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Determinants of Bank RAROC Moderated by Bank Risk

Tipri Rose Kartika[1]
Benny Hutahayan[2]
Adler Haymans Manurung[3]
Kevin Deniswara[4]

Abstract

This paper aims to examine Determinants of Bank RAROC moderated by Bank Risk. Model Panel Data is used to examine determinants of RAROC for period of 2008 to 2018. The research found that Internal Bank Factors which is Net Interest Margin, Non-Performing Loan, Capital Adequacy Ratio, Ratio Operational Expenses to Operational Income, Market Power, Risk, Asset significant affect RAROC. All external Bank factors which is Oil price, Exchange Rate and Economic Growth significant affect RAROC as dependent variable. Risk is used as moderating variable to affect RAROC that it is significant. Risk as moderating variable is better compared to Asset as moderating variable in determining RAAROC.

Keyword: Bank Performance, RAROC, Net Interest Margin, Bank Risk, Exchange Rate, Oil Price, Economic Growth, Data Panel, Moderating Variable.

[1] Lecturer of Publishing Department, State Polytechnic of Creative Media, Jakarta Indonesia. rosetipri@polimedia.ac.id
[2] Currently Lecturer of Faculty of Administration Science, University of Brawijaya, Indonesia. E-mail: bennyhutahayan@ub.ac.id
[3] Professor Banking and Finance, Management Department, BINUS Business School Doctor of Research in Management, Bina Nusantara University, Jakarta 11480, Indonesia. adler.manurung@binus.ac.id
[4] Lecturer, Accounting Department, Faculty of Economics and Communication, Bina Nusantara University, Jakarta 11480, Indonesia kevindeniswaraignatius@binus.ac.id

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Introduction

Discussion of Bank Performance is still hot to academician and practitioners because it discusses heart of economics of a country. Measurement of Bank Performance mostly use Return on Assets (RoA) and Return on Equity (RoE). Hasan et.al (2019) documented determinant of Bank Performance in Indonesia which is ROA and ROE as measurement of Bank Performance. Hadi et.al (2018) examined ROA and ROE in Middle East. Menicucci and Paolucci (2016) studied determinants of bank profitability using ROA and ROE. Hakimi et.al (2015) investigated RAO and ROE in Tunisian Banking Sector. Lall (2014) used ROA and ROE to measure bank performance Crisis Period in USA. Staikouras and Wood (2011) explored ROA and ROE in European Bank. Hoffmann (2011) studies ROA and ROE in USA Banking Industry.

Then, measurement of bank performance add by some researcher or academician that it should consider risk facing the company. Zaik et.al (1996) stated that RAROC performance measurement system has become a key decision-making tool at Bank of America. Turnbull (2002) also suggested RAROC as toll to value bank performance. Baer et.al (2011) also explored RAROC as a measurement of bank Performance. Manurung et.al [26] explored Bank Performance using RAROC. Naimy (2012) studies RAROC as measurement of Bank Performance in Lebanese Bank. Lima(2014) investigated RAROC to become a measurement in Brazil Bank. Petria et.al (2015) discuss Bank performance using RAROC in EU 27 banks systems. Saha et.al (2016) explored RAROC as a measurement of Bank Performance in Malaysia. Manurung et.al (2020) examined Bank Performance of RAROC Moderated by Assets in Indonesia.

Determinant of Bank Performance mostly used internal bank factor. Bank performance was also affected by external bank factor such as Oil Price, Exchange Rate, economic growth or macroeconomic variable. Brahmaiah and Ranajee (2018) examined factors influencing Profitability of Banks in India such as Strength of equity capital, operational efficiency, ratio of banking sector deposits to the gross domestic product (GDP). Fani et.al (2018) investigated Impact of Internal and External Factors on Bank Performance in Pakistan. Lutf and Omarkhil (2018) explored Impact of Macroeconomic Factors on Banking Profitability. Saeed (2014) studied the impact of bank-specific, industry-specific, and

macroeconomic variables on bank profitability before, during, and after the financial crisis of 2008.

This research will use Risk of bank to become moderating variable in the model. The moderating variable could be stated to strong or to weak relationship between dependent variable and independent variable (Manurung, 2019, Sharma 1981). Shatnawi et.al (2019) examined risk as moderating variable on relationship board structures and corporate performance. Tasmin and Muazu (2017) used risk management as moderating variable to determine Enterprise Risk Management. Manurung et.al (2020) use risk as moderating variable to examine the determinant of Net interest Margin in Indonesia.

Theoretical Review

Bank is an intermediary financial institution that manage by some professional to get profit for its operation. Bank is a heavy regulated institution and the government has big tension to the financial institutions especially bank. As a bank, they collected fund or money from the surplus unit or household and distribute to deficit units or company, and the bank get margin as a return. Bank has four tasks to transform which is value, time, risk and liquidity (Manurung, 2017). Bank needs the high capital to operate it as requirement the banking regulator or central bank of a nation. The Capital of Bank will grow as much as profit that bank be gotten it. Then, the capital of bank could be arranged (Manurung et.al 2020) as follows:

$$\left.\begin{aligned} E_1 &= E_0 + \pi_1 \\ E_2 &= E_1 + \pi_2 = E_0 + \{\pi_1 + \pi_2\} \\ E_n &= E_0 + \{\pi_1 + \pi_2 + \ldots + \pi_n\} \end{aligned}\right\} \qquad (1)$$

E_1 is capital bank on year – 1 and grow from on year – 0 by profit (π_1) then it grow again by profit on year – 2 (π_2), so total Capital become E_2 as mention in equation (1).

Bank could increase their capital through profit (π_1, π_2, ….., $\pi_{\sim}$) and issue shares to other people or public (Svitek, 2001), and also issue long term debt is known Subordinate Debts (Kleff dan Weber, 2008). Manurung et.al (2020) stated profit of the bank could be calculated with assumptions that r, i, ρ are constant as follows:

$$\pi = (1 - T)(r * L - i * D - \rho L) \qquad (2)$$

T = tax
L = Loan
D = Deposits
r = rate of Loan
i = rate of deposits
ρ = rate of Non-Performing Loan

If L = (1 – α)*D + E, which is α as reserve requirement by central bank that it provide by bank (Jiang, 2010). Then, equation (2) could be rewrite as follows:

$$\pi = (1-T) * [r * \{(1-\alpha) * D + E\} - i * D - \rho\{(1-\alpha) * D + E\}]$$

$$\pi = (1-T) * [(r+\rho) * E + \{(1-\alpha) * (r-\rho) - i\} * D] \quad (3)$$

$$\frac{\pi}{E} = (1-T) * [(r+\rho) + \{(1-\alpha) * (r-\rho) - i\} * \frac{D}{E}] \quad (4)$$

(π / E) is known as Return on Equity (RoE). If we want to make equation (4) to become (π / A), is known as return on asset (RoA), Equation (3) could be rewrite as follows:

$$\frac{\pi}{A} = (1-T) * [(r+\rho) * \frac{E}{A} + \{(1-\alpha) * (r-\rho) - i\} * \frac{D}{A}] \quad (5)$$

If E = A – D, so Equation (4) could be rewritten as follows:

$$\frac{\pi}{A} = (1-T) * [(r+\rho) + \{\alpha * (\rho - r) - i\} * \frac{D}{A}] \quad (6)$$

Equation (4) dan (6) are first indicator to see bank of financial performance for practitioners, academician and Regulator. If we want to maximize for each RoA and RoE, then we could derive first order for equation (4) with (D/E) and equation (6) with (D/A).

The second indicator for both academician and practitioner is known Risk Adjusted Return on Capital (RAROC). This RAROC has considered risk to calculate it as follows:

$$RAROC = \frac{REVENUE - Cost - Expected\ Loss}{Risk\ Required\ Capital} \quad (7)$$

Then Klaassen and van Eeghen (2015) arranged the formula of RAROC to become factor of RoE as follows:

$$RAROC = \frac{R-C-EL}{RRC} = \left\{ROA - \frac{EL}{EA}\right\} * \frac{EA}{TA} * \frac{TA}{RRC} \quad (8)$$

R = revenue
C = Cost
EL = Expected Loss
EA = Earning Assets
TA = Total Assets
RRC = Risk Required Capital

Based on the Equation (7), Risk, ROA, ratio Expected Loss to Earnings Asset, ratio Earnings Assets to Total Assets are determinant of RAROC. This formula could be expanded to add macroeconomics variable which is to explore in this research.

RESEARCH DESIGN

Model

This research use Model data Panel to estimate relationship some independent variable to determine probability of bankruptcy coal mining firm as dependent variable and Debt to Equity Ratio, Gross Profit Margin, Net Profit Margin, Time interest earned, Current Ratio and Total Asset as independent. This research also uses Oil Price and Fed Rate as external variable. Total Asset is used as moderating variable. Model Data Panel is appropriate for data small which short time series and small company as sample. Besides that, model data panel also show time and the cross-section as sample. Gujarati (2003), Wooldridge (2002), Greene (2008), Biorn (2017) and Sul (2019) stated model data panel is as follows:

a. Pooled Data Model

Pooled Data Model is model that data combine all together and the model is as follows:

$$Y_{i,t} = \beta_1 + \beta_2 X_{2i,t} + \beta_3 X_{3i,t} + \mu_{i,t} \quad (9)$$

i = 1, 2, … , k ; t = 1, 2, … , n

X's are non-stochastic and $E(\mu_{it}) \sim N(0, \sigma^2)$

b. Fixed Effect Model

FEM is a model that μ_i and X's are assumed correlated.

$$Y_{i,t} = \beta_{1i} + \beta_2 X_{1i,t} + \beta_3 X_{2i,t} + \mu_{i,t} \quad (10)$$

i = 1, 2, … , k ; t = 1, 2, … , n

c. Random Effect Model (REM)

REM is a model that ε_i and X's are assumed uncorrelated.

$$Y_{i,t} = \beta_{1i} + \beta_2 X_{1i,t} + \beta_3 X_{2i,t} + \mu_{i,t} \quad (11)$$

$$\beta_{1i} = \beta_1 + \varepsilon_i$$

i = 1, 2, … , k ; t = 1, 2, … , n

μ_i is a random error with a mean value of zero and variance of σ_ε^2.

Judge (1982), Wooldridge (2002), Biorn (2017) and Sul (2019) stated that how we choose FEM or REM as follows:

1. When T (number of time series data) is large and N (the number of cross-sectional units) is small, FEM may be preferable.
2. When N is large and T is small, if we strongly believe that the individual, or cross-sectional, units in our sample are not random drawings from a larger sample, FEM is appropriate. If the cross-sectional units in the sample are regarded as random drawings, the REM is appropriate.
3. When individual error component ε_i and one or more regressors are correlated, FEM is an unbiased estimator.
4. REM estimators are more efficient than FEM Estimators, when N is large and T is small and if the assumptions underlying REM hold.

Data

Data for this research was collected from the company that they published to public in newspaper or their website as mandatory requirement from government and Indonesia Stock Exchange, but macroeconomics data is obtained from Central Bank of Indonesia. Data is annually data that collected for period of 2014 to 2018, that only twenty-five companies have financial statement for the period. Then, Risk Adjusted Return on Capital (RAROC), Net Interest Margin

(NIM), Non-performing Loan (NPL), Capital Adequacy Ratio (CAR), Ratio Operational Expenses to Operational Income (BOPO), Market Power (MP), Risk, Gender in Board of Director (GNDR), and Economic Growth are calculated that is based data collection. Data Total Asset, Exchange Rate, Oil Price are transformed to logarithm natural, when model run by Eviews.

Discussion and Analysis Data

Data is used for period 2014 to 2018 which RAROC has minimum of -161.4%; maximum of 88.07%, average 10.43% and standard of deviation of 46.81%. Those figures stated that fluctuation of RAROC is to high, but the average RAROC is on average. It could compare to interest rate might be higher.

Furthermore, the discussion examine determinant of RAROC which is internal and external bank factor. We use model data panel, which is Fixed Model because the data is selected by purposive sampling dan the process is also used Eviews Program and improving the heteroscesdacity. The results is follows:

$$RAROC_{i,t} = 29.558 - \underset{(-5,46)}{11.838}\ NIM_{i,t} + \underset{(2.001)}{5.632}\ NPL_{i,t} - \underset{(-3.569)}{2.385}\ CAR_{i,t}$$

$$+ \underset{(3.202)}{66.496}\ Risk_{i,t} - \underset{(-1.747)}{0.265}\ BOPO_{i,t} - \underset{(-2,445)}{6.263}\ MP_{i,t}$$

$$+ \underset{(0.467)}{0.103}\ GNDR_{i,t} + \underset{(4.702)}{0.417}\ Aset_{i,t} - \underset{(-4.610)}{0.975}\ OILP_t + \underset{(4.171)}{3.321}\ EX_t$$

$$+ \underset{(1.626)}{52.115}\ EG_t - \underset{(-1.903)}{9.496}\ (NIM*Risk)_{i,t} - \underset{(-2.270)}{10.198}\ (NPL*Risk)_{i,t}$$

$$+ \underset{(2.243)}{2.826}\ (CAR*Risk)_{i,t} - \underset{(-0.711)}{0.223}\ (BOPO*Risk)_{i,t}$$

$$+ \underset{(3.377)}{0.341}\ (Aset*Risk)_{i,t} - \underset{(-2.710)}{8.274}\ (MP*Risk)i,t$$

$$- \underset{(-1.974)}{1.008}\ (GNDR*Risk)_{i,t} - \underset{(-2.868)}{1.698}\ (OILP*Risk)_t$$

$$- 6.766\ (EX*Risk)_t + 31.621\ (EG*Risk)_t + \varepsilon_{i,t} \qquad (12)$$

R^2 = 97.13, F. 59.36, T-test in brackets

Equation (12) is RAROC Model that it explain by Net Interest Margin, Non-Performing Loan, Capital Adequacy Ratio, Ratio Operational Expenses to Operational Income, Market Power, Risk, Asset, and Gender as internal bank factor, and Oil Price, Exchange Rate and Economic Growth as external bank factor. Those factors could explain RAROC fluctuation by 97.13% which is nearly 100%. Others bank factor only explain by 2.87%. This model also has good of fit by F testing.

Net Interest Margin as a measurement capability to sell the fund includes to affect RAROC for this Research. Manurung et.al (2020), Hasan et.al (2020) also use Net Interest Margin to affect Bank Performance. Net Interest Margin negatively significant affect Bank RAROC at level of significant of 1%. This result supports the theory and previous research.

This research also includes Non-Performing Loan (NPL) as determinant of RAROC which is a measurement capability bank to manage the loan that distributed to society. The Bank RAROC will be expected to increase when NPL has increasing for following year. This research found that Non-Performing Loan positively significant affect Bank RAROC at level of significant of 5%. This finding support previous research and theory.

Capital Adequacy Ratio (CAR) is a measurement the capability bank to provide risk of loss the bank. Bank RAROC will be expected to decrease when CAR increase following year. This research found that Capital Adequacy Ratio negatively significant affect Bank RAROC at level of significant of 1%. This result supports the previous research and theory.

Ratio Operational Expenses to Operational Income (in Indonesia is known BOPO) is a measurement the bank to do efficiency in bank. This ratio will be expected to have negative relationship to Bank RAROC. This research found that Ratio Operational Expenses to Operational Income negatively significant affect Bank RAROC at level of significant of 10%. This research supports the previous research and theory.

Market Power is a measurement the bank capability to dominate market. The Bank RAROC will be expected to decrease when market power will have increasing. This research founds that

Market Power negatively significant affect Bank RAROC at level of significant of 5%. This research support previous research and theory.

Risk is a measurement to see how big risk facing by thank bank. It measures by standard of deviation of price in the stock exchange, that it said by total risk. Bank RAROC will be expected to increase when the Risk have increasing. This research found that Risk positively significant affect Bank RAROC at level of significant of 1%. This finding supports the previous research and theory.

Assets is a measurement to see how big the Bank, because Central Bank of Indonesia issued a rule to divide bank based on paid capital. This ratio will be expected to have positive relationship with Bank RAROC. This research found that Asset positively significant affect Bank RAROC at level of significant of 1%.

Oil Price is a price oil that has impact to company performance. This oil price has negative impact to Bank RAROC. This research has found that Oil Price negatively significant affect Bank RAROC at level of significant of 1%. This research supports the previous research and theory.

Exchange rate is a tool to see how good a country to other country. If Exchange rate is more than 1, it means that country has good economic comparing to other country. Exchange rate has negative relationship to Bank RAROC. This research found that Exchange Rate negatively significant affect Bank RAROC at level of significant of 1%.

Economic Growth is a measurement to see how the growth the company. The company mostly expect to grow for next following year. If the company has growth, the cost of capital is expected to decrease from previous year. RAROC will be expected to increase when the economic growth increase to following year. This research found that Economic Growth positively significant affect Bank RAROC at level of significant of 15%. This finding supports the previous research and the theory.

Risk could become moderating variable for Net Interest Margin, Non-Performing Loan, Capital Adequacy Ratio, Market Power Assets, Gender, Oil Price and Exchange Rate to Bank RAROC to strong or to weak relationship. Risk could not become moderating variable for Ratio Operational Expenses to Operational Income, and Economic Growth.

This research includes Gender as independent variable to affect RAROC. Then this research found that Gender variable do not significant affect Bank RAROC at level of Significant of 10%.

Conclusion

This research found results, first, RAROC Fluctuation is to high but the average is comparable to interest rate but it is better. Second, Internal Bank Factors which is Net Interest Margin, Non-Performing Loan, Capital Adequacy Ratio, Ratio Operational Expenses to Operational Income, Market Power, Risk, Asset significant affect RAROC. Third, All external Bank factor which is Oil price, Exchange Rate and Economic Growth significant affect RAROC as dependent variable. Fourth, risk is used as moderating variable to affect RAROC that it is significant. Risk as moderating variable is better compared to Asset as moderating variable in determining RAAROC.

References

B. Brahmaiah, and Ranajee (2018), Factors Influencing Profitability of Banks in India; Theoretical Economics Letters, Vol. 8, pp. 3046-3061.

Fani, K. A., Khan, V. J., Kumar, B., and Kumar, B (2018), Impact of Internal and External Factors on Bank Performance in Pakistan; International and Public Affairs, Vol. 2 (4),2018, pp. 66 – 77.

Gujarati, D. N. (2003),Basic Econometrics; 4th eds.; McGraw Hill.

Hadi, A. R. A., Hussain, H. I., Suyanto, T and T. H. Yap (2018), Bank's Performance and Its Determinants – Evidence from Middle East, Indian Sub-Continent and African Banks, Polish Journal of Management Studies, Vol. 17 (1), pp. 17 - 2

Hakimi, A., Hamdi, H., and M. Djelassi (2015), Testing the concentration-performance relationship in the Tunisian banking sector, Journal of Economics and Business Vol. 18 (2), pp. 41 – 62

Hasan, M.S. A, Manurung, A. H. and B. Usman (2020), Determinants of Bank Profitability with Size as Moderating Variable, Journal of Applied Finance & Banking, Vol. 10 (1), pp. 53 – 166.

Hoffmann, P. S. (2011), Determinants of the Profitability of the US Banking Industry, International Journal of Business and Social Science, Vol. 2 (22), pp. 255 – 269.

Klaassen, P. and van Eeghen, I., (2015), Analyzing bank performance – linking RoE, RoA and RAROC: U.S. commercial banks 1992–2014, Journal of Financial Perspectives, EY Global FS Institute, vol. 3(2), pp. 103111.

Lall, Pooran (2014), Factors affecting U.S. Banking Performance: Evidence From the 2007-2013 Financial Crisis, International Journal of Economics, Finance and Management, Vol. 3 (6), pp. 282 – 295.

Manurung, Adler H., Usman, B. and J. C. Manurung (2020), Determinants of RAROC of Bank using Internal and External Bank

Factor and Size as Moderating Variable, International Journal of Advanced Science and Technology, Vol. 29 (4), pp. 3433 – 3441

Manurung, Adler H., Hutahayan, B., Deniswara, K. and T. R. Kartika (2020), Determinant of Net Interest Margin in Indonesia Bank Moderated by Risk, International Journal of Advanced Science and Technology Vol. 29 (5), pp. 11317-11328.

Manurung, Adler H. (2017), Financial Risk Management: Banking, PT Adler Manurung Press, Jakarta.

Menicucci, E. and G. Paolucci, (2016), The determinants of bank profitability: empirical evidence from European banking sector, Journal of Financial Reporting and Accounting, Vol. 14 (1), pp.86 – 115.

Naimy, V. Y. (2012); The RAROC as an Alternative Model of Analyzing the Lebanese Banks' Performance and Capital Allocation; Journal of Business & Financial Affairs, Vol. 1, No. 1; pp. 1- 5.

Saeed, M. S. (2014), Bank-related, Industry-related and Macroeconomic Factors Affecting Bank Profitability: A Case of the United Kingdom; Research Journal of Finance and Accounting, Vol. 5 (2), pp. 42 – 50. [

Saha, A., Ahmad, N. H. and S. G. Yeok (2016), Evaluation of Performance of Malaysian Banks in Risk Adjusted Return on Capital (RAROC) and Economic Value Added (EVA) Framework, Asian Academy of Management Journal of Accounting and Finance, Vol. 12 (1), pp. 25 –47.

Staikouras, C. K. and G. E. Wood (2011), The Determinants of European Bank Profitability, International Business & Economics Research Journal, Vol. 3 (6), pp. 57 - 68.

Svitek, I. M. (2001); Functions of Bank Capital; BIATEC, Rocnik Vol. 9, No. 5; pp. 37 –40.

Turnbull, S. M. (2002), Bank and Business Performance Measurement, Economic Notes by Banca Monte dei Paschi di Siena SpA, vol. 31 (2), pp. 215–236.

Verbeek, M. (2008), A Guide to Modern Econometrics, 3rd ed., John Wiley & Sons.

Wooldridge, J. M. (2002), Econometric Analysis of Cross Section and Panel Data; the MIT Press, Cambridge – England.

Zaik, E., Walter, J., Kelling, G. and C. James (1996), RAROC at Bank of America: From Theory to Practice, Journal of Applied Corporate Finance, Vol. 9 (2), pp. 83 – 93.