The influence of capital risk, liquidity risk, and credit risk, on profitability with macroprudential intermediation ratio as a moderating variable

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A R T I C L E I N F O	ABSTRACT
	The banking industry faces bank business activities with increasingly complex risks due to rapid development that creates new risk exposures, so the bank must implement good risk management to reduce risks arising from bank activities. This study aims to determine the determinants of profitability, such as capital risk, liquidity risk, credit risk, and macroprudential intermediation ratio as moderation variables. This study utilized information taken from the financial statements of bank companies that have been registered on the IDX by using a purposive sampling test method that met the research criteria. The research period was taken for five years with a total of 130 data from 26 banking sector entities. This study utilized multiple linear analysis methods with secondary data types. The study results revealed a simultaneous influence between capital risk, liquidity risk, credit risk, and macroprudential intermediation ratios on profitability. Capital risk has a negative impact on profitability, liquidity risk shows a a positive relationship with profitability, and the presence of capital risk mediated by macroprudential intermediation ratios strengthens the relationship with profitability. Additionally, liquidity risk mediated by macroprudential intermediation ratios strenghthens the relationshio with profitability, while credit risk mediated by macroprudential intermediation ratios weakens the relationship with profitability. *This is an open access article under the CC BY-NC license.*

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INTRODUCTION

Nowadays, the banking industry faces bank business activities with increasingly complex risks due to rapid development that creates new risk exposures, so the bank must implement good risk management to reduce risks arising from bank activities (Anggari &; Dana, 2020). The strong banking industry of a country can face negative shocks from a country and contribute to the stability of the Indonesian financial system, so that bank companies related to profits must maintain profitability levels properly (Irawati, 2021). In order to prevent the occurrence risks faced by the

bank, and to make it easier for the bank to maintain maximum profit, this is due to the large business risks faced by the Bank (Jumreornvong *et al*. 2018).

The effect of competition on bank profitability can influence policy interventions because if higher profitability comes from market forces, then it is in low deposit interest, high loan interest and poor financial quality can have a negative impact on customers (Shair *et al*. 2019) . On the other hand, lower profitability can also result from technical inefficiencies or broad competition among banks, one of which requires appropriate policy responses from policymakers to balance competition and improve managerial skills (Saiful &; Ayu, 2019). Risk is another important factor that can affect profitability in any way. There are numerous available studies that focus on bank risk and profitability (Shair et al., 2019). Therefore, profitability is essential in ensuring the suistanability of the bank company (Suryaningsih &; Sudirman, 2020).

Bank Indonesia has formulated and refined the reserve requirement policy in monitoring the banking industry by establishing a macroprudential intermediation ratio (MIR) (Davis *et al*., 2022). This aims to enlarge the economy from purchasing securities to high-quality credit to increase and expand intermediation based on the prudential principle so as not to hamper financial system stability (Yustina *et al.,* 2021). Therefore, the implementation of profitability in RIM will affect the economic growth target and maintain the principle of prudence (Davis *et al*. 2022).

Capital capability is one of the risks faced by the bank in maintaining capital needs to support the bank's growth (Ariwidanta &; Wiksuana, 2018). Capital is an important element in the banking world that can be used as a benchmark for the bank's ability to prevent possible losses for financing activities (Hermanto &; Tjahjadi, 2021). Thus, capital in profitability is obtained from the benefits of using assets in order to have an efficiency level of a bank (Syahzuni &; Florencia, 2022).

The bank's inability to fulfill obligations when the time has been determined by the customer may cause liquidity risks faced by the bank. Therefore, it is important to assess a bank's liquidity, which aims to determine which bank is in a healthy, moderately healthy, and unhealthy condition (Suryaningsih &; Sudirman, 2020). Therefore, the risks faced by the bank in meeting its liquidity needs in demand for current accounts and savings, which are expected to reduce the cost of funds (Daryanto *et al.,* 2020). So, that the Bank to earn profits in encouraging cost efficiency activities (Badawi et al., 2021).

Banks in distributing their funds are through providing credit. Business are very dependent on the bank credit issued that will be used as capital for business (Permatasari, 2020). Credit risk can occur due to improper lending policies (Saleh &; Afifa, 2020). The bank's functional activities involve purchasing securities and credit derived from acquired credit risk (Saady *et al,* 2020). So that profitability can be used as a reference in evaluating the efficiency of the bank's financial performance, and calculating the amount of profit obtained by the bank (Daryanto *et al.* 2020) .

Previous research conducted by Abbas *et al*. (2019) , Saleh &; Afifa (2020), Suryaningsih &; Sudirman (2020) stated that credit risk, liquidity risk, and bank capital affect bank profitability. Previous research conducted by (Irawati, 2021), Pracoyo &; Imani (2018), Pratiwi & Masdupi (2021) and Ramadhanti *et al*. (2019) mentioned that capital adequacy (CAR) results and liquidity have a significant positive effect on profitability. Then previous research conducted by Anggari &; Dana (2020), Ariwidanta &; Wiksuana (2018), Davis *et al*. (2022) stated that liquidity risk and macroprudential intermediation ratio have a positive effect, while credit risk has a negative effect on profitability. However, the difference between this study and the previous study is the addition of macroprudential intermediation ratio (MIR) variables and in the research year from 2017-2021.

This research aims to determine the influence of capital risk variables, liquidity risk, and credit risk on profitability with macroprudential intermediation ratio as a moderating variable. The implications of this research are providing input to the bank's management on the importance of risk management in all bank activities to obtain maximum profitability.

RESEARCH METHOD

In this research, the measurements used in the dependent variable involved profitability measured by a ratio scale and three independent variables, namely, capital risk, liquidity risk, and credit risk, while moderating variables, namely the macroprudential intermediation ratio (MIR) measured by a ratio scale. Profitability is the ability to fundamental performance of a company as measured by the efficiency level and effectiveness used by the company in generating profits, and using the ratio of return on assets (ROA) (Weston *et al.*, 1991). Capital risk measurement used CAR, and the analysis used for banks could determine losses from activities carried out by the bank (Myers &; Majluf, 1984). Liquidity risk measurement employed CASA. This analysis was used to show the proportion of low-cost funds compared to total third-party funds obtained by banks (Jose et al., 1996). Credit risk measurement used NPL to measure the bank's ability to discredit provided by the Bank (Klein, 1996). Then, the macroprudential intermediation ratio (MIR) was measured using RIM (Cooke, 1970).

This research data used secondary data obtained through the IDX's official website and each company's official website. The research sample used the banking industry listed on the Indonesia Stock Exchange (IDX) during 2017-2021. Purposive sampling technique with criteria, banking companies that were permanently listed on the IDX in 2017-2021, banking companies that have complete data according to the variables used for overall measurement during the study period, and companies that have not IPO during the research period. The statistical tools used in this study include, descriptive test, normality analysis test, autocorrelation test, multicollinearity test, heteroscedasticity test simultaneous test, partial test and adjusted R test. The measurement in this study was through the causal relationship or explanatory causality between the dependent variable, independent variable, and moderating variable in quantitative methods with multiple linear regression equations.

RESULTS AND DISCUSSIONS

Result

This research data used secondary data obtained through the IDX's official website and each company's official website. The research sample used the banking industry listed on the Indonesia Stock Exchange (IDX) during 2017-2021. Purposive sampling technique with criteria, banking companies that were permanently listed on the IDX in 2017-2021, banking companies that have complete data according to the variables used for overall measurement during the study period, and companies that have not IPO during the research period.

Table 1. Descriptive test

	CAR	CASA	NPL	RIM	ROA
Mean	26.60008	42.03262	1.389692	83.55469	1.621077
Median	23.14000	41.84000	1.050000	83.45000	1.545000
Maximum	98.07000	78.90000	9.920000	277.2900	5.710000
Minimum	12.67000	5.140000	0.050000	14.37000	0.070000
Std. Dev.	12.00608	20.08108	1.167775	32.39371	1.158877
Skewness	2.639787	0.019719	3.482816	2.065534	0.801460
Kurtosis	13.00164	1.860260	23.72587	13.64896	3.439442
Jarque-Bera	692.8275	7.044711	2589.610	706.6910	14.96335
Probability	0.000000	0.029530	0.000000	0.000000	0.000563
Sum	3458.010	5464.240	180.6600	10862.11	210.7400
Sum Sq. Dev.	18594.84	52019.24	175.9170	135366.5	173.2464
Observations	130	130	130	130	130

Descriptive Statistical Test when viewed from Table 1, there is a total of 130 data (Obs) based on the test results above. The Capital Risk proxied with Capital Adequacy Ratio (CAR) shows an average value of 26.60 at Bank Nationalnobu Tbk, quartile value of 23.14 at Bank Mandiri (Persero)

Tbk, maximum value of 98.07 at Bank of India Indonesia Tbk, minimum value of 12.67 at Bank Capital Indonesia Tbk, and the standard deviation is 12.00.

The Liquidity Risk variable proxied with Current Account Saving Account (CASA) shows an average value of 42.03 at Bank OCBC NISP Tbk, quartile value of 41.84 in Bank Capital Indonesia Tbk, maximum value 78.90 in Bank Central Asia Tbk, minimum value of 5.14 in Bank of India Indonesia Tbk, and standard deviation of 20.08.

Credit Risk (NPL) variable shows an average value of 1.38 at Bank Maspion Indonesia Tbk, a quartile value of 1.05 at Bank Rakyat Indonesia (Persero) Tbk, maximum value of 9.92 at Bank Yudha Bhakti Tbk, minimum value of 0.05 at Bank Nationalnobu Tbk, and the standard deviation is 1.16.The Macroprudential Intermediation Ratio (RIM) shows an average value of 83.55 at Bank Central Asia Tbk, quartile value of 83.45 at Bank Rakyat Indonesia Agroniaga Tbk, maximum value of 277.29 at BPD West Java and Banten Tbk, minimum value at 14.37 at Bank BTPN Tbk, and the standard deviation is 32.39.

Profitability (ROA) shows an average value of 1.62 at Bank Pan Indonesia Tbk, a quartile value of 1.54 at Bank Rakyat Indonesia Agroniaga and a maximum value of 5.71 at Bank of India Indonesia Tbk, a minimum value of 0.07 at Bank Mayapada International Tbk, and the standard deviation is 1.15.

The Normality Test in this study uses the Residuals test to show that the data is normal with a significance value of >0,05, and probability shows that the data has a significance result of 0.25, which the result is also greater than 0,05, so the data shows a normal distribution.

The Autocorrelation Test in this study utilizes the LM Test which provided that if the value of Prob. Chi square > 0,05, then there is no autocorrelation problem. The prob value of Chi square is 0.31 where the value is > 0,05. So, the basis for decision making in the LM Test is concluded that there is no autocorrelation problem.

Multicollinearity test *of* test results can be seen from the tolerance value of < 0,1 and the value of Variance Inflation Factor (VIF) < 10. The test results in table 4.4 obtained a variable tolerance value of capital risk of 0.039 < 0,10 and a VIF value of capital risk of 1.188 < 10. Liquidity Risk is 0,014 < 0.10 and VIF value of Liquidity Risk is 1,437 < 10. Credit risk is 0.0128 < 0,10 and VIF value of Credit risk is 1.154 < 10. CAR_RIM of 0.023 < 0,10 and the VIF value of CAR_RIM is 1.496 < 10. CASA_RIM of 0.0126 < 0,10 and the VIF value of CASA_RIM is 1.622<10. NPL_RIM of 0.006<0.10 and the VIF value of NPL_RIM is 1.624<10. It can be inferred that all variables are free from the problem of multicollinearity.

The heteroscedasticity test uses the Harvey method. If the value of Prob. Chi square > 0,05, so there is no heteroscedasity problem. The test results show the value of Prob. Chi square 0,19 > 0,05, so it is concluded that there is no indication of heteroscedasticity.

Simultaneous Test (Test F) from the regression test results, a significance result of 0,000 is obtained, meaning a value below 0,05, meaning that there is a concurrent influence. From the capital risk test result, liquidity risk, credit risk, and profitability influence the macroprudential intermediation ratio simultaneously.

	Hipotesis	Coefficient	Prob.	Hasil
H₁	Risiko permodalan berpengaruh negatif terhadap Profitabilitas	-0.440	0.1574	Ditolak
H₂	Risiko likuiditas berpengaruh positif terhadap Profitabilitas	2.974	0.0000	Diterima
H₃	Risiko kredit berpengaruh negatif terhadap Profitabilitas	0.148	0.8606	Ditolak
H₄	Risiko Permodalan Dimensi memperkuat hubungan Rasio Intermediasi Makroprudensial (RIM) terhadap Profitabilitas	0.836	0.0000	Diterima
H₅	Risiko Likuiditas Dimensi memperkuat hubungan Rasio Intermediasi Makroprudensial (RIM) terhadap Profitabilitas	-0.198	0.0001	Diterima
H₆	Risiko Kredit Dimensi memperlemah hubungan Rasio Intermediasi Makroprudensial (RIM) terhadap Profitabilitas	-0.012	0.4284	Ditolak

Picture 2. Hipothesis with partial test (t-test)

H1: Capital risk has a negative influence on profitability rejected
H2: Liquidity risk has a positive influence on profitability accepted
H3: Credit risk has a positive influence on profitability rejected
H4: Capital risk dimension strenghthens the relationship between macroprudential intermediation ratios and profitability accepted
H5: Liquidity risk dimension strengthens the relationship between macroprudential intermediation ratios and profitability accepted
H6: Credit risk dimension weakens the relationship between macroprudential intermediation ratios and profitability rejected

The table above shows the individual influence of the independent variables on the dependent variables and the indirect influence by the moderating variable if it has a significance result of < 0,05. There is a capital risk with a significance value of 0.1574 meaning that it does not affect individual profitability. The liquidity risk with a significance value of 0.000 means that it has an influence on individual profitability. Credit risk with a significance value of 0.8606 means that it does not affect profitability individually. There is also a risk that RIM-mediated capital has significance that 0.000 indirectly strengthens the profitability relationship. The variable liquidity risk mediated by RIM has significance resilt, with 0.001 indirectly strengthening the profitability relationship. The variable credit risk is mediated by RIM, which indirectly weakens the effect of the profitability relationship.

The Adjusted R^2 test of the independent variable measures how much ability to explain its relationship to the dependent variable. If the value is close to 1, the independent variable will have a greater impact on explaining the dependent variable. However, if it is close to 0, the smaller influence of the independent variable explains the dependent variable. The value of R^2 is 0.402120, which means that the variables of capital risk, liquidity risk, credit risk, and macroprudential intermediation ratio provide an explanation for profitability of 40.21%.

The data reveals that the constant value is -10.480. The cost coefficient value for capital risk indicates that for every 1% increase in capital risk, profitability decreases by 0.440. On the other hand, the coefficient for liquidity risk suggests that for every 1% increase in liquidity risk, profitability increases by 2.974. The coefficient for credit risk indicates that for every 1% increase in credit risk, profitability decreases by 0.148. Furthermore, when examining the relationship between macroprudential intermediation ratios (RIM) and profitability, the analysis revelas that RIM-mediated liquidity risk increases profitability by 0.836 for every 1% change in RIM-mediated capital risk. RIM-mediated liquidity risk increases profitability by 0.198 for every 1% change in RIM-

mediated liquidity risk. However, RIM-mediated credit risk decreases profitability by 0.012 for every 1% change in RIM-mediated credit risk.

Discussion
The Influence of Capital Risk on Profitability

The results of the t-test show that capital risk has a negative but not significant influence on profitability. These results are not in line with the above hypothesis according to Saleh & Afifa (2020), these results do not meet the assumptions above that the capital adequacy ratio (CAR) that has a positive influence on ROA. This result can be seen from the coefficient when the CAR decreases, the ROA at the bank also decreases. Having a large CAR but not using it for Bank service activities, so the benefits obtained are not too significant.

The Influence of Liquidity Risk on Profitability

The results of the t-test show that liquidity risk has a significant positive influence on profitability. This supports previous research by Pracoyo & Imani, (2018) which stated that liquidity risk has a significant positive impact on profitability. This shows that the bank is making the right decision to increase CASA in order to maximize the profits. As a low-cost fund, CASA can reduce the bank's capital to make a profit. As the expenses incurred by the bank to acquire funds decrease, the difference between the interest earned by the bank on loans to the public and the obligation to pay interest to customers on saving increases. Consequently, the bank's profitability increases.

The Influence of Credit Risk on Profitability

The results of the t-test show that credit risk has a positive but not significant influence on pfoitability. This is in line with research conducted by Abbas *et al.* (2019) which reveals that credit risk negatively affects profitability. High credit risk is caused by the customer's failure to fulfill its obligations to the Bank. Non-current, doubtful, and missing bad loans pose credit risk. If the bank takes a large number of non-performing loans, it will be a threat to the bank because the existence of non-performing loans will not only cause losses to the bank, but also disrupt the bank's business activities. So, the higher the ratio, the worse the credit quality of the bank. Therefore, the greater the credit risk, the lower the profitability of the bank.

The Influence of Capital Risk Mediated by Macroprudential Intermediation Ratio (MIR) on Profitability

The results of the t-test show that capital risk mediated macroprudential intermediation ratio strengthens the relationship to profitability in banking firms. This supports previous research conducted by Yustina *et al*. (2021) which states that capital risk has a positive influence on RIM. This situation shows that when the coefficient results are positive, there will also be an increase in the ROA variable. There is an increase in profits, so macroprudential policy is seen as a way to create financial system stability.

The Influence of Liquidity Risk Mediated by Macroprudential Intermediation Ratio (MIR) on Profitability

The results of the t-test show that liquidity risk mediated macroprudential intermediation ratio strengthens the relationship to profitability among banking firms and this result is not in line with Yustina *et al*. (2021) which stated that liquidity risk has no significant influence on RIM. Liquidity management in banking institutions is one of the priority aspects. This situation shows that when CASA increases, it will also be followed by an increase in ROA. It can be concluded that the bank keeps the ability to fulfill financial obligations within a predetermined time. This can increase the macroprudential intermediation ratio in liquidity. Moreover, this is not in line with Yustina *et al*. (2021) which atated that liquidity risk has no significant influence on RIM.

The Influence of Credit Risk Mediated by Macroprudential Intermediation Ratio (MIR) on Profitability

The results of the t-test show that credit risk mediated macroprudential intermediation ratio weakens the relationship to profitability in banking firms. This is not in line with Wijayanti *et al.* (2018) which stated that credit risk has a positive influence on RIM. It can be stated that the level of risk of non-performing loans does not affect the bank's ability to disburse loans with the Macroprudential Intermediation Ratio. In this concept, it can be stated that the bank has fulfilled the principle of prudence in disbursing credit. Meanwhile, it is known that the bank will continue to try increasing its lending to obtain high profits as well. It means that in order to increase its credit distribution, RIM is expected to continuously increase. However, RIM cannot constantly exceed or fall below the predetermined limit. If it exceeds the upper limit, the banking sector is considered to be unhealthy because the level of credit disbursement is considered too high, not commensurate with the available funding. On the other hand, if RIM falls below the lower limit, it is also considered unhealthy as it indicates that the bank's funds are not being utilized productively.

CONCLUSION

The results of the study concluded that capital risk does not influence on profitability due to sufficient capital and high capital adequacy ratio (CAR), but the bank does not utilize it effectively in its banking services, resulting in a minimal impact of CAR on profitability. On the other hand, liquidity risk has a significant influence on profitability as banks aim to increase the current acount and savings account (CASA) to maximize profits. Credit risk has a significant nefative influence which indicates that higher credit risk leads to lower profitability. The RIM moderates the influences of capital risk and liquidity risk on profitability, indicating that the bank complies with prudential principles regarding capital and liquidity risks. However, RIM does not moderate the impact of credit risk on profitability because problematic credit risk does not affect the bank's ability to distribute loans based on the macroprudential intermediation ratio. This research has limitations, namely research that only used three independent variables (capital risk, liquidity risk, and credit risk) and the focus only on the banking sector. The implications of further research can consider other variables, such as operating costs and operating income (BOPO), Loan to Deposit Ratio (LDR). Furthermore, it is recommendeded to conduct updated and more in-depth theoretical studies to provide broader and informative knowledge for research users. In future studies, it is also expected to use different population groups with a larger range, to achieve a better and more varied impact than previous studies. Future research is expected to conduct research by adding variables that affect profitability.

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