

## Analysis Of Financial Risks On Indonesian Commercial Banks Return On Asset In 2012 – 2021

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**Abstract** – Financial risks analysis is immensely important for financial institutions since obtaining desirable return at acceptable level of risks is their main objective. Based on Indonesian Banking Statistics, non-performing loans and risk weighted assets have increased annually in Indonesian commercial banks from 2012 to 2021. Additionally, fluctuations in external variables can result in uncertainties which cannot be controlled internally. This work presented analyze the relationship between financial risks such as credit, liquidity, interest rate, inflation, and foreign exchange toward commercial banks return on asset by using multiple linear regression method. The results that independent variables simultaneously have a significant relationship towards return on asset. In addition, some independent variables such inflation rate and liquidity risks have partially positive significant relationship to return on asset while operational risk has negative relationship. The result of this research will be insight for practitioner in banking as consideration when they are designing the strategy for enhancing their return on asset.

**Keywords:** Commercial Banks, Financial Risks, Financial Sector, Return on Asset

### 1. Introduction

In carrying out their business operations, commercial banks in Indonesia are exposed to various uncertainties that can pose as financial risks. One of which emerges when financing funds distributed were not able to return to the bank. During the research period, credit disbursement continues to increase with an average increase of 8% per year (OJK, 2022). In addition, the amount of funds distributed that are not being able to be returned to the commercial bank also increases during this period, with an average of increase of 15% per year (OJK, 2022). This data shows the amount of risk that exposes commercial banks to only one of their business activities. According to Hawley's risk theory of profit (1893), the potential financial return for any institutions increases with the risk they are willing to take.

Credit, market, liquidity, and both systematic and unsystematic external risks are among few of the risks that a bank are exposed to, and must deal with (Lake, 2013). Karim El-faham (2020) also supported the previous statement by stating that credit, foreign exchange, interest rate, and liquidity risk are the most critical financial risk types that need to be controlled for any bank. Risks might produce either positive or negative possibilities, or they could simply be uncertainty. As a result, risks are considered to be associated to an opportunity and a loss for a company. The goal of risk management is not to minimize risks, instead it is to optimize risk and reward tradeoff (Shafiq and Nasr, 2010).

Lake (2013), Tafara (2020), and Siregar (2020) in their research, concluded that credit risk has significant negative impact on ROA. Lake (2013) also concluded in his research concluded that liquidity risk has significant negative impact on bank's ROA. However, Siregar (2020) concluded that liquidity risk has positive significant impact on bank's ROA. Siregar (2020), Tafara (2020), and Wibowo (2013) in their research, concluded that operational risk

has significant negative impact on ROA. Although this study has a similar topic to other previous studies, there are several differences from the previous studies that this research emphasizes. As a starter, this research will utilize both internal and external financial risks simultaneously as the independent variables. Secondly, the latest list of BUKU 4 banks will be used as a sample size. Lastly, in order to capture and analyze the primary trend of financial risks effects, this research will scrutinize the following past 10 years.

## 2. Literature Review

This part will provide review of literature related to the research and briefly describes theoretical review about financial risks which may influence bank's return on assets. In addition, this chapter also reviews theory of multiple linear regression in which will be applied in the research.

### 2.1. Credit risk

The possibility of losses imposed from a customer's failure or inability to repay the amount borrowed as well as the interest, within a given time frame. Widely used indicators of bank's credit risk is the ratio of non-performing loans to total loans. A loan is considered to be non-performing if it is not producing any income, full principal and interest repayment has not been paid, and the maturity date has passed (Lake, 2013).

$$\text{Credit Risk} = \frac{\text{Non - Performing Loans}}{\text{Total Loans}} \quad (2.1)$$

### 2.2. Liquidity risk

This risk originates from a bank's incapability to accept increases in debts and when a bank's assets are insufficient to cover its debts, it is unable to acquire sufficient cash by converting assets quickly (Basel Committee on Banking Supervision, 1997). The ratio of total bank loans to total customer deposits will be used to assess liquidity risk. This ratio compares the quantity of loans a bank has to the amount of money it gets from customers.

$$\text{LDR} = \frac{\text{Total Loans}}{\text{Total Customer Deposits}} \quad (2.2)$$

### 2.3. Operational risk

Another risk that may affects bank's ROA is the increasing amount of cost needed for its operational, usually calculated as a cost to income ratio used for measuring the change in the cost of the bank. It can be stated that this measurement has a negative relationship with profitability, suggesting that higher costs or expenses will lead to lower operational efficiency, and decreasing return accordingly.

$$\text{Operational Efficiency} = \frac{\text{Operational Cost}}{\text{Operational Income}} \quad (2.3)$$

### 2.4. Inflation rate

Inflation is the most widely used macroeconomic variable, which explains the process

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of continuously increasing price levels. The mobilization of money is strongly influenced by the inflation rate. The opportunity cost of holding financial assets increases when price levels fluctuate. That is, if the price level continues high, individuals will consider themselves fortunate if they own real assets rather than financial ones (Wibowo and Syaichu, 2013).

### 2.5. Interest rate risk

Banks are exposed to interest rate risk if there is a discrepancy in the size or maturity of interest rate sensitive assets and liabilities that causes a potential loss to the bank if interest rates rise or fall, which affects the net asset value of the budget (Lake, 2013). The impact of interest rates on businesses depends on their funding choices such as a combination of capital and liabilities. This impact may grow even further because banking operations typically exposed to both maturity mismatches and interest rate mismatches.

### 2.6. Foreign exchange rate

The exchange rate indicates how many units in one currency can be bought and sold in units in another currency. This risk occurs when a company is involved in international businesses when the transactions are being performed using foreign currency. This uncertain fluctuation poses a threat to bank profits and capital if such a move is in an undesired and unexpected direction.

### 2.7. Multiple linear regression

Multiple linear regression is a statistical method of identifying the outcome of the dependent/response variable by using two or more independent/explanatory variables (Gujarati, 2004). Multiple linear regression will only be applied when there are two consecutive variables, independent variables and dependent variable. The independent variable will be used as a parameter to calculate the outcomes. Gujarati (2004) stated some assumptions which emphasize the classical linear regression model:

- The residuals of linear regression model should have mean equal to zero
- There should not be serial correlation from each of the independent variable's residuals
- The variance of residuals is constant
- There should be no exact collinearity between independent variables
- The residuals should be normally distributed

The general function of multi variable regression model is three variable regressions, with one dependent and two independent variables (Gujarati, 2004). where  $Y$  is response or dependent variable,  $\beta$  is the intercept or parameter,  $X$  the explanatory or independent variable, and  $u$  is the residuals or error. In a case, there are two independent variables,  $X_1$  and  $X_2$ , the equation of multiple linear regression is given by

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + u \quad (2.4)$$

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where  $\beta_i$ ,  $i=0,1,2$  is a constant and  $u$  is error.

### 3. Hypothesis Development

Numerous studies have been performed to examine at the relationships involving financial risks and bank's ROA. Credit risk and operational risk was expected to have significant negative impact on bank's ROA based on the results obtained from Lake (2013), Tafara (2020), and Siregar (2020) in their research. On the other hand, there are differences in the results of previous studies regarding the effects of liquidity risk.

Lake (2013) in his study, found that inflation has positive insignificant impact on bank's profitability. However, El-Faham (2020) and Jeevitha et al. (2019) found out that inflation has insignificant negative impact on bank's ROA. Lake (2013), and Tafri et al. (2009) found out that interest rate has positive impact on ROA. According to Keshtgar and Pahlavani (2020), exchange rate has a statistically significant negative effect on bank ROA. On the contrary, Lake (2013) in his study found out that exchange rate volatility has an insignificant positive effect on bank's ROA.

From previous research stated above, it can be seen that the results obtained are contradict with each other especially for external financial risks. Therefore, the alternate hypothesis for each financial risk's relationship with bank's ROA for this research are:

**H<sub>a.1</sub>:** Credit risk (CR) has a significant relationship on commercial bank's ROA.

**H<sub>a.2</sub>:** Liquidity risk (LIQ) has a significant relationship on commercial bank's ROA.

**H<sub>a.3</sub>:** Operational risk (OR) has a significant relationship on commercial bank's ROA.

**H<sub>a.4</sub>:** Inflation rate (INF) has a significant relationship on commercial bank's ROA.

**H<sub>a.5</sub>:** Interest rate (IR) has a significant relationship on commercial bank's ROA.

**H<sub>a.6</sub>:** Foreign exchange (FX) has a significant relationship on commercial bank's ROA.

**H<sub>a.7</sub>:** CR, LIQ, OR, INF, IR, and FX have a simultaneous relationship on commercial bank's ROA.

### 4. Method

The researcher seeks to find out the effect of selected financial risks towards bank's ROA in banking BUKU 4 listed in IDX for the period of 2012 to 2021. In realizing these objectives, researcher will be using quantitative approach. Hence, multiple linear regression analysis was used to evaluate the hypothesis of this study and to determine the relevance of each independent variable. Multiple linear regression is a statistical technique that uses two or more independent/explanatory factors to determine the result of the dependent/response variable (Gujarati, 2004). Descriptive statistics were also used for this research to help present the general information from the observations. The respected information will be delivered in the form of mean, median, maximum and minimum value, and standard deviation.

This research has 107 commercial banks that operate in Indonesia as the population, and thus will be limited to the number of the sample, involving merely on 10 commercial banks. There are two sample criteria for this research. The first one is bank must operate as a commercial banks and categorized as bank BUKU 4. The second one is bank must publish its annual reports and financial statements to Indonesian citizens for minimum of ten consecutive years (2012-2021).

The secondary information that will be analyzed is sourced from two distinct sources.

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Financial statements from each chosen company's website will be utilized to gather information on banks' ROA and internal financial risks from Indonesia Stock Exchange (IDX, n.d.). Data on the inflation rate, interest rate, and currency exchange rates may be found on the official Badan Pusat Statistik website (BPS a, n.d.; BPS b, n.d.).

The research analysis will use the significance value of 0.05 or 5 percent. Below are the analysis steps that will be followed:

1. Collecting and input all the observed data acquired
2. Calculate descriptive statistics from the observations to quantify the essential aspects of the variables and to examine the general patterns
3. Building a regression model consist of bank's ROA as dependent variable and the aforementioned 6 financial risks as independent variable
4. Perform a classical assumption test, in which the model must comply to all of the assumption to be qualified as a regression model Gujarati (2004).
  - a. The Durbin-Watson test is used to determine whether there is an autocorrelation which the residuals are serially correlated if they are connected with one another.
  - b. The Jarque-Bera test was used in this research to determine s if the residuals of dependent and independent variables in a model regression are normally distributed or not.
  - c. The multicollinearity test which implements variance inflation factor (VIF) is used to see if the independent variables in the regression model have a correlation between each other.
  - d. Heteroscedasticity test is a measurement that shows if the variance of the residuals is not constant (Brooks, 2008). This research will use Harrison McCabe test as it compares the ratio between the residuals sum of squares of a chosen subset and the sum of squares of all the squared residuals (Wiedermann et al., 2017)
5. After the model passes all classical assumption tests, analyzing the regression model will be implemented using hypothesis tests
  - a. Coefficient of determination will determine the capability of the regression line obtained from independent variables to explain the variance of the dependent variable (Gujarati, 2004).
  - b. The adjusted R-squared test is an extension version of coefficient of determination that calculates independent variables in a regression model that are not significant (CFI, 2022).
  - c. Simultaneous test (F-Test) is conducted to determine whether all independent variables have simultaneous effect on the dependent variable.
  - d. Partial test (T-Test) is conducted to determine whether each independent variables has a significant partial effect on the dependent variable.

All calculation and statistical testing in this work is helped by using R software.

## 5. Results and Discussions

This part will present the data analysis using descriptive statistics, and multiple linear regression. Classical assumption and hypotheses test will be used to examine the regression

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models.

### 5.1 Descriptive statistics

Descriptive statistics which were used in this research includes mean, median, minimum value, maximum value, and standard deviation. Below are the results of descriptive statistics from the observations in this research.

**Table 1. Descriptive Statistics**

VARIABLE	SAMPLE SIZE	MEAN	MEDIAN	MINIMUM VALUE	MAXIMUM VALUE	STANDARD DEVIATION
ROA	100	0.024	0.022	0.002	0.050	0.0105
CR	100	0.023	0.023	0.004	0.046	0.0096
LIQ	100	0.886	0.881	0.620	1.342	0.1049
OR	100	0.765	0.773	0.542	0.989	0.0985
IR	100	0.851	0.854	0.740	0.985	0.0521
INF	100	0.040	0.032	0.017	0.084	0.0231
FX	100	0.055	0.020	-0.030	0.260	0.0780

The result from Table 1 can be interpreted as follows:

1. ROA as the dependent variable has an average of 0.024 with standard deviation of 0.0105. This indicates that the data spread of ROA is mostly around 0.0135 to 0.0345.
2. Credit risk as the independent variable has an average of 0.023 with standard deviation of 0.0096. This indicates that the data spread of CR is mostly around 0.0134 to 0.0326.
3. Liquidity risk as the independent variable has an average of 0.886 with standard deviation of 0.1049. This indicates that the data spread of LIQ is mostly around 0.7811 to 1.0269.
4. Operational risk as the independent variable has an average of 0.765 with standard deviation of 0.0985. This indicates that the data spread of LIQ is mostly around 0.6665 to 0.8635.
5. Interest rate as the independent variable has an average of 0.851 with standard deviation of 0.0521. This indicates that the data spread of LIQ is mostly around 0.7989 to 0.9031.
6. Inflation rate as the independent variable has an average of 0.040 with standard deviation of 0.0231. This indicates that the data spread of LIQ is mostly around 0.0169 to 0.0631.
7. Foreign exchange as the independent variable has an average of 0.055 with standard deviation of 0.0780. This indicates that the data spread of LIQ is mostly around -0.023 to 0.133.

### 5.2 Classical assumption test

**Table 2. Autocorrelation Test**

DEPENDENT VARIABLE	DURBIN WATSON STATISTICS	P-VALUE
ROA	1.9669	0.3291

From the table above, it can be seen that Durbin-Watson test for the regression model produced the p-value which are higher than the significance level of 5%. Durbin Watson test statistics also proven to be in between upper critical value (dU) and 4-dU, which are 1.827 and 2.173. Hence, proving that there is no serial correlation in the residuals.

**Table 3. Normality Test**

DEPENDENT VARIABLE	JARQUE BERA STATISTICS	P-VALUE
ROA	5.5924	0.06104

From the table above, it can be seen that Jarque-Bera test for the regression model produced the p-value which are higher than the significance level of 5%. In addition, the test statistics for both models are lower than the critical value of 5.991 which obtained from chi-square distribution table with degree of freedom 2. Hence, proving that the residuals are indeed follow normal distribution.

**Table 4. Multicollinearity Test**

INDEPENDENT VARIABLE	TOLERANCE VALUE	VIF
CR	0.6136876	1.629494
LIQ	0.7008043	1.426932
OR	0.5100051	1.960765
INF	0.4703973	2.125863
IR	0.5625854	1.777508
FX	0.6358257	1.572758

It can be seen from the table above that each independent variables in regression model have tolerance value higher than 0.1, and each variance inflation factor for the independent variable is not exceeding 10. Therefore, we can assume that there is no multicollinearity found in the model.

**Table 5. Heteroscedasticity Test**

DEPENDENT VARIABLE	HARRISON MCCABE STATISTICS	P-VALUE
ROA	0.66599	0.997

It can be seen from the table above that p-value for the regression model is higher than the significance level of 5%. In addition, Harrison McCabe statistics also produce value near to 0.5. Hence, we can assume that the residuals have a constant variance.

### 5.3 Multiple linear regression

After the regression model fulfilled all classical assumption tests, multiple linear regression will be implemented. This part of numerous linear regression obtains the values of

coefficient regression ( $\beta$ ) of each independent variable.

<b>VARIABLE</b>	<b>ESTIMATE</b>	<b>STANDARD ERROR</b>
<b>INTERCEPT</b>	0.08718	0.01186
<b>CR</b>	-0.07438	0.05553
<b>LIQ</b>	0.01324	0.00473
<b>OR</b>	-0.09662	0.00591
<b>INF</b>	0.06501	0.02631
<b>IR</b>	-0.00727	0.01065
<b>FX</b>	-0.00453	0.00668

From Table 6, the multiple linear regression model can be written as equation:

$$ROA = 0.08718 - 0.07438CR + 0.01324LIQ - 0.09662OR + 0.06501INF - 0.00727IR - 0.00435FX$$

The equation above can be interpreted as:

1. If all independent variables are 0 or constant, then the value of commercial bank's ROA will be 0.087185.
2. Coefficient regression value of credit risk explains that credit risk has a contrary relationship with return on assets. The value of -0.074386 shows when CR increases by 1 unit and other independent variables are constant, then commercial bank's return on asset will decrease by 0.074386.
3. Coefficient regression value of liquidity risk explains that liquidity risk has a parallel relationship with return on assets. The value of 0.013241 shows when LIQ increases by 1 unit and other independent variables are constant, then commercial bank's return on asset will increase by 0.013241.
4. Coefficient regression value of operational risk explains that operational risk has a contrary relationship with return on assets. The value of -0.096625 shows when OR increases by 1 unit and other independent variables are constant, then commercial bank's return on asset will decrease by 0.096625.
5. Coefficient regression value of inflation rate explains that inflation rate has a parallel relationship with return on assets. The value of 0.065018 shows when INF increases by 1 unit and other independent variables are constant, then commercial bank's return on asset will increase by 0.065018.
6. Coefficient regression value of interest rate risk explains that interest rate risk has a contrary relationship with return on assets. The value of -0.007271 shows when IR increases by 1 unit and other independent variables are constant, then commercial bank's return on asset will decrease by 0.007271.
7. Coefficient regression value of foreign exchange rate explains that foreign exchange rate has a contrary relationship with return on assets. The value of -0.004537 shows when FX increases by 1 unit and other independent variables are constant, then commercial bank's return on asset will decrease by 0.004537.



5.4 Hypothesis test

**Table 7. Coefficient of Determination**

DEPENDENT VARIABLE	R-SQUARED
ROA	0.8696

From table above, it can be summarized that on the regression model, 86.96% of the variance in return on assets can be explained by the variance in the 7 selected independent variables, whereas the other 13.04% is influenced by other factors outside of the selected independent variables.

**Table 8. Adjusted Coefficient of Determination**

DEPENDENT VARIABLE	ADJUSTED R-SQUARED
ROA	0.8586

From table above, it can be summarized that on the regression model, 85.86% of the variance in return on assets can be explained by the variance in the 7 selected independent variables, whereas the other 14.14% is influenced by other factors outside of the selected independent variables.

**Table 9. Simultaneous Test**

DEPENDENT VARIABLE	F-TEST STATISTICS	P-VALUE
ROA	79.06	2.2x10 <sup>-16</sup>

It can be seen from the table above, simultaneous test for the regression model produced p-value of 2.2 x10<sup>-16</sup> in which is smaller than the significance level of 0.05. In addition, the F-statistic is higher than the critical value of 2.122 obtained from F-distribution table. Therefore, it can be assumed that the selected financial risks have simultaneous effects on bank's ROA.

**Table 10. Partial Test**

VARIABLE	T-TEST STATISTICS	P-VALUE
INTERCEPT	-1.339	0.18409
CR	-1.339	0.18409
LIQ	2.795	0.00645
OR	-16.342	2e-16
INF	2.470	0.01554
IR	-0.682	0.49696
FX	-0.678	0.49939

Results presented in Table 10 can be interpreted as:

1. The p-value of credit risk is 0.18409 in which the value is higher than the significance level of 0.05. In addition, the T-statistic is lower than the value of 1.9886 which is obtained from t-table. Hence, accepting null hypothesis that credit risk does not have significant relationship on bank's return on asset.
2. The p-value of liquidity risk is 0.00645 in which the value is lower than the significance level of 0.05. In addition, the T-statistic is higher than the value of

- 1.9886 which is obtained from t-table. Hence, accepting null hypothesis that liquidity risk does have significant relationship on bank's return on asset.
3. The p-value of operational risk is  $2e-16$  in which the value is lower than the significance level of 0.05. In addition, the T-statistic is higher than the value of 1.9886 which is obtained from t-table. Hence, accepting null hypothesis that operational risk does have significant relationship on bank's return on asset.
  4. The p-value of inflation rate is 0.01554 in which the value is lower than the significance level of 0.05. In addition, the T-statistic is higher than the value of 1.9886 which is obtained from t-table. Hence, accepting null hypothesis that inflation rate does have significant relationship on bank's return on asset.
  5. The p-value of interest rate is 0.49696 in which the value is higher than the significance level of 0.05. In addition, the T-statistic is lower than the value of 1.9886 which is obtained from t-table. Hence, accepting null hypothesis that interest rate does not have significant relationship on bank's return on asset.
  6. The p-value of exchange rate is 0.49939 in which the value is higher than the significance level of 0.05. In addition, the T-statistic is lower than the value of 1.9886 which is obtained from t-table. Hence, accepting null hypothesis that exchange rate does not have significant relationship on bank's return on asset.

## 6. Conclusions and Recommendations

Based on the research that has been carried out, the summarize results were as follows:

1. Independent variables used in regression model was shown to be able to explain more than 80% of the dependent variable's variance.
2. Liquidity risk was shown to have significant positive effect on commercial bank's ROA.
3. Operational risk was shown to have significant negative effect on commercial bank's ROA

This study is limited to 10 commercial banks that were categorized as BUKU 4 banks as a sample size and 6 financial risks. Future research can be developed in the way mentioned below but is not limited to:

1. Research on relationship between the used six financial risks variables with the different metrics as to indicate commercial bank's performances.
  2. Research on relationship between different metrics to measure financial risks variables with bank's ROA or other different metrics as to indicate commercial bank's performances.
  3. Comparing the results obtained from BUKU 4 Banks which were used as a sample to the other BUKU Banks as the upcoming sample.
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