of capital adequacy on profitability has been conducted by several researchers, among others, namely, (Ridho et al., 2021), (Dan & Sudirgo, 2019), (Anggari & Dana, 2020) and (Sunaryo, 2020) indicated that capital adequacy has a significant positive effect on profitability. There is another study conducted by (Nofita Sari & Endri, 2019) which states that capital adequacy has a significant negative effect on profitability.

A healthy bank can provide good financial services to the community, both in terms of ensuring the security of deposit funds and their distribution to the community in the form of loans or often called credit. Non-performing loans can affect bank income, but if the bank does not distribute its credit to customers, the bank will not get profit or profit from the credit, allowing the company's profits to be utilized as part of the bank's capital reserves. The tool used to measure credit risk in this study is Noan Performing Loan (NPL). Research related to the effect of credit risk on profitability has been researched several times by (Nindi et al., 2021), which states that credit risk has a significant positive effect on profitability. Other research conducted by (Rinofah et al., 2022), and (Dewi et al., 2021) has a negative and significant effect on profitability.

Liquidity is related to the bank's activities in raising funds, where liquidity reflects the bank's efficiency in managing funds obtained for operational financing and is obliged to repay depositor funds in a timely manner. Liquidity can be proxied using Loan To Deposit Ratio (LDR). Bank Indonesia Regulation Number 15/7/PBI/2013 states that the Loan to Deposit

Ratio value that is reasonable for banks to have ranges from 78 percent to 92 percent. If the loan to deposit ratio value is greater than 92 percent, it shows that the amount of funds channeled to the public is less balanced with the acquisition of funds raised from the public. Low liquidity has an unfavorable impact banks because banks are unable to fulfill their obligations, so that these conditions are vulnerable to banks because they can result in losses (Utami & Tasman, 2020). Research conducted by (Chandrawati et al., 2021), (Pardede & Pangestuti, 2016) and (Astutiningsih K & Baskara I, 2019) states that liquidity has a positive effect on profitability. Other research conducted by (Hasna et al., 2022) states that liquidity has a significant negative effect on profitability. There are other studies that have different results such as (Dan & Sudirgo, 2019) (Maulana et al., 2021) which indicated that liquidity has no effect on profitability.

The mixed results related to the effect of capital adequacy and credit risk on profitability indicate that a mediating variable is needed that can help increase profitability, namely liquidity.

THEORETICAL REVIEW

Agency Theory

According to (Jensen & Meckling, 1976) agency theory describes the relationship between the principal and the agent, where the importance of managing this relationship is to reduce conflicts of interest and ensure the agent's actions are aligned with the interests of the principal. In banking, CAR reflects the bank's ability to bear risk, while NPL indicates the quality of credit risk management. Meanwhile, liquidity (LDR) acts as a mediating variable that reflects the bank's ability to meet short-term obligations, while providing a positive signal about the efficiency of risk management. Ultimately, ROA is an indicator of profitability that shows the agent's success in maximizing assets. With transparent and efficient management, agency theory emphasizes the importance of reducing agency costs to achieve a balance of interests between principals and agents.

Asymmetric Information Theory

Information asymmetry theory was first coined by (Akerlof, 1970) which explains how information imbalances can cause market failure. This theory says that one party in a transaction has better information than the other party. This can have an impact on financial decision-making, especially in the banking sector. In the context of banking, high capital adequacy provides a positive signal that the bank has sufficient capital reserves to bear the risk, thus reducing the negative impact of information imbalances (Jensen & Meckling, 1976).

In the context of CAR, information asymmetry can be reduced by transparency in capital management, which increases principals' confidence in the financial stability of the bank. Meanwhile, high NPLs often indicate banks' failure to assess borrowers' ability to repay loans, which is a form of information asymmetry in credit risk management, as the proportion of loans to

deposits can be confusing. In addition, if information on asset management is not provided accurately, the value of (ROA) as a measure of profitability may be misused. Therefore, transparency, and accurate information disclosure are key to reducing information gaps, ensuring optimal management of the variables in this study, as well as supporting overall banking performance.

Profitabilitas

Profitability is considered as an indicator of the bank's ability whether the funds are managed successfully to obtain profits (Syababy & Purwaningsih, 2023). Profitability can be assessed using various metrics, including Return on Assets (ROA), Return on Equity (ROE), Operating Cost to Operating Income Ratio (BOPO), and Net Interest Margin (NIM). In this case, ROA is considered the best indicator to measure bank profitability (Kasmir, 2019). High profitability also indicates good bank health and a high level of efficiency (Wijayani, 2023).

Capital Adequacy to Profitability

Capital adequacy can be defined as the ability of a bank to cover losses that may occur in lending or trading securities (Kasmir & et al., 2014). CAR is a ratio that shows how much of the bank's total assets that contain risk (loans, investments, securities, and other bank bills) are funded from the bank's own capital and also funded from other sources (public funds, loans, etc.). (Dendawijaya & Lukman, 2009). If a bank has a large capital, then the bank can operate easily, so that at critical times, the bank can remain stable because it has a large capital in Bank Indonesia. The capital adequacy ratio in this study is represented by the Capital Adequacy Ratio (CAR).

Meanwhile, ROA measures the bank's efficiency in using its assets to generate profits. The relationship between the two is seen when an optimal CAR allows the bank to maintain asset quality, reduce losses, and maximize income from its assets. With good risk management through maintaining a healthy CAR, banks can increase efficiency and profitability, which is reflected in higher ROA values. (Ridho et al., 2021) indicated that capital adequacy has a significant and positive effect on profitability. Theoretical statements and analysis of previous research findings support this hypothesis.

H1: Capital adequacy has a positive significant effect on profitability

Capital Adequacy to Liquidity

With strong capital, Banks have the capability to oversee and control their assets and liabilities more flexibly, including maintaining sufficient liquidity to meet short-term needs, such as customer withdrawals or payment of other obligations. In addition, strong capital levels increase the confidence of depositors and investors, which in turn helps banks maintain or even improve their liquidity. However, there is a trade-off: if too much capital is allocated to meet capital adequacy without an efficient strategy, banks may miss opportunities to optimize other liquid assets, which may affect operational performance. Therefore, balanced capital and liquidity management is critical to ensure the sustainability and profitability of banks.

Some previous studies, such as (Gautama et al., 2018) indicate that capital adequacy significantly and positively impacts liquidity. Theoretical statements and analysis of previous research findings support this hypothesis.
H2: Capital adequacy has a positive and significant effect on liquidity.

Credit Risk to Profitability

Credit risk, as measured through indicators such as Non-Performing Loan (NPL), has a direct influence on profitability. Credit risk reflects potential losses due to the inability of debtors to fulfill loan repayment obligations. When credit risk increases (indicated by high NPLs), banks have to set aside loan loss reserves which ultimately reduces available net profit. Credit risk can create uncertainty in the market, lower investor confidence, increase the cost of funding, which further burdens bank profitability, and impair the efficiency of asset management, which impacts profitability indicators such as Return on Assets.

Conversely, with credit risk under control, operating expenses related to credit losses can be reduced, which in turn improves the efficiency and profitability of the bank. Therefore, effective credit risk management is key to maintaining and increasing profitability in the long term. Research related to the effect of credit risk on profitability has been researched several times by (Rinofah et al., 2022), (Firmanila, 2023), (Hernawati et al., 2024), and (Dewi et al., 2021) which states that credit risk has a negative and significant effect on profitability. Theoretical statements and analysis of previous research findings support this hypothesis.
H3: Credit risk has a negative and significant effect on profitability

Credit Risk to Liquidity

Credit risk affects a bank's liquidity as a high non-performing loan rate reduces cash inflows from loan repayments, thereby reducing the availability of funds for short-term needs. In addition, an increase in credit risk forces banks to set aside larger loss reserves, which reduces liquid resources. Conversely, good credit risk management supports stable cash flows, strengthens liquidity, and ensures banks can efficiently meet their obligations.

Findings from earlier studies by (Desda & Yuliza, 2021) state that credit risk has a negative and significant effect on liquidity. This aligns with the study conducted by (Bernardin & Chaniago, 2017) which indicated that credit risk has a significant effect on liquidity. Theoretical statements and analysis of previous research findings support this hypothesis.
H4: Credit risk has a negative and significant effect on liquidity

Liquidity to Profitability

The correlation between liquidity and profitability is frequently inverse, If a company focuses too much on maintaining high liquidity by holding assets in cash or other liquid assets, the potential to generate profits from productive investments is reduced, so profitability may decline. Conversely, if a company

allocates most of its assets to more profitable longterm investments, liquidity risk increases as the funds available to meet shortterm liabilities are limited. However, this relationship is not always negative if the company is able to maintain a balance between liquidity and profitability. Adequate liquidity helps firms manage financial risks and avoid failure to meet obligations, while prudent allocation of funds to productive investments supports increased profits. Therefore, efficient liquidity management is key to ensuring financial stability while sustainably improving profitability.

Based on research conducted by (Astutiningsih K & Baskara I, 2019) and (Chandrawati et al., 2021), liquidity has a positive effect on profitability. Theoretical statements and analysis of previous research findings support this hypothesis.

H5: Liquidity has a positive and significant effect on profitability.

Adequacy to Profitability with Liquidity as a Mediating Variable

Capital adequacy, or Capital Adequacy Ratio (CAR), helps banks maintain financial stability by protecting against potential losses and increasing customer confidence. On the other hand, liquidity plays an important role in strengthening this relationship. With sufficient capital, banks can maintain optimal liquidity to meet short-term obligations and avoid financial stress. Good liquidity also allows banks to manage funds efficiently, balancing the need to provide liquid funds with profitable investment opportunities. Ultimately, the combination of capital adequacy and well-managed liquidity contributes directly to a sustainable increase in profitability.

Based on the results of research by (Rinofah et al., 2022), which states that liquidity is unable to mediate the effect of capital adequacy on profitability. Based on the results of previous research, the following hypothesis is formulated:

H6: Liquidity is able to mediate the effect of capital adequacy on profitability

Credit Risk on Profitability with Liquidity as a Mediating Variable

Credit risk, which measures the probability of default by borrowers, has a direct influence on bank profitability. High credit risk, indicated by rising Non-Performing Loans (NPL), can increase the provision for loan losses, which in turn depresses net profit and lowers a bank's Return on Assets (ROA). When credit risk increases, a bank's liquidity may be compromised as cash flows from loan repayments are reduced. This forces the bank to set aside more funds for loss reserves, reducing funds available for productive investments, and ultimately depressing profitability. Conversely, maintained liquidity allows banks to better manage the impact of credit risk, maintain stable cash flows, and support profitability. Research by (Rinofah et al., 2022), shows that liquidity fails to mediate the effect of credit risk on profitability. Based on the results of previous research, the following hypothesis is formulated:

H7: Liquidity is able to mediate the effect of credit risk on profitability.

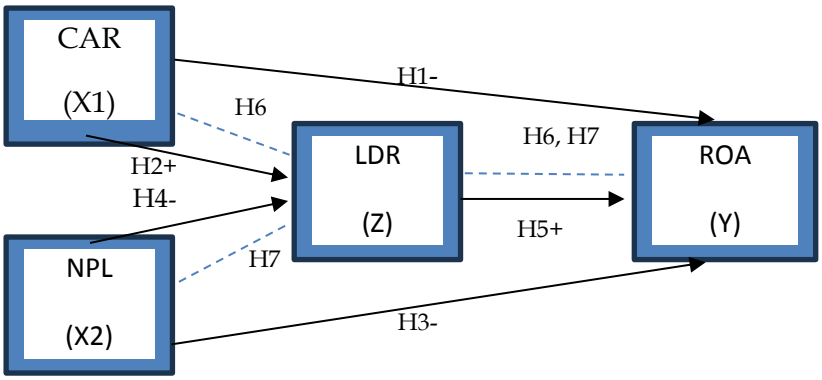

Figure 1. Conconceptual Framework

METHODOLOGY

Population and Sample

The population in this study were 46 companies which are banking companies listed on the Indonesia Stock Exchange (IDX) during the observation period. The samples in this research include CAR, NPL, ROA, and LDR for banking companies for the period 2021-2023.

Data Collection Technique

The data in this study were collected from secondary sources, namely annual financial reports and annual reports of banking companies during the 2021-2023 period. The data used in this research are secondary data, namely, covering CAR, NPL, ROA, and LDR of banking companies for the period 2021-2023.

Data Analysis Technique

The data analysis method in this research is multiple regression analysis. This data is then processed using the Eviews 12 program. The research has a linear regression equation model as follows:

$Y = \alpha + \beta 1X + \beta 2X2 + \beta 3Z + e1$
$Z = \alpha + \beta 1X1 + \beta 2X2 + e2$

Where:

Y : Likuidity
α : Constant
$\beta 1 \beta 2\ \beta 3$: Regression Coefficient
X : Profitability
e : Standard Error

RESULTS

Descriptive Statistics

Table 1. Descriptive Statistics

Statistic	Y	X1	X2	Z
Mean	0.180675	-1.114255	-0.243353	4.454848
Median	0.336472	-1.305636	-0.223144	4.426880
Maximum	5.164786	1.041619	1.591274	6.268926
Minimum	-3.912023	-2.227478	-4.605170	3.390136
Std. Dev	1.269856	0.593433	1.102747	0.406450
Skewness	-0.339799	1.181768	-1.001835	1.273467
Kurtosis	5.184925	4.455925	4.842731	7.613830
Jarque-Bera	27.70586	40.77769	39.21312	146.9723
Probability	0.000001	0.000000	0.000000	0.000000
Sum	22.94570	-141.5104	-30.90581	565.7657
Sum Sq. Dev.	203.1792	44.37252	153.2224	20.81538
Observations	127	127	127	127

Table 1 shows that the Capital Adequacy Variable (X1) has an average value of -1.114255 with a standard deviation of 0.593433, which indicates a moderate spread of data. The minimum value of this variable is -2.227478, while the maximum value reaches 1.041619.

The Credit Risk variable (X2) has an average value of -0.243353 with a standard deviation of 1.102747, which indicates a significant data distribution. The lowest value of this variable is -4.605170, while the highest value is 1.591274.

The Liquidity variable (Z) has an average of 4.454848 and a standard deviation of 0.406380, which also indicates a considerable variation in data. The minimum value for this variable is 3.390136, while the maximum value is 6.268926.

Meanwhile, the Profitability (Y) variable has an average value of 0.180675 with a standard deviation of 1.269856, which indicates a fairly dispersed distribution of data compared to other variables. The lowest value of this variable is -3.912023, while the highest value is 5.164786.

Linear Regression

Table 2. Multiple Linear Regression with Probability as Dependent Variable

Variable	Coefficeint	Std. Error	t-Statistic	Prob
C	-8.885704	2.659405	-3.341238	0.0013
Log X1	-0.431729	0.453676	-0.951623	0.3442
Log X2	-0.225549	0.160294	-1.407095	0.1633
Log Z	1.914866	0.539183	3.551420	0.0006
Effect Specification				
R-Squared			0.716331	
Adjusted R-square			0.553221	
F-statistic			4.391710	
Prob (F-statistic)			0.000000	

From the data analysis results in Table 2, the multiple linear regression equation is derived as follows:

LOG_Y = -8.88570432018 - 0.431728535691*LOG_X1 - 0.22554864182*LOG_X2 + 1.914865559*LOG_Z

The F-statistic value is found to be 4.391710, with a Prob (F-statistic) value of 0.000000 (<0.05). This indicates that the Capital Adequacy and Credit Risk variables significantly influence the Profitability variable.
The Adjusted R-squared value of 0.553221 indicates that the Profitability variable accounts for 55.3% of the effect, while the remaining 44.7% is influenced by factors outside the scope of this study.

Table 3. Multiple Linear Regression with Liquidity as Dependent Variable

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	4.806281	0.091360	52.60798	0.0000
Log X1	0.328383	0.081038	4.052217	0.0001
Log X2	-0.058660	0.031892	-1.839351	0.0692
Effect Specification				
R-squared			0.871851	
Prob (F-statistic)			0.000000	

From the data analysis results in Table 3, the multiple linear regression equation is derived as follows:

LOG_Z = 4.80628143088 + 0.328383429962*LOG_X1 - 0.0586602133357*LOG_X2

It is known that the R-squared value is 0.871852, It can be concluded that the Capital Adequacy and Credit Risk variables contribute 87.2% to the influence on Liquidity. While the remaining 12.8% is influenced by other variables outside this study.

Sobel Test

This test is essential to assess whether the mediating variable significantly influences the relationship between the variables.

Table 4. Sobel Test

Variable	Test Statistic	Std. Error	Nilai P-Value	Information
Capital Adequacy (X1)-> Profitability (Z)-> Liquidity (Y)	2.67084198	0.23543491	0.00756613	Significant
Credit Risk (X2)-> Profitability (Z)-> Liquidity	-163327891	0.06877334	0.10241035	Not Aware

Based on the results of the Sobel Test in table 4, the P-Value obtained is 0.00756613 (<0.05) with a Statistical Sobel Test value of 2.67084198, it can be

concluded that the capital adequacy variable has a significant effect on the Profitability through the Liquidity (Mediation) or indirectly the Liquidity is able to mediate the effect of the Capital Adequacy on the Profitability.

While the P-Value owned by the Credit Risk Variable is 0.10241035 (>0.05) with a Statistical Sobel Test value of -163327891, It can be inferred that the Credit Risk does not have a significant impact on the Profitability through the Liquidity (mediation) or indirectly the Liquidity variable does not mediate the effect of the Credit Risk on the Profitability.

DISCUSSION

Effect of Capital Adequacy Ratio on Return On

The regression analysis presented in Table 2 indicates that capital adequacy has a negative coefficient of -0.951623 and a t-statistic of -0.951623, and a p-value of 0.3442 (greater than 0.05). Based on these results, it can be concluded that capital adequacy negatively influences profitability. As a result, the first hypothesis of this study is rejected. This result is consistent with previous research by (Nofita Sari & Endri, 2019).

This finding aligns with the asymmetric information theory (Akerlof, 1970), which suggests that a high level of capital adequacy communicated by banks signals their financial stability to investors and depositors.

Effect of Capital Adequacy on Liquidity

The regression analysis in Table 3 indicated that capital adequacy has a positive coefficient and a t-statistic of 4.052217, with a p-value of 0.0001 (less than 0.05). This suggests that capital adequacy significantly positively impacts liquidity. As a result, the second hypothesis of this research is accepted. These findings align with the research conducted by (Gautama et al., 2018).

Effect of Credit Risk on Profitability

The regression analysis results in table 2 indicated that credit risk has a coefficient of -0.225549 and a t-Statistic of -1.407095 with a prob value of 0.1633 (>0.05), it can be concluded that the credit risk variable negatively affects the profitability variable. Therefore, the 3rd hypothesis in this study is accepted. Previous research that is in line with the results of this study was also conducted by (Firmanila, 2023) and (Hernawati et al., 2024).

This finding aligns with earlier studies on asymmetric information theory, which suggest that information imbalances between banks and borrowers can heighten default risk and diminish bank profitability. Consequently, enhancing financial performance requires improved information management and greater transparency in the lending process.

Effect of Credit Risk on Liquidity

The regression analysis test results in table 3 indicated that credit risk has a negative coefficient with a t-Statistic of -1.839351 with a prob value of 0.0692 (>0.05), it can be concluded that the credit risk variable negatively affects the liquidity variable. Therefore, the 4th hypothesis in this study is accepted.

Previous research in line with this research was conducted by (Desda & Yuliza, 2021).

Bad debts are more prone to arise when banks lack adequate information regarding debtors' repayment capacity, leading to uncertainty about incoming cash flows. In such cases, banks should adopt a more cautious approach in managing their finances by tightening credit conditions and exercising greater prudence in financial management to ensure liquidity stability.

Effect of Liquidity on Profitability

The regression analysis results in table 2 show that liquidity has a positive coefficient and t-Statistic of 3.551420 with a prob value of 0.0006 (<0.05), it can be concluded that the liquidity variable has a significant positive effect on the profitability variable. Therefore, the 5th hypothesis in this study is accepted. Previous research in line with this research was conducted by (Chandrawati et al., 2021), which means that liquidity has a positive and significant effect on profitability.

This aligns with agency theory (Jensen & Meckling, 1976), which describes how agent management facilitates the more effective handling of assets and liabilities to optimize the welfare of the principal.

The Effect of Capital Adequacy on Profitability with Liquidity as a Mediating Variable

Sobel test results show that capital adequacy has a significant effect on profitability through liquidity. Therefore, the 6th hypothesis of this study is accepted. The results of this study are not in line with research conducted by (Rinofah et al., 2022), which states that liquidity is unable to mediate the effect of capital adequacy on profitability.

The Effect of Credit Risk on Profitability with Liquidity as a Mediating Variable

The sobel test results show that credit risk does not significantly affect profitability through liquidity. Therefore, the 7th hypothesis of this study is rejected. Research conducted by (Rinofah et al., 2020), is in line with the results of this study which show that liquidity fails to mediate the effect of credit risk on profitability.

CONCLUSIONS AND RECOMMENDATIONS

Based on the research and testing that has been done, the conclusions can be drawn as follows: Capital adequacy and credit risk have no significant effect on profitability, while liquidity has a positive and significant effect on profitability. On the other hand, capital adequacy has a significant positive effect on liquidity, while credit risk has a negative effect on liquidity. Capital adequacy also has a significant positive effect on profitability through liquidity, while credit risk has no effect on profitability through liquidity.

FURTHER STUDY

Future researchers are expected to extend the duration of the study for 5 years in order to produce a larger sample. In addition, adding variables that can affect profitability, such as Net Interest Margin (NIM) and Operating Costs to Operating Income (BOPO), or other variables that lead to related variables.

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