CHAPTER I

INTRODUCTION

1.1 Background

The banking industry is one of many industries that is always exposed to financial risks. One of the primary purposes of banking is to distribute funds to people or organizations that require it to fulfill their necessities or serve as capital for businesses (UU No. 10, 1998). When clients are provided with financing funds, banks will be exposed to uncertainty, which leads to the risk of the funds not being returned to the bank. During year 2021 alone, commercial banks have disbursed over 5,7 quadrillions rupiah in financing or credit to non-banking entities (Otoritas Jasa Keuangan, 2022).

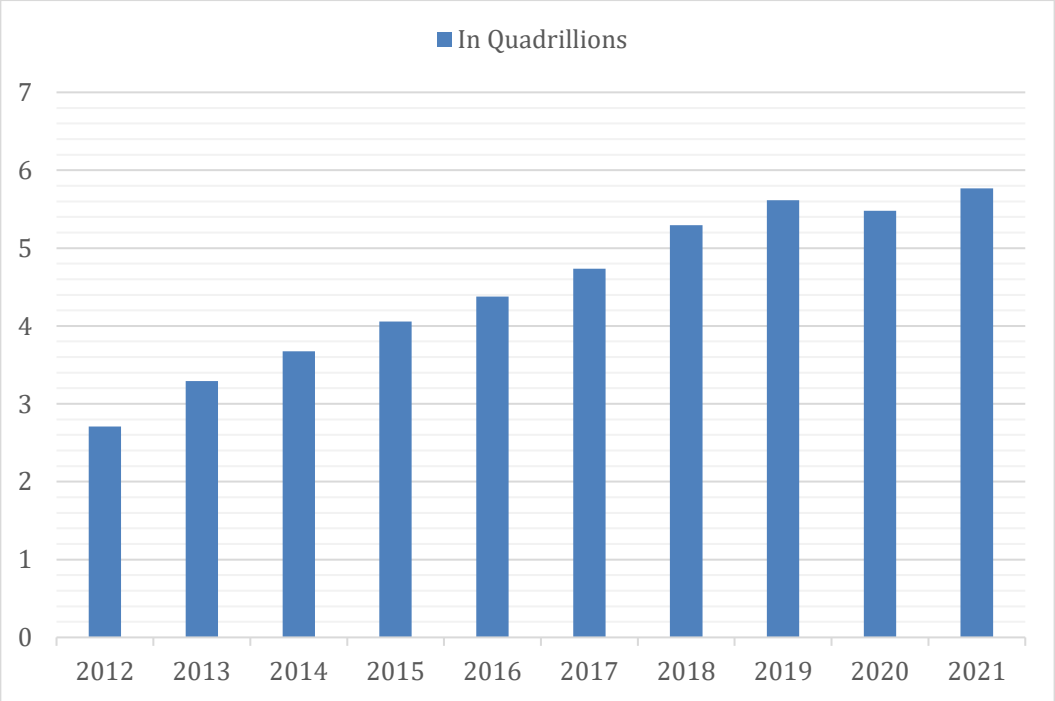

Figure 1.1. Credit Distribution Commercial Banks 2012-2021

(Source: Indonesian Banking Statistics, OJK)

Judging from the data obtained from the Indonesian Banking Statistics, credit distributed by commercial banks continues to increase with an average increase of 8% per year. 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 the business owner increases with business risk. Without this relationship, business owners would not take a higher risk in their business activity since businesses would not gain more profit than what they already got by taking the safest option. Many economists support the idea that high risk does not always equate to high profitability. High level of profits is only earned if risks are effectively managed through solid information, skills, and experiences.

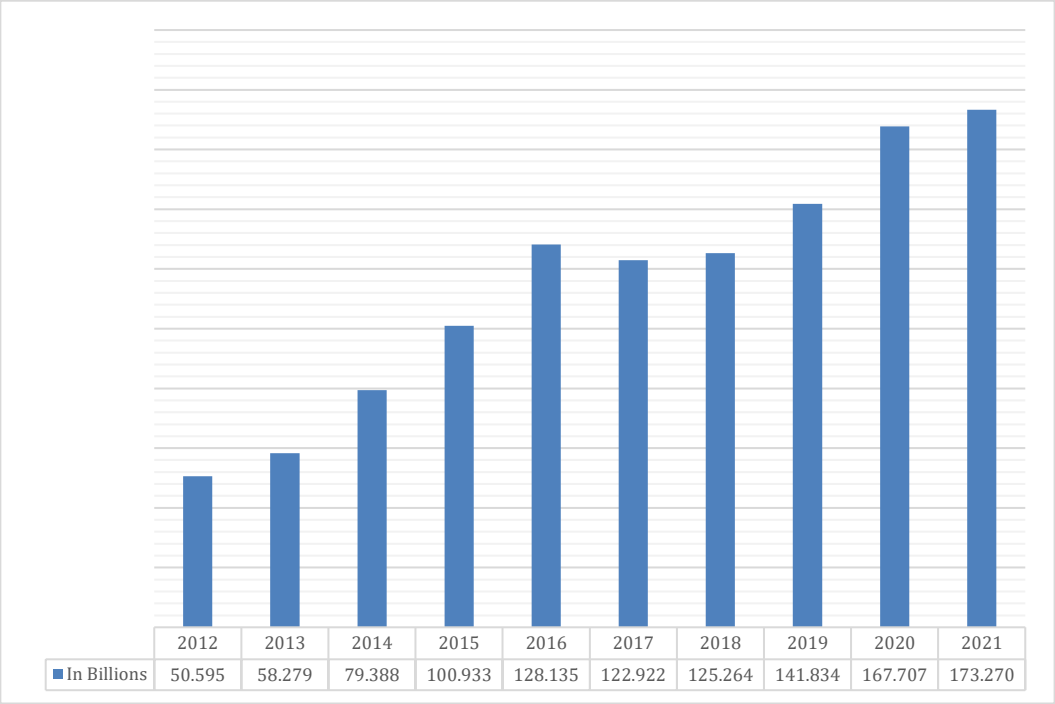

Figure 1.2. Non-Performing Loans Commercial Banks 2012-2021

(Source: Indonesian Banking Statistics, OJK)

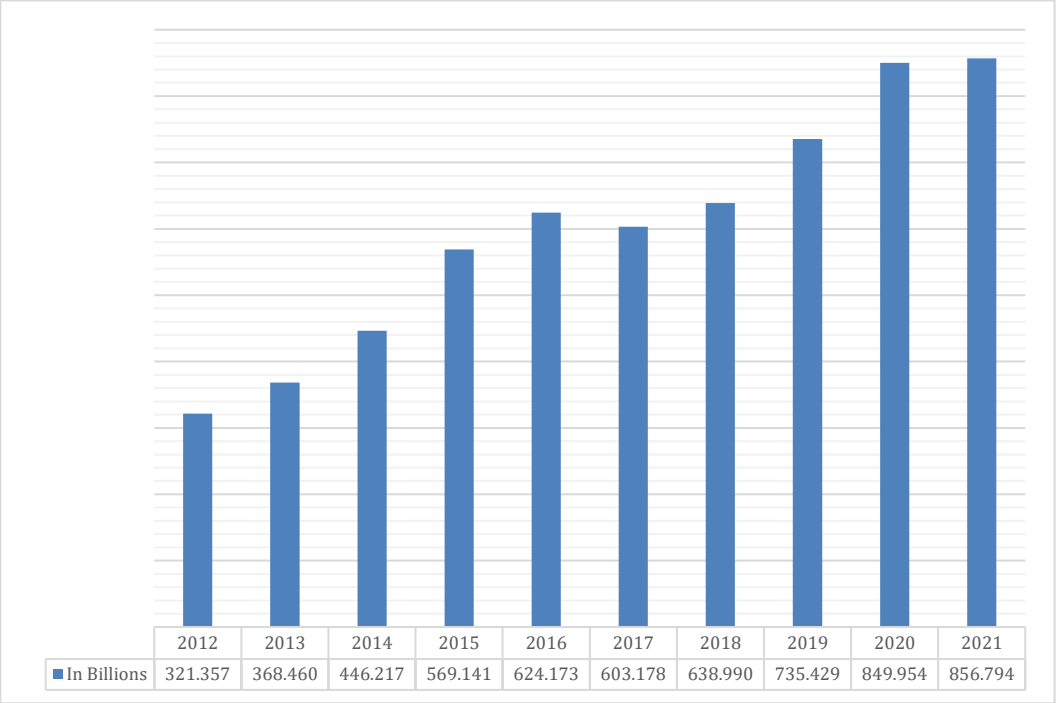

Figure 1.3. Operational Expenses Commercial Banks 2012-2021

(Source: Indonesian Banking Statistics, OJK)

Figure 1.2 shows the increasing amount of funds distributed that are not being able to be returned to the commercial bank. The increasing amount occurs during year 2012 to 2021 with an exception on year 2017 (Otoritas Jasa Keuangan, 2022). Similar to previous graphics, figure 1.3 shows the increasing expenses that commercial banks need to operate. The increasing expenses also occurs during year 2012 to 2021 with an exception on year 2017 (Otoritas Jasa Keuangan, 2022).

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). This statement is also supported by Karim El-faham (2020), he concluded in his research that credit risk, liquidity risk, interest rate risk, and foreign exchange are major financial risk that needed to be controlled for any bank. These statements reflect how maintaining financial performance in banking would be very challenging. As a result, the better it is at mitigating these risks, the better the bank's financial performance. According to Rose and Hudgins (2006), profitability and risk are the two primary aspects of bank performance, and every

financial institution's principal objective is to achieve a desirable level of profit at an acceptable level of risk. Therefore, studying the impact of financial risks on the profitability of Indonesian commercial banks is crucial, as it allows banks to manage these risks effectively, maximize profitability and help the country's economy.

Gross domestic product (GDP) is the sum of the final product values of all economic units' activity (BPS, n.d.). According to Bank Indonesia (2022), banking industry only contribute 4.3% to Indonesian GDP. However, as commercial banks' primary responsibility is to act as a facilitator between depositors and borrowers, performing this role will contribute to ensuring that economies operate properly (Gobat, n.d.). Consumers and businesses can borrow more money and spend more when credit distribution grows consistently. Resulting in an increase in investments and consumption which provides jobs and increases revenue and profit gained for the country (Banu, 2013).

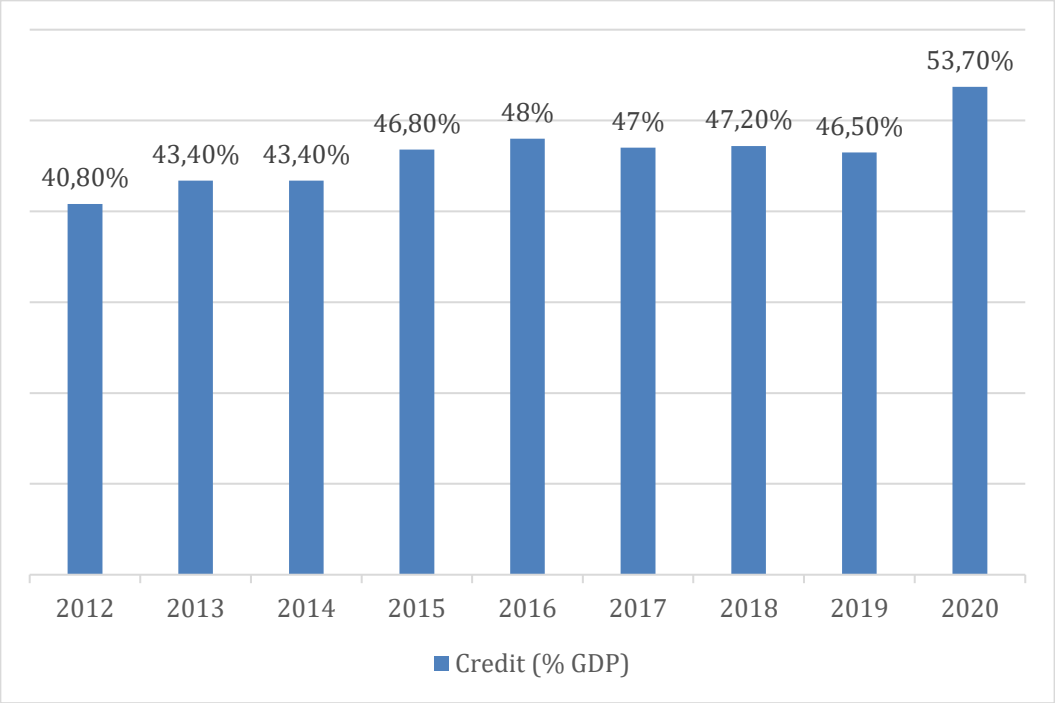

Figure 1.4. Domestic Credit Provided by Banking in Percentage of GDP

(Source: data.worldbank.org Domestic Credit Indonesia)

According to data acquired from the world bank, during year 2012 to 2020 Indonesian GDP has been financially supported by domestic credit with the average proportion of 46%. This graphic shows how credit distributed by domestic banking sector supports Indonesian economic growth. Decreasing performance of the banking sector may resulted in small medium enterprises and big companies in need of money are experiencing capital shortages, causing their operations to suffer. This incident can create disturbances and cause obstacles to Indonesia's economic development. In order to preserve stability, a bank's performance must be favorable, as it gauges how successfully financial objectives are met and serves as a tool for assessing the bank's current state and potential complications.

Financial performance serves as an evidence of every company's accomplishments, and it must show the capacity of the organization in managing and allocating their resources (Dwi *et al.*, 2019). The profitability of a company will reflect its overall economic performance. According to Suhardjono (2005), Return on asset (ROA) and return on equity (ROE) are two most common ratios used to assess bank profitability. ROA and ROE calculate thoroughly the total assets owned and the amount of equity/capital needed by certain company in a certain period of time (Rose and Hudgins, 2006). This calculated amount will then be used as comparison with the net income earned by the company in that particular period. Therefore, these two metrics are able to explain company's profitability more thoroughly as compared to other metrics which will be briefly explained in chapter two.

As a result, the purpose of this study is to scrutinize bank’s profitability as well as the various external and internal risks that are considered to effect bank’s profitability. In addition to looking internal financial risks, such as: (credit risk; liquidity risk; and operational efficiency), this research will also include external risks such as: (interest rate; inflation; and foreign exchange rate) that have direct and indirect effects on bank profitability. For this study, the researchers utilized two dependent variables: Return on Assets and Return on Equity. Both variables were chosen as financial performance indicators for the bank, with the purpose of

assessing profitability. The current research used the data from all BUKU 4 banks in Indonesia on the period 2012 to 2021.

1.2 Statement of the Problem

Commercial banks are exposed to a diverse range of financial risks when providing financial services (Santomero, 1997). In this present day, banks are faced with uncertainty and unreliability caused by human behavior. This uncertainty produces various financial risks, including credit risk, liquidity risk, operational risk, inflation, foreign exchange risk, and interest rate risk, which may impose a burden on commercial banks and possibly influence the profitability of commercial banks.

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 objective of good risk management is not to minimize risks, instead it is to optimize risk and reward tradeoff (Shafiq and Nasr, 2010). To implement a good risk management in organizations, it is necessary to evaluate the impact that these risks have on profitability. Hence, to improve bank's return, management should know the risk factors which have effect on profitability.

1.3 Research Questions

In line with the statement of problem described above, the following specific research questions have been made:

1. Does credit risk have relationship with commercial bank's profitability in period 2012 to 2021?
2. Does liquidity risk have relationship with commercial bank's profitability in period 2012 to 2021?
3. Does operational efficiency have relationship with commercial bank's profitability in period 2012 to 2021?

4. Does inflation rate have relationship with commercial bank's profitability in period 2012 to 2021?
5. Does interest rate risk have relationship with commercial bank's profitability in period 2012 to 2021?
6. Does foreign exchange rate have relationship with commercial bank's profitability in period 2012 to 2021?
7. Does credit risk, liquidity risk, operational efficiency, inflation rate, interest rate risk, and foreign exchange rate have a simultaneous relationship with commercial bank's profitability in period 2012 to 2021?

1.4 Research Objectives

The thesis is intended to provide evidence of various factors affecting bank performance. Therefore, the following objectives have been made:

1. to be able to find out how is the relationship between credit risk and bank's profitability using non-performing loan as a metric
2. to be able to find out how is the relationship between liquidity risk and bank's profitability using loan to deposits as a metric
3. to be able to find out how is the relationship between liquidity risk and bank's profitability using capital adequacy as a metric
4. to be able to find out how is the relationship between operational efficiency and bank's profitability using operational expenses as a metric
5. to be able to find out how is the relationship between inflation rate and bank's profitability
6. to be able to find out how is the relationship between interest rate risk and bank's profitability
7. to be able to find out how is the relationship between foreign exchange rate and bank's profitability
8. to be able to find out how is the simultaneous relationship between credit risk, liquidity risk, operational efficiency, inflation rate, interest rate risk, foreign exchange rate and bank's profitability

1.5 Research Benefits

The researcher hopes that by conducting this study, the findings would be beneficial to a variety of people, including:

1. For researcher

   Researcher able to acquire significant knowledge regarding bank's profitability, its measurement, as well as its internal and external factors. Moreover, this study will help researcher to finish his undergraduate studies.

2. For society

   This research hopefully able to provides understanding about the importance of financial risk and its impact on bank's profitability for management's mitigation process. This research also can be used as an insight for the community as to what causes changes in commercial bank's profit.

3. For university

   Researcher believes that this research may help other students on their study through adding and expanding the knowledge of financial risks and their impact on bank's profitability. Additionally, future research can utilize this research as a benchmark and comparator, especially for Actuarial Science major and Faculty of Business in President University.

1.6 Research Limitations

Several limitations of this research are as follow:

1. The research was restricted to the officially reported financial data of the BUKU 4 Banks due to bank confidentiality policies.
2. The period used for this research is 10 years, starting from 2012 to 2021.
3. The measurement of bank's profitability only using return on assets and return on equity.
4. The internal risk determinants of bank's profitability only consist of credit risk, liquidity risk, and operational efficiency.

5. Inflation, interest rate, and foreign exchange rate are the only macroeconomic measurement used as external risk determinants of bank's profitability.

1.7 Outline of the Research

In this research, the thesis will be organized as follow:

Chapter 1: Introduction

The first chapter explains about the background of the problem, statement of the problem, research questions, research objectives, research benefits, and research limitations. Chapter 1 is ended by providing outline of the research.

Chapter 2: Literature Review

The second chapter provides review of literature related to the research and describes theoretical review about banking in Indonesia, its profitability measurement, and financial risks which may influence bank's profitability. In addition, this chapter also reviews the methodology and various testing that will be used in the research. Hypothesis development, research framework, previous research, and research gap are also being reviewed in this chapter.

Chapter 3: Research Methodology

The third chapter describes the research design, and sampling design. In addition, this chapter also summarize instrument/operational that will be used in this research. It concludes with an overview of data collection and analysis design.

Chapter 4: Analysis and Discussion of Findings

The fourth chapter explains the data analysis using descriptive statistics, and multiple linear regression. Classical assumption and hypotheses test will be used to examine the regression models. This chapter will be concluded with discussion of findings.

Chapter 5: Conclusion and Recommendations

The fifth chapter consists of conclusion that researcher obtained from previous chapter, along with recommendations for Indonesian commercial banks and future researches.

CHAPTER II

LITERATURE REVIEW

2.1 Banking in Indonesia

According to Undang – undang No 10 Tahun 1998, banks are referred to as companies that collect fundings from public in the form of deposits and distribute them in the form of credits and/or other financial products. Furthermore, in the opinion of Dr. Kasmir bank is defined as a financial institution whose business activities are collect funds from the community then distribute it back to the community, as well as providing additional financial services (Kasmir, 2014). In some of the definitions above, it can be concluded that the main activities of banking are taking deposits, and giving loans, as well as provide other financial services such as clearing, insurance, and investment.

Banks are known to raise funds from the public in the form of savings and deposits. Those funds are then lent to customers in need. In this case, the savings community will be rewarded in the form of interest, as the bank will use the funds raised by this community. The interest given for these savers is a source of bank spending. Banks, on the other hand, will lend their money to borrowers as a financial services, and gained a form of interest that were paid to the bank by these borrowers. These interests become the source of bank income.

Commercial Bank businesses based on Undang – Undang No. 10 Tahun 1998 regarding banking are as follow:

1. Collecting funds from the public in the form of savings in the form of demand deposits, time deposits, certificates of deposit, savings and/or other forms of equivalent to it.
2. Granting credit
3. Issuing debt acknowledgment letter
4. Buy, sell, or guarantee at own risk or for interest and/or on the order of its customer:

- Money orders including money orders accepted by the bank whose validity period is no longer than usual in trading the said letters.
- Debt acknowledgment letters and other trade papers that are validity is no longer than the custom in trading the letters in question.
- State treasury papers and government guarantee letters.
- Bank Indonesia Certificate.
- Bonds
- Trade certificates with maturity of up to one month.
- Other securities instruments with maturities of up to with one year.

5. Transferring funds either for the company's benefit or for the benefit of customers.
6. Placing funds on, borrowing funds from, or lending funds to other banks, either by using letters, telecommunications or by money order, check, or other means.
7. Receive payments from bills on securities and perform calculations with or between third parties.
8. Execute custodial duties for the benefit of third parties in accordance with a contract.
9. Place funds from customers to other customers in form of securities that are not listed on the stock exchange.
10. Buying through collateral customers in whole or in part in the event that the debtor does not fulfil its obligations to the bank, by conditions so that the purchased must be disbursed as soon as possible.
11. Carry out receivable activities, credit card business, and other activities trustee.
12. Giving financial assistance or engaging in other syariah-based activities in compliance with the rules established by Bank Indonesia.
13. Carry out other activities that are commonly carried out by banks throughout does not conflict with this law, the statutory regulations valid invitation.

Table 2.1. Bank Category Based on Capital

Amount of Core Capital	Bank Category
< Rp 1,000,000,000,000	BUKU 1
Rp 1,000,000,000,000 – Rp 5,000,000,000,000	BUKU 2
Rp 5,000,000,000,000 – Rp 30,000,000,000,000	BUKU 3
> Rp 30,000,000,000	BUKU 4

(Source: Otoritas Jasa Keuangan No 6 /POJK.03/2016)

BUKU Bank is an abbreviation of Bank Umum bedasarkan Kegiatan Usaha. The Financial Services Authority (OJK) has classified banks into 4 types of BUKU, each of which is distinguished by the amount of its core capital. Amount of core capital is important because it affects the security level of banks and its strength for mitigating risk. In other words, the larger the core capital is, the safer the customer funds held by the bank.

The scope of products and activities that can be carried out by each BUKU category is also different. For instance, BUKU 1 Banks can only collect and distribute funds which are basic products or activities in banking. BUKU 2 Bank can carry out all product activities or BUKU 1 Bank activities more broadly. Additionally, BUKU 2 banks are permitted to engage in a restricted range of treasury operations, including as trading in commodities and derivatives. In addition to being able to carry out all BUKU 2's activities and products more broadly, BUKU 3 banks can also invest 25% in limited domestic and international financial institutions in the Asian region. As for BUKU 4 banks, they can invest 35% in financial institutions at domestic and foreign with an international global coverage area.

2.2 Profitability

According to Rose and Hudgins (2006), some most commonly metric to assess financial institution’s profitability used outside of ROA and ROE are the following:

- Net interest margin

  This metric measures how much is the spread between interest earned and interest paid by certain institutions in relation to its total assets.
- Net operating margin

  This metric measures how much profit a company generates from its operations after paying all sorts of costs needed to operate.
- Net profit margin

  This metric measures how much net profit that company able to generates as a percentage of its sales or revenue.
- Return on investment

  This metric measures how much do company able to earn from investing activities in relation to its investment.

2.2.1 Return on Assets

Return on assets (ROA) is one of the most commonly used financial indicators that represents a company's profitability in comparison to its total assets. Also, according to Ahmeti *et al*. (2014), ROA refers to management's ability to finance deposits and commercial investments for customers at reasonable costs. Hence, the higher ROA of a company means that they manage its balance sheet more efficiently and productively to generate profits, and a low ROA means that management needs improvement for the next period.

The benefit of utilizing ROA to gauge a company's financial success is that it is a comprehensive indicator that covers all financial accounts. Another benefit of measuring performance with ROA is that calculating ROA is very easy to calculate and understood.

According to Bambang (1995), the advantages and disadvantages of return on assets include are as follows:

- Advantages of ROA:
  1. ROA is easy to calculate and understand.

2. It is a measure of management performance that is sensitive to any influence on the company's financial condition.
3. It allows management to focus its attention on obtaining maximum profits.
4. As an indicator of how effectively management are able to generate revenue from utilizing company's assets.
5. As a tool for evaluating the implementation of policies management.

- Disadvantages of ROA:
  1. Not encouraging management to add assets if the expected ROA value turns out to be too high
  2. Management tends to focus on short-term goals rather than on long-term goals, so they tend to make decisions which is more profitable in the short term but has negative consequences in the long run length.

Return on Assets is calculated by dividing the company's net income by total assets. As a formula, it is expressed as:

$$Return\ on\ Assets\ (ROA) = \frac{Net\ Income}{Total\ Assets} \tag{2.1}$$

The extended Return on Assets formula based on the Dupont triangle is as follow:

$$Return\ on\ Assets\ (ROA) = \underbrace{\frac{Net\ Income}{Sales}}_{Profit\ Margin} \times \underbrace{\frac{Sales}{Total\ Assets}}_{Assets\ Turnover} \tag{2.2}$$

2.2.2 Return on Equity

While the ROA measures the return on all capital invested in an asset, the return on equity (ROE) focuses on just the equity component of the investment. According to Zamani and Moeljadi (2012), in contrary to company value, ROE is intended to represent shareholder value, often known as shareholder equity. In other word, ROE displays management prospect for its shareholder, instead of its assets. Hence, ROE is commonly used for measuring firm's capability to generate profits for their shareholder.

A sustainable and increasing ROE indicates that a company is proficient at creating shareholder value because it knows how to wisely reinvest its profits to increase productivity and profitability. On the other hand, decreasing ROE could mean that management is making the wrong decisions about reinvesting capital into non-yielding assets.

Return on Equity is calculated by dividing the company's net income by total equity. As a formula, it is expressed as:

$$ROE = \frac{Net\ Income}{Total\ Equity} \tag{2.3}$$

The extended Return on Equity formula based on the Dupont triangle is as follow:

$$ROE = \underbrace{\frac{Net\ Income}{Sales}}_{Profit\ Margin} \times \underbrace{\frac{Sales}{Total\ Assets}}_{Asset\ Turnover} \times \underbrace{\frac{Total\ Assets}{Total\ Equity}}_{Equity\ Multiplier} \tag{2.4}$$

Return on Equity formula can also be extended using Dupont equation (five-way)

$$ROE = \underbrace{\frac{Net\ Income}{EBT}}_{Tax\ Burden} \times \underbrace{\frac{EBT}{EBIT}}_{\substack{Interest \\ Burden}} \times \underbrace{\frac{EBIT}{Sales}}_{\substack{EBIT \\ Margin}} \times \underbrace{\frac{Sales}{Total\ Assets}}_{\substack{Assets \\ Turnover}} \times \underbrace{\frac{Total\ Assets}{Total\ Equity}}_{Equity\ Multiplier} \tag{2.5}$$

where EBT is earnings before tax, and $EBIT$ is earnings before interest and tax.

2.3 Financial Risk

Six general categories of potential risks may be used to categorize risks associated with the banking industry as a whole (Santomero, 1997): credit risk, liquidity risk, operational risk, counterparty risk, market risk, and legal risk. Counterparty risk arises from a counterparty's inability to execute an obligation causes by a sudden price shift brought on from systematic factors, or from any other unforeseen political or legal limitation. Whereas market risk refers to the possibility that an asset's value will vary due to external influences which the two greatest concern for banking sectors are the fluctuations of interest rate and the value of

currencies (Santomero, 1997). Therefore, this research will be only focusing on credit risk, liquidity risk, operational risk, and lastly market or external risks.

2.3.1 Credit Risk

The possibility of losses imposed from a customer's failure or inability to repay the amount borrowed from the bank, as well as the interest, within a given time frame is commonly known as credit risk (Siamat, 2005). Credit risk arises from several bank functional operations reported in the banking book, including credit, treasury, and investment, as well as trade finance. Bank's credit loss coverage which calculated by dividing loan loss reserves over total loans is one of the ratios that can be used to assess credit risk. The higher the ratio, the higher the coverage and the lower bank's exposure to credit risk. Higher ratios indicate that bank is more able to cover unexpected credit default and reducing unnecessary loss.

Another 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). This ratio reflects financing threat on bad loans which indicates that the higher the non-performing loans rate, the worse the quality of credit distributed.

The formula of credit risk can be expressed as:

$$Credit\ Risk^1 = \frac{Loan\ Loss\ Reserves}{Total\ Loans} \tag{2.6}$$

Or

$$Credit\ Risk^2 = \frac{Non - Performing\ Loans}{Total\ Loans} \tag{2.7}$$

2.3.2 Liquidity Risk

Liquidity risk is the possibility of suffering losses as a result of not being able to repay liabilities on time when they are due or from being unable to do so at a sustainable cost (CEB, n.d.). Liquidity 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 raising obligations or converting assets quickly (Basel Committee on Banking Supervision, 1997).

2.3.2.1 Loan to Deposit Ratio

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, therefore the higher the ratio, the higher banks are exposed to risks and also opportunities.

The formula can be expressed as:

$$LDR = \frac{Total\ Loans}{Total\ Customer\ Deposits} \tag{2.8}$$

2.3.2.2 Capital Adequacy Ratio

Another measurement that can be used is capital adequacy ratio which presents the ratio of a bank's capital to its total risk weighted assets, thus indicates if the bank's capital is sufficient to absorb any future shocks. Tier-1 capital is equity that is permanently and immediately available to cushion a bank's losses without forcing it to cease operations. Tier-2 capital is a supplementary funds which were used to reduce losses in the case of a bank failure, therefore providing some protection to depositors and creditors.

The formula of capital adequacy can be expressed as:

$$CAR = \frac{Tier\ 1\ Capital + Tier\ 2\ Capital}{Risk\ Weighted\ Assets} \tag{2.9}$$

2.3.3 Operational Efficiency

Operational efficiency is another factor that affects the bank's profitability, usually calculated as a cost to income ratio used for measuring the change in the cost of the bank. Salary expenditures, marketing fees, and interest expense are examples of operational costs spent by the bank in carrying out its everyday tasks.

According to Bank Indonesia's regulation No. 14/26/PBI/2012, operational efficiency is determined using Operating Cost to Operating Income.

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 profitability accordingly. This statement is supported in previous studies by Satriyo Wibowo (2013), El-Faham (2020), and Yuliani (2007) which states that this ratio has a significant negative effect on profitability.

The formulas of operational efficiency ratio are as follow:

$$Operational\ Efficiency = \frac{Total\ Cost}{Net\ Income} \tag{2.10}$$

Or

$$Operational\ Efficiency\ = \frac{Operational\ Cost}{Operational\ Income} \tag{2.11}$$

2.3.4 Inflation

Inflation is the most widely used macroeconomic variable, which explains the process of continuously increasing price levels. Changes in inflation will greatly impact economic growth, nation's competitiveness, interest rates, income distribution, and even national stability (El-Faham, 2020). The mobilization of money is also 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).

If foreign financial assets are included as one of the asset options, then differences in domestic and international inflation rates can cause the rupiah exchange rate against foreign currencies to become overvalued and in turn will eliminate the competitiveness of Indonesian commodities (CSA Institute, n.d.). The occurrence of inflation can be caused by several factors such as increased demand, increased production costs and the amount of money in circulation.

2.3.5 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). Another related cause of interest rate risk is yield curve risk. This happens when the yield curve is steep, flattened, or tilted downwards. In this case, a shift in the yield curve can increase interest rate risk by amplifying the effects of maturity mismatches. A bank's earnings are affected by interest rate changes by how much it earns in net interest income, other income that is interest-sensitive, and operational expenses (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 (such as long-term assets financed by current liabilities) and interest rate mismatches (such as fixed rate loans financed by floating rate deposits).

Gap analysis will be used in this study to measure bank's interest rate risk. The gap analysis is the simplest and most accessible techniques for measuring bank's interest rate risk exposure using interest sensitive assets and liabilities (Basel Committee on Banking Supervision, 1997). The ratio of the difference between the dollar value of liabilities and the dollar value of assets in regard to its total capital is used to quantify interest rate risk (Tafri *et al.*, 2009).

$$GAP = Rate\ Sensitive\ Assets - Rate\ Sensitive\ Liabilities \tag{2.12}$$

$$Interest\ Rate\ Risk = \frac{GAP}{Total\ Capital} \tag{2.13}$$

2.3.6 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. There are two different types of exchange rates, spot rate is exchange prices for immediate delivery transactions, forward rate applies for currently agreed transactions but where the actual payment or currency exchange is going to take place at a later date (CSA Institute, n.d.).

Foreign exchange risk arises when a bank holds assets or liabilities in foreign currencies and there's a fluctuations in exchange rates. This uncertain move poses a threat to bank profits and capital if such a move is in an undesired and unexpected direction. According to Bessis (2002), foreign exchange risk is a loss due to fluctuations in exchange rates. Such loss of income can result from a discrepancy between the value of assets and the value of capital and liabilities denominated in foreign currencies, or the discrepancy between foreign assets and foreign liabilities expressed in local currency.

2.4 Descriptive Statistics

Descriptive statistics were used for this research to quantify the essential aspects of the variables and to examine the general patterns of the data from 2012 to 2021. The respected variables will be delivered in the form of mean, median, maximum and minimum value, and standard deviation.

1. Mean is an average value calculated from the sample. The formula can be described as follow:

$$\bar{X} = \frac{1}{n}(x_1 + x_2 + \cdots + x_n) = \frac{\sum x}{n} \tag{2.14}$$

   where x is the value of each sample data, and n is the total number of sample data.

2. Median is a statistical measure that shows the middle value of a group of data that has been sequenced from the lowest to the highest (CFI, 2022)

   For even number of sample size:

$$Median = x_{\left(\frac{n+1}{2}\right)} \tag{2.15}$$

For odd number of sample size:

$$Median = \frac{\left(x_{(n/2)} + x_{(n/2)+1}\right)}{2} \tag{2.16}$$

where x is the value of each sample data, and n is the total number of sample data.

3. Minimum and maximum value is the biggest and smallest value from the sample data
4. Standard deviation is called as a statistical measure used to determine the distribution of data in a sample and how near a single data point is to the sample mean (Tafara, 2020). The formula can be described as follow:

$$Standard\ Deviation = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} \tag{2.17}$$

where x_i is the value of i^{th} point in the data set, $\bar{x}$ is the mean of the data set, and n is the total number of data points.

2.5 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). Hence, multiple linear regression analysis was used to evaluate the hypothesis of this study and to determine the relevance of each independent variable in affecting commercial bank's profitability in Indonesia. 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).

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + u_i \tag{2.18}$$

where *Y* is response or dependent variable, β is the intercept or parameter, X_1 and X_2 the explanatory or independent variable, u is the residuals or error, and *i* is the i^{th} observations.

Since equation (2.19) is only for two independent variables, the equation for k independent variables can be written as (Brooks, 2008):

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + u_i \tag{2.19}$$

Equation above can be simplified by writing it in matrix form

$$Y = X\beta + u \tag{2.20}$$

$$\begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_i \end{bmatrix} = \begin{bmatrix} 1 & X_{11} & X_{21} & \cdots & X_{k1} \\ 1 & X_{12} & X_{22} & \cdots & X_{k2} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & X_{1i} & X_{2i} & \cdots & X_{ki} \end{bmatrix} \begin{bmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \\ \vdots \\ \beta_k \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_i \end{bmatrix} \tag{2.21}$$

In multiple linear regression, in order to obtain the estimation of parameters (β), residuals sum of squares (*RSS*) is needed and expected to be derived with respect to the parameters (Brooks, 2008).

$$RSS = \sum u_i^2 = L = [u_1 \quad u_2 \quad \dots \quad u_i] \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_i \end{bmatrix} = u^T u \tag{2.22}$$

Using matrix properties, we can obtain

$$u^T = (Y - X\beta)^T \tag{2.23}$$

$$u = (Y - X\beta) \tag{2.24}$$

$$u^T u = (Y - X\beta)^T (Y - X\beta) = Y^T Y - \beta^T X^T Y - Y^T X\beta + \beta^T X^T X\beta \tag{2.25}$$

$$\beta^T X^T Y = \underbrace{[\beta_0 \quad \beta_1 \quad \beta_2 \quad \dots \quad \beta_k]}_{1\times k} \underbrace{\begin{bmatrix} 1 & 1 & \cdots & 1 \\ X_{11} & X_{21} & \cdots & X_{1i} \\ X_{12} & X_{22} & \cdots & X_{2i} \\ \vdots & \vdots & \ddots & \vdots \\ X_{k1} & X_{k2} & \cdots & X_{ki} \end{bmatrix}}_{k\times i} \underbrace{\begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_i \end{bmatrix}}_{i\times 1} \tag{2.26}$$

$$Y^T X\beta = \underbrace{[Y_1 \quad Y_2 \quad \dots \quad Y_i]}_{1\times i} \underbrace{\begin{bmatrix} 1 & X_{11} & X_{21} & \cdots & X_{k1} \\ 1 & X_{12} & X_{22} & \cdots & X_{k2} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & X_{1i} & X_{2i} & \cdots & X_{ki} \end{bmatrix}}_{i\times k} \underbrace{\begin{bmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \\ \vdots \\ \beta_k \end{bmatrix}}_{k\times 1} \tag{2.27}$$

Matrices in equation (2.27) and (2.28), $\beta^T X^T Y$ and $Y^T X\beta$ will produced a 1×1 matrix. Both matrices in fact will have the same results, so it can be written as $\beta^T X^T Y = Y^T X\beta$ (Brooks, 2008). Thus equation (2.26) can be rewritten as

$$u^T u = (Y - X\beta)^T (Y - X\beta) = Y^T Y - 2(\beta^T X^T Y) + \beta^T X^T X\beta \tag{2.28}$$

Differentiating equation (2.29) with respect of β in order to find the parameter values

$$\frac{\partial L}{\partial \beta} = -2X^T Y + 2X^T X\beta = 0 \tag{2.29}$$

$$2X^T X\beta = 2X^T Y \tag{2.30}$$

$$X^T X\beta = X^T Y \tag{2.31}$$

Using matrix properties, we can obtain

$$\beta = (X^T X)^{-1} X^T Y \tag{2.32}$$

This research is using two different variables as the dependent variable; return on assets and return on equity. Therefore, there are going to be two regression models tested in this research.

Regression model 1 is as follow:

$$ROA_i = \beta_0 + \beta_1 CR_i + \beta_2 LIQ_i + \beta_3 CAR_i + \beta_4 OE_i + \beta_5 INF_i + \beta_6 IR_i + \beta_7 FX_i + u_i \quad (2.33)$$

Regression model 2 is as follow:

$$ROE_i = \beta_0 + \beta_1 CR_i + \beta_2 LIQ_i + \beta_3 CAR_i + \beta_4 OE_i + \beta_5 INF_i + \beta_6 IR_i + \beta_7 FX_i + u_i \quad (2.34)$$

where ROA is return on assets, ROE is return on equity, CR is credit risk, LIQ is liquidity risk using loan to deposit ratio, CAR is liquidity risk using capital adequacy, OE is operational efficiency, INF is inflation rate, IR is interest rate risk, and FX is foreign exchange rate.

2.6 Classical Assumption Test

Test for Autocorrelation

The autocorrelation test aims to test whether in regression model there is a correlation between residuals. It is said that the residuals are serially correlated if they are connected with one another. The Durbin-Watson (1951) test is used to determine whether there is an autocorrelation. The general formula for Durbin-Watson is:

$$DW = \frac{\sum_{t=2}^{T}(u_t - u_{t-1})^2}{\sum_{t=1}^{T} u_t^2} \quad (2.35)$$

where u_t is residual at tth value, and T is the number of periods/observations.

Durbin-Watson test has 2 critical values: an upper critical value (dU), a lower critical value (dL), as well as an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. The decision making whether there is an autocorrelation is as follows (Brooks, 2008):

1. If DW test statistics is between the upper critical value (dU) and (4-dU), then autocorrelation coefficient is equal to zero, indicating that autocorrelation is not present.
2. If DW test statistics is lower than the lower critical value (dL), then autocorrelation coefficient is greater than zero, indicating there is a positive autocorrelation.
3. If DW test statistics is greater than (4-dL), then the coefficient autocorrelation is less than zero, indicating there is negative autocorrelation.
4. If DW test statistics lies between the upper critical value (dU) and the lower critical value (dL) or lies between (4-dU) and (4-dL), then the result cannot be concluded.

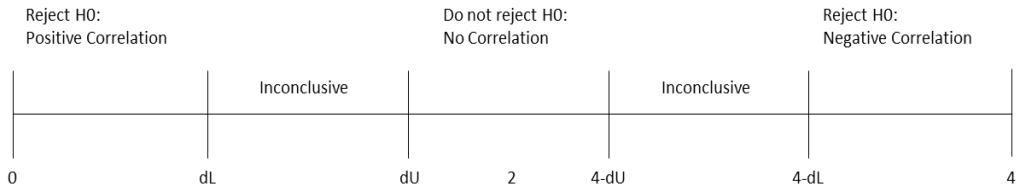

Figure 2.1. Durbin-Watson Autocorrelation

(Source: Introductory Econometrics for Finance)

Test for Normality

This test determines if the residuals of dependent and independent variables in a model regression are normally distributed or not. Relationships and significance tests can be affected by non-normally distributed variables. The Jarque-Bera test was used in this research to determine if the residuals had a normal distribution. Jarque-Bera test is calculated using skewness and kurtosis. Skewness is a degree of asymmetry in a probability distribution that strayed from the symmetrical normal distribution. While kurtosis is a measure of whether the data are heavy-tailed or light-tailed in comparison to a normal distribution (NIST, n.d.). Heavy tails occurs when datasets have many outliers resulting in high kurtosis value. The skewness for a normal distribution is near zero, while the kurtosis of the

normal distribution is 3 (Brooks, 2008). The sample skewness and kurtosis can be expressed as:

$$Skewness = \frac{1}{n}\frac{\sum_{i=1}^{n}(X_i - \bar{X})^3}{\sigma^3} \tag{2.36}$$

$$Kurtosis = \frac{1}{n}\frac{\sum_{i=1}^{n}(X_i - \bar{X})^4}{\sigma^4} \tag{2.37}$$

where n is the total number of sample size, $\bar{X}$ is sample mean, and σ is standard deviation.

The formula of Jarque-Bera test statistic is as follows:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \sim \chi^2(2) \tag{2.38}$$

where n is the total number of sample size, S is skewness, and K is kurtosis.

The decision process for Jarque-Bera test is by comparing Jarque-Bera value to Chi-squared distribution with the degree of freedom 2. If the test value is smaller than the value from Chi-squared distribution table, then we failed to reject H_0. On the contrary, if the test value is bigger, then we accept the H_1.

H_0: The residuals are normally distributed
H_1: The residuals are not normally distributed

Test for Multicollinearity

The multicollinearity test is used to see if the independent variables in the regression model have a correlation between each other. Whenever independent variables have a high correlation with each other, the link between independent variables and the dependent variable is disrupted (Syakhrun and Amin, 2019). The value of tolerance and the value of VIF (Variance Inflation Factor) is one of the many ways to test multicollinearity. This test measures correlation between independent variables by making a new regression model using one of the

independent variable as the new dependent variable to check if the independent variable selected is influenced by the other.

$$Tolerance = 1 - R^2 \tag{2.39}$$

$$VIF = \frac{1}{1 - R^2} \tag{2.40}$$

where R^2 is the coefficient determination of the independent variable selected as dependent variable.

If the tolerance value is greater than 0.1 or the VIF value is less than 10, it can be concluded that there is no multicollinearity in the processed data, while the regression results will be affected by a multicollinearity problem if the VIF is more than 10 (Gujarati, 2004).

H_0: There is no multicollinearity on the sample data
H_1: There is multicollinearity on the sample data

Heteroscedasticity Test

Heteroscedasticity test is a measurement that shows if the variance of the residuals is not constant (Brooks, 2008). If the residuals do have a constant variance, they are called homoscedasticity. There are several types of heteroscedasticity test, such as Harrison McCabe test, Breusch-Pagan test, white test, etc. However, there is no concrete evidence on which test is the best test yet. This research will use Harrison McCabe test to evaluate the variance of the residuals. According to Wiedermann *et al*. (2017), the ratio between the residuals sum of squares of a chosen subset and the sum of squares of all the squared residuals was utilized in the Harrison McCabe test. The test statistic of Harrison McCabe can be obtained using this formula (Wiedermann *et al*., 2017).

$$HMC = \frac{\sum_{i=1}^{n/2} u_i^2}{\sum_{i=1}^{n} u_i^2} \tag{2.41}$$

where u is residuals, and n is the sample size.

If the p-value smaller the selected significance level, then we reject the null hypothesis. The null hypothesis of this test is that every delta or coefficients are equal to zero. Hence, giving evidence of homoscedasticity.

H_0: The sample data is homoscedasticity ($\delta_0 = \delta_1 = \delta_2 = \cdots = \delta_k = 0$)
H_1: The sample data is heteroscedasticity

2.7 Hypothesis Test

Coefficient of Determination (R squared test)

The capability of the regression line obtained from independent variables to explain the variance of the dependent variable is measured by the coefficient of determination (Gujarati, 2004). This test compares the distance between estimated value and the mean with the distance between actual value and the mean. Therefore, R^2 result will spread between zero to one. The general formula for coefficient of determination is as follow (Miles, 2005):

$$R^2 = \frac{\sum(\hat{Y} - \bar{Y})^2}{\sum(Y - \bar{Y})^2} \tag{2.42}$$

where $\hat{Y}$ is the estimated value obtained from regression line, $\bar{Y}$ is the mean of value Y, and Y is the actual value obtained from dataset.

The closer the value R^2 is close to 1 indicates that independent variables in the regression model have a higher chance to explains the information required in predicting the dependent variable.

Adjusted Coefficient of Determination (Adjusted R^2)

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). This test shows whether adding additional independent variables will actually improve the predictor capability of a regression model or not. The main flaw of R-squared test is that R^2 value will increase with every independent variables added to the model (Stephanie, n.d.). Therefore, even if the

additional independent variables show no relationship with the dependent variables, the R^2 will increase and mislead researcher on using more independent variables. By considering the number of independent variables and the number of sample data, adjusted R-squared will solve the existing problem. Adjusted R-squared is calculated using (Miles, 2005):

$$\overline{R^2} = \left\{\frac{(1-R^2)(N-1)}{N-K-1}\right\} \tag{2.43}$$

where N is the total number of samples, and K is the number of independent variables.

Simultaneous Test (F-test)

This test is conducted to determine whether all independent variables have simultaneous effect on the dependent variable. This study will use ANOVA to carry out the F-test. The test is done by comparing the F_{Count} to F_{Table} and the significant value of F_{Count} with significant level of alpha which is 5%. F_{Table} is obtained by using degree of freedom and the F-Distribution table. F-test statistics are as follow (Gujarati, 2004).

$$F = \frac{(ESS)/(numerator\ DF)}{(RSS)/(denominator\ DF)} \tag{2.44}$$

$$ESS = \sum\left(\hat{Y}_i - \bar{Y}\right)^2 \tag{2.45}$$

$$RSS = \sum\left(Y_i - \hat{Y}\right)^2 \tag{2.46}$$

$$numerator\ DF = K - 1 \tag{2.47}$$

$$denominator\ DF = N - K \tag{2.48}$$

where ESS is explained sum of squares, RSS is residual sum of squares, N is number of samples, and K is number of independent variables.

All independent variables simultaneously have a significant relationship towards dependent variable If F_{Count} is greater than F_{Table} and the significant value

of F_{Count} is smaller than 0.05. On the opposite, when the significant value of F_{Count} is bigger than 0.05, all independent variables simultaneously have no significant relationship towards dependent variable (Syakhrun and Amin, 2019).

H_0: There is no simultaneous relationship with dependent variable
H_1: There is simultaneous relationship with dependent variable

Partial Test (t-test)

The purpose of this test is to determine whether each independent variable has a significant effect on the dependent variable. The test statistics for partial test is as follow (Brooks, 2008).

$$Test\ Statistics = \frac{\hat{\beta}}{SE(\widehat{\beta})} \tag{2.49}$$

$$SE(\widehat{\beta}) = \frac{s}{\sqrt{\sum(x_i - \bar{x})^2}} \tag{2.50}$$

$$s = \sqrt{\frac{RSS}{N - K - 1}} \tag{2.51}$$

where β is parameter or coefficient, $SE(\hat{\beta})$ is Standard error of regression coefficient, s is estimated standard error of regression model, and RSS is residuals sum of squares.

Decision making for this test is based on the comparison of the t_{Count} of each coefficient with t_{Table} with significant level of 5%. The value of t_{Table} is obtained by using degree of freedom and the t-Distribution table.

$$DF = N - K - 1 \tag{2.52}$$

where N is the number of samples, and K is number of independent variables.

The null hypothesis is accepted if t_{Count} is less than t_{Table}, which indicates that the independent variable has no influence on the value of the dependent variable. On the contrary, the null hypothesis will be rejected when t_{Count} is bigger than t_{Table}.

The significant level of each variable becomes a measure of the significance of the effect given by each independent variable.

H_0: There is no partial relationship of each independent variables towards dependent variable
H_1: There is partial relationship of each independent variables towards dependent variable

2.8 Variables and Hypotheses Development

In experimental research, an independent variable is a variable that should not have any correlations with other explanatory variables which researchers control or modify to see what effects it will have on dependent variables. Credit risk, liquidity risk, operational efficiency, inflation, interest rate, and exchange rate have been selected as independent variables for this research on the basis of their potential influence to bank's profitability.

2.8.1 Credit Risk

The credit risk is primarily driven by the percentage of non-performing loans to total loans. The greater the ratio, the worse the quality of the credit facility and hence the larger the risk it yields. Most research studies examined that increasing credit risk is often related with lower business profitability, implying that credit risk has a negative impact on commercial bank profitability. Aulia and Antyo (2018) point out that credit risk should have a negative influence on profitability since the higher the number of unpaid loans, the lower income commercial banks got. This statement also supported by the same result from Lake (2013), Almanda (2019), and Siregar (2020). Hence, credit risk is expected to have a negative relationship with banks profitability.

Hypothesis$_{0.1}$: Credit risk has no significant impact on the profitability of the banks.
Hypothesis$_{a.1}$: Credit risk has significant impact on the profitability of the banks.

2.8.2 Liquidity Risk

Liquidity risk, or the risk that a bank may not have enough current assets, such as cash and immediately saleable securities to meet the current liabilities (CSA Institute, n.d.). The Loan to Deposit Ratio was chosen as a measuring tool because it demonstrates the bank's current and future availability of funding sources. The higher this percentage is, the more aggressive or active the bank is in distributing its credit funds, and the lower this ratio is, the more customer's funds which were not utilized for lending. There are differences in the results of previous studies regarding the effects of liquidity risk using the loan to deposit ratio.

Hypothesis$_{0.2}$: Liquidity risk (Loan to deposits ratio) has no significant impact on the profitability of the banks.
Hypothesis$_{a.2}$: Liquidity risk (Loan to deposits ratio) has significant impact on the profitability of the banks.

Another indicator that can be used to assess the liquidity of a bank is capital adequacy ratio or CAR. Capital adequacy refers to the supply of own capital to covers the risk of losses associated with the fluctuation of bank assets, which essentially most of its funds are supplied from third-party funds or the general public. Several studies looked at the impact of capitalization on bank profitability as measured by equity to risk-weighted assets. Even with all of this, there seems to be no evidence on the effects of capital ratio on bank profitability.

Hypothesis$_{0.3}$: Liquidity risk (Capital adequacy ratio) has no significant impact on the profitability of the banks.
Hypothesis$_{a.3}$: Liquidity risk (Capital adequacy ratio) has significant impact on the profitability of the banks.

2.8.3 Operational Efficiency

The ratio of operational expenses to operating income is used to assess a bank's efficiency and capacity to carry out its activities. Tripe (2014) indicates how an operational risk capital cost might be connected to cost-to-income ratio volatility. Wahyu and Azhar (2019) point out that more efficient banks can operate

at cheaper costs and increasing its profits. As a result, this variable is likely to have a negative impact, as greater ratios imply decreased efficiency and profitability. Siregar (2020) discovered a negative connection between income and BOPO, similar to Syakhrun *et al*., (2019).

Hypothesis$_{0.4}$: Operational efficiency has no significant impact on the profitability of the banks.
Hypothesis$_{a.4}$: Operational efficiency has significant impact on the profitability of the banks.

2.8.4 Inflation

The rate of inflation is used to determine how microeconomic risk may influence commercial bank profitability. The yearly inflation rate of the country is taken into consideration by the researchers in this study. This indicator represents the total percentage increase in the consumer price index for all products and services. 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 profitability. Hence, there are no definite result on the impact of inflation on profitability.

Hypothesis$_{0.5}$: Inflation has no significant impact on the profitability of the banks.
Hypothesis$_{a.5}$: Inflation has significant impact on the profitability of the banks.

2.8.5 Interest Rate Risk

Interest rate risk is another key financial risk that can impact commercial bank performance. Since it has a significant impact on the interest rates for loans and savings that commercial banks offer, and because interest income is the principal source of income for commercial banks. Another source of revenue for commercial banks is created by the difference in maturity between certain assets and liabilities. Hence, higher ratio shows bigger difference in interest rates and expected to impact bank's profitability positively. This theory is supported with

several studies that looked at the impact of interest rate risk on bank profitability. Lake (2013), and Tafri *et al*. (2009) found out that interest rate has positive impact on profitability.

Hypothesis$_{0.6}$: Interest rate has no significant impact on the profitability of the banks.

Hypothesis$_{a.6}$: Interest rate has significant impact on the profitability of the banks.

2.8.6 Foreign Exchange Rate

Foreign exchange risk emerges from unhedged or underhedged investments in a certain currency. These holdings may occur as a natural result of business operations rather than as a result of a purposeful intent to establish a currency trading position (Lake, 2013). According to Keshtgar and Pahlavani (2020), exchange rate has a statistically significant negative effect on bank profitability. On the contrary, Lake (2013) in his study found out that exchange rate volatility has a insignificant positive effect on profitability.

Hypothesis$_{0.7}$: Exchange rate has no significant impact on the profitability of the banks.

Hypothesis$_{a.7}$: Exchange rate has significant impact on the profitability of the banks.

Table 2.2. Descriptions of The Variables and Their Expected Relationship

	Variables	Notation	Expected Sign
Dependent Variables	Return on assets	ROA	NA
	Return on equity	ROE	NA
Independent Variable	Credit risk	CR	-
	Liquidity risk	LIQ	+/-
	Liquidity risk (Capital Adequacy)	CAR	+/-
	Operational efficiency	OE	-
	Inflation rate	INF	+/-

	Interest rate risk	IR	+
	Exchange rate	FX	+/-

2.9 Research Framework

This study involves two regression models. The first model is used to explore the significant influence of credit risk, liquidity risk, operational risk, and macroeconomic indicators on the profitability of bank assets. The second model is used to detect the significant influence of credit risk, liquidity risk, operational risk, and macroeconomic indicators on the bank's return on equity.

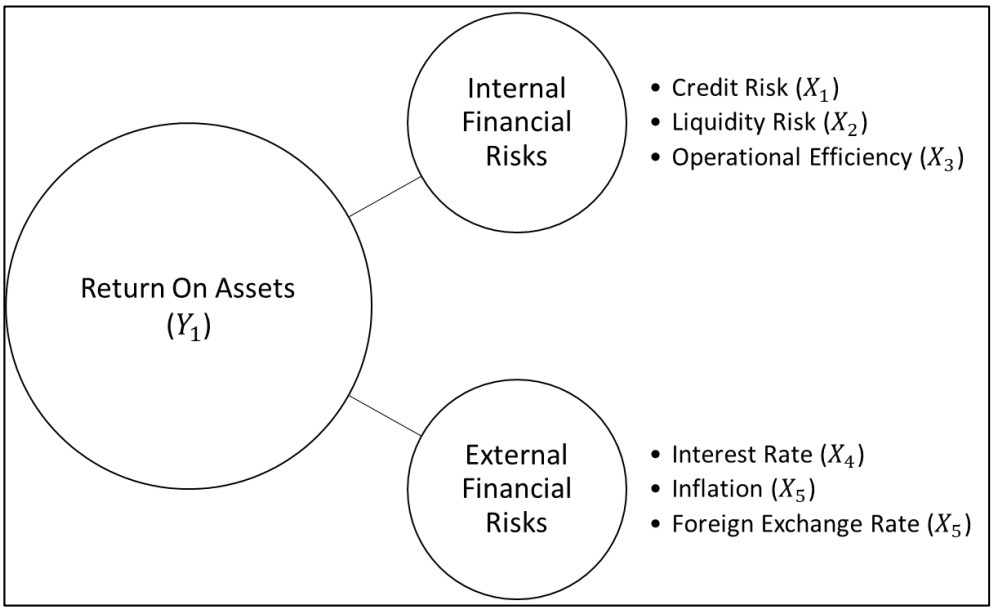

Figure 2.2. Research Framework Model 1

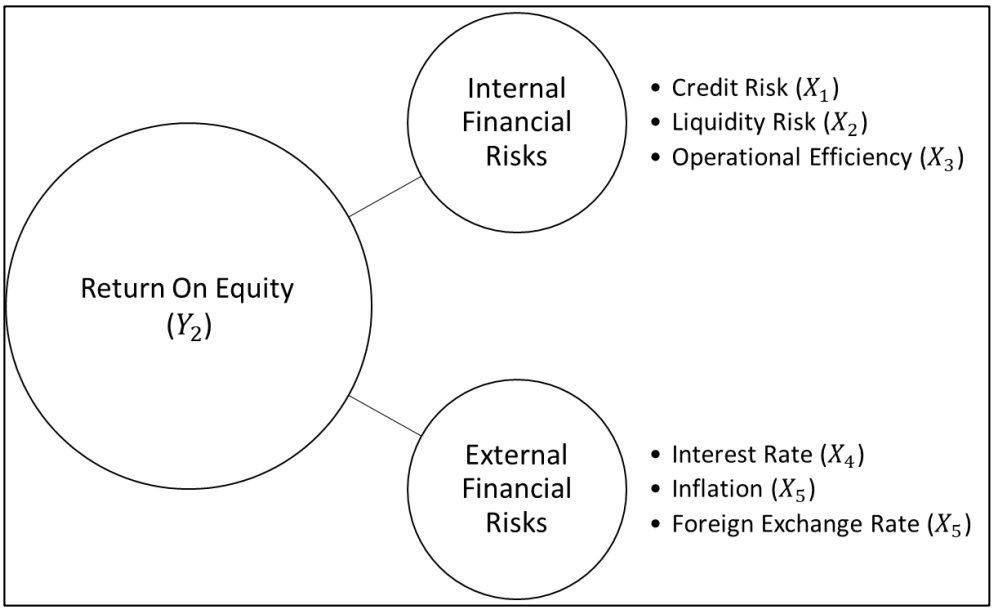

Figure 2.3. Research Framework Model 2

2.10 Previous Research

Several research have been conducted to analyze financial risk factors and to which extends it influence the profitability of commercial banks. Below are the several researches which have similar variables with this study.

Table 2.3. Previous Research

Author	Year	Title	Variables	Findings
Lake, E.	2013	*Financial Risks and Profitability of Commercial Banks in Ethiopia*	• Dependent variables: Return on Assets (ROA) • Independent variables: Credit risk, liquidity risk, foreign exchange, and interest rate	Credit risk and liquidity risk have significant negative impact on ROA. Interest rate risk and foreign exchange have positive insignificant impact on ROA.
Olalere, O., & Omar, W.A.	2015	*The Empirical Effects of Credit Risk on Profitability of Commercial Banks: Evidence from Nigeria*	• Dependent variables: Return on Equity (ROE) • Independent variables: Nonperforming	Nonperforming loan ratio has significant negative impact on ROE. Debt to total assets has negative

			loan ratio, Total debt to assets, and total debt to equity	insignificant impact on ROE. Debt to equity ratio has insignificant positive impact on ROE.
Siregar, P.A.	2020	*Risiko Keuangan dan Pengaruhnya Terhadap Profitabilitas Bank Syariah di Indonesia*	• Dependent variables: Return on assets • Independent variables: Capital adequacy ratio, nonperforming loan ratio, operating cost to operating income ratio, and return on equity	Capital adequacy ratio has significant positive impact on ROA. Nonperforming loan ratio has significant negative impact on ROA. Operating cost to operating income ratio and return on equity have insignificant impact on ROA
Tafara, F.N.	2020	*The Financial Ratio Analysis Towards Financial Performance of Commercial Bank in Indonesia*	• Dependent variables: Return on assets • Independent variables: Capital adequacy ratio, nonperforming loan ratio, net interest margin, operating cost to operating income ratio, and loan to deposits ratio	Capital adequacy ratio and net interest margin have significant positive impact on ROA. Nonperforming loan ratio and operating cost to operating income have significant negative impact on ROA. Loan to deposits ratio has insignificant negative impact on ROA.
Wibowo, E.S., & Syaichu, M.	2013	*Analisis Pengaruh Suku Bunga, Inflasi, CAR, BOPO, NPF Terhadap Profitabilitas Bank Syariah*	• Dependent variables: Return on assets • Independent variables: Interest rate,	Capital adequacy ratio, nonperforming loan, inflation, and interest rate have insignificant

			inflation, capital adequacy ratio, operating cost to operating income ratio, nonperforming loan ratio	impact on ROA. Operating cost to operating income has significant negative impact on ROA
Badawi, A.	2017	*Effect of Credit Risk, Liquidity Risk, and Market Risk Banking to Profitability Bank*	• Dependent variables: Return on Equity (ROE) • Independent Variables: Liquidity Risk (loan to deposit ratio), credit risk (non-performing loan ratio), market risk (Net interest margin).	Non-performing loan ratio and loan to deposit ratio do not affect return on equity. Market risk has positive impact on return on equity.

2.11 Research Gap

After observing previous research conducted, researcher able to find several gaps that might be filled. Gaps were observed based on factors such as samples, populations, variables, and periods. Lake (2013) in his research, he uses internal financial risks such as credit and liquidity risk. In addition, he also uses external risks such as interest rate and foreign exchange risk. However, he only uses ROA as a measurement of profitability. Olalere and Omar (2015) focuses only on the impact of credit risk on commercial bank's profitability. Tafara (2020) in her research, she only uses microeconomic or internal determinants, and only uses ROA as the measurement of profitability. In research conducted by Siregar (2020), he only uses internal financial risks as an independent variable on the profitability of Islamic banks in Indonesia. Wibowo and Syaichu (2013) in their research, analyze both internal and external factors that may impact bank's probability. However, they only use ROA as the measurement of profitability and their research sample is Bank Syariah.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Design

The selection of a suitable research approach supports a researcher in planning and conducting a study in such a way that the desired outcomes are achieved. The researcher seeks to find out the effect of macroeconomic risks and internal financial risks towards bank's financial performance indicators, such as return on assets and return on equity in banking BUKU 4 listed in IDX for the period of 2012 to 2021. In realizing these objectives, researcher will be using quantitative approach.

Quantitative approach is one in which the researcher primarily utilizes hypotheses assumptions and questions to develop understanding, then using specific variables and employ techniques that can be used to test the early theories and acquire statistics on predetermined instruments that yield statistics records (Lake, 2013). This method is based on numerical observations and expected to give exact, quantitative, numerical data which could be compared statistically between different variables. However, quantitative research also has some distinctive limitations. First, due of the focus on theory or hypothesis testing rather than on the actual behavioral finance bias, researchers may miss out on occurrences that are occurring. In addition, it is possible that the information acquired is too abstract and general to be directly applied to specific local conditions, contexts, and individuals.

3.2 Sampling Design

This research is using secondary data acquired from bank's annual reports and financial statements that are publicly accessible on institution's official websites. Purposive sampling is the type of non-probability sampling used by researchers. This sampling method employs a number of criteria in line with the

research's needs, therefore the population had to be segmented into the most appropriate sample for the study. This research has 98 commercial banks that operate in Indonesia as the population, and thus will be limited to the number of the sample, involving merely on BUKU 4 banks. The list of sample criteria for this research is as follows:

1. Company must be in banking industry and operates as a commercial banks
2. Bank must be in bank BUKU 4
3. Bank must publish its annual reports and financial statements to Indonesian citizens for minimum of ten consecutive years (2012-2021)

Therefore, here are the list of banks that being used in this research:

Table 3.1. List of The Selected Commercial Banks

No	Banks	IDX Code
1	PT. Bank Central Asia Tbk	BBCA
2	PT Bank Rakyat Indonesia Tbk	BBRI
3	PT Bank Mandiri Tbk	BMRI
4	PT Bank Negara Indonesia Tbk	BBNI
5	PT Bank Pan Indonesia Tbk	PNBN
6	PT Bank Danamon Indonesia Tbk	BDMN
7	PT Bank CIMB Niaga Tbk	BNGA
8	PT Bank Permata Tbk	BNLI
9	PT Bank BTPN Tbk	BTPN
10	PT Bank OCBC NISP Tbk	NISP

(Source: idx.co.id)

3.3 Instruments Usage

Table 3.2. Instruments Usage

Variables	Notation	Usage	Equation
Return on Assets	ROA	Helps to determine how profitable a company is compared to its total assets	(2.1)
Return on Equity	ROE	Determine how profitable a company is compared to its equity	(2.3)
Credit Risk	CR	Measures the possibility of a loss resulting from a borrower's failure to repay a loan	(2.7)
Liquidity Risk	LIQ	Helps to determine how capable a bank is to pay its loans by using the most liquid assets (customer deposits)	(2.8)
	CAR	Helps to determine how capable a bank's capital is to cover potential losses from its assets	(2.9)
Operational Efficiency	OE	Determine how much costs a bank needs to generate income from operational aspect	(2.11)
Interest Rate Risk	IR	Measures how big is the difference between interest bank's gain and interest bank's loss in relation to assets which generate interest	(2.13)

3.4 Data Collection Design

The secondary data that will be used is obtained from 2 different sources. Each selected company's website will provide financial statements that will be used to gathered bank's profitability, credit risk, liquidity risk, operational efficiency, and interest rate risk. Inflation rate and foreign exchange data will be obtained through Badan Pusat Statistik official website.

3.5 Data Analysis Design

The research was mostly based on panel data, which was acquired through structured document review, to identify and assess the effect degree of financial risks on bank profitability. The data set used consisted of ten banks at which the identical variables were gathered every year for ten years. As a result, there are a

total of 100 observations in this shared data set. The method used to analyze the data is multiple linear regression, this is because the data used is panel data which have more than one independent variable and are observed across time. This method also used by the authors of previous studies mentioned in chapter 2.5. In order to emphasize the process and step in analyzing this research, a general workflow is constructed.

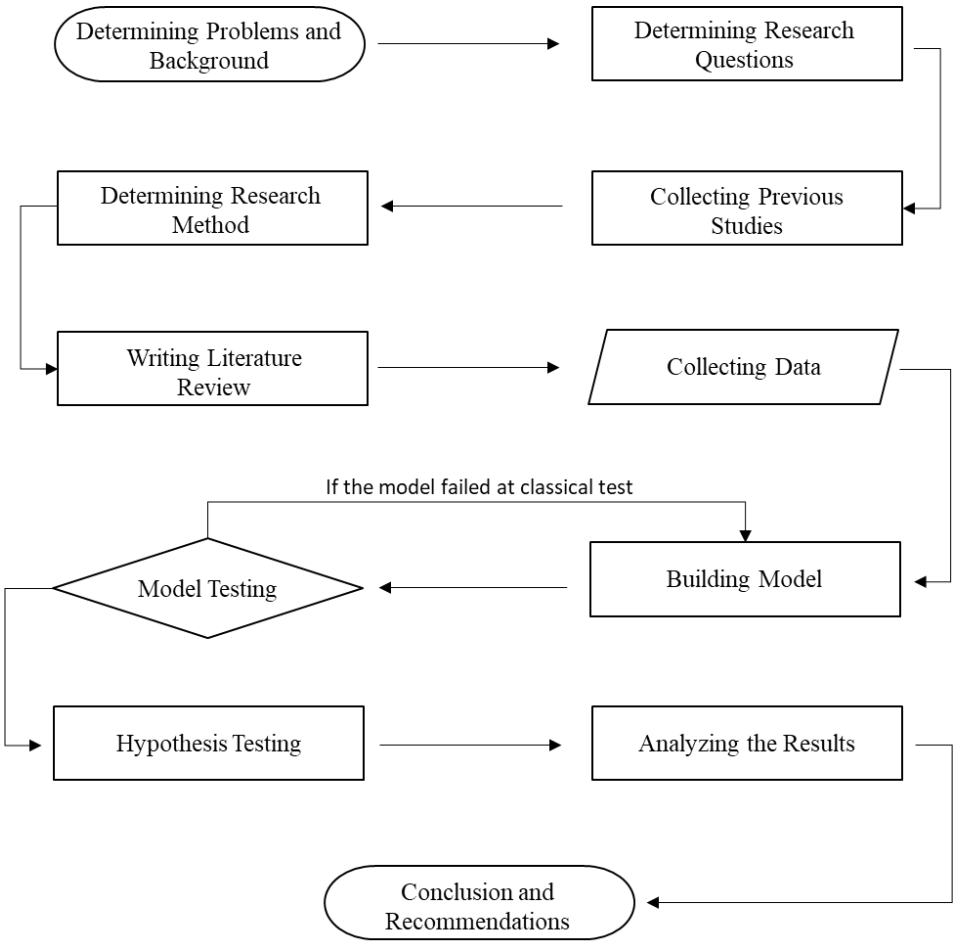

Figure 3.1. General Workflow

CHAPTER IV

ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Data Analysis

4.1.1 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 4.1. Descriptive Statistics of Sample Banks

Variables	Sample Size	Mean	Median	Minimum Value	Maximum Value	Standard Deviation
ROA	100	0.024	0,022	0,002	0,050	0,0105
ROE	100	0,135	0,118	0,015	0,341	0,0726
CR	100	0,023	0.023	0.004	0,046	0,0096
LIQ	100	0,886	0.881	0.620	1,342	0,1049
CAR	100	0.202	0,195	0.136	0.357	0,0408
OE	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

(Source: Processed Data)

From table 4.1, the research observations can be summarized as:

a) For return on assets as dependent variable, the minimum value of 0.2% is obtained from Permata Bank year 2015, while the maximum value of 5% is obtained from BRI year 2013. In addition, the average and the median of return on assets are 2.4% and 2.2%. This variable has a standard deviation of 1.05%.
b) For return on equity as dependent variable, the minimum value of 1.5% is obtained from CIMB Bank year 2015, while the maximum value of 34.1% is obtained from BRI year 2013. In addition, the average and the median of

return on equity are 13.5% and 11.8%. This variable has a standard deviation of 7.26%.

c) For credit risk as independent variable, the minimum value of 0.4% is obtained from BCA year 2012, while the maximum value of 4.6% is obtained from Permata Bank year 2017. In addition, the average and the median of credit risk are 2.3% and 2.3%. This variable has a standard deviation of 0.96%.

d) For liquidity risk as independent variable, the minimum value of 62% is obtained from BCA year 2021, while the maximum value of 134.2% is obtained from BTPN year 2020. In addition, the average and the median of liquidity risk are 88.6% and 88.1%. This variable has a standard deviation of 10.5%.

e) For capital adequacy as independent variable, the minimum value of 13.6% is obtained from Permata Bank year 2014, while the maximum value of 35.7% is obtained from Permata Bank year 2020 In addition, the average and the median of capital adequacy are 20.2% and 19.5%. This variable has a standard deviation of 4.08%.

f) For operational efficiency as independent variable, the minimum value of 54.2% is obtained from BCA year 2021, while the maximum value of 98.9% is obtained from Permata Bank year 2015. In addition, the average and the median of operational efficiency are 76.5% and 77.3%. This variable has a standard deviation of 9.85%.

g) For interest rate risk as independent variable, the minimum value of 74% is obtained from Mandiri year 2021, while the maximum value of 98.52% is obtained from Permata Bank year 2013. In addition, the average and the median of interest rate risk are 85.1% and 85.4%. This variable has a standard deviation of 5.21%.

h) For inflation rate as independent variable, the minimum value of 1.7% is obtained from year 2020, while the maximum value of 8.4% is obtained from year 2013. In addition, the average and the median of inflation rate are 4% and 3.2%. This variable has a standard deviation of 2.31%.

i) For foreign exchange as independent variable, the minimum value of -3% is obtained from year 2016, while the maximum value of 26% is obtained from year 2013. In addition, the average and the median of foreign exchange are 5.7% and 3%. This variable has a standard deviation of 7.8%.

4.1.2 Classical Assumption Test

Normality Test

Normality test is used to determine whether the residuals of the models are normally distributed or not. The model's residual should be normally distributed to fulfill the classical assumptions of linear regression. If the residuals are not normally distributed, hypothesis results for the model might be not accurate. Below are the results of Jarque-Bera normality test for this research.

Table 4.2. Normality Test

Model	Jarque-Bera Test Statistics	P-Value
Model 1 (Y: ROA)	5.5924	0.06104
Model 2 (Y: ROE)	1.81	0.4045

(Source: Processed Data)

From the table 4.2 above, it can be seen that Jarque-Bera test for both models 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 and significance level of 5%. Based on this results, it can be proved that both model's residuals are normally distributed. Hence, the first classical assumption test is fulfilled.

Autocorrelation Test

Autocorrelation test is used to determine whether there is a correlation between residuals in the regression model. The model's residual should not have

autocorrelation to fulfill the classical assumptions of linear regression. Below are the results of Durbin-Watson autocorrelation test for this research.

Table 4.3. Autocorrelation Test

Model	Durbin-Watson Test Statistics	P-Value
Model 1 (Y: ROA)	1.9669	0.3291
Model 2 (Y: ROE)	1.8661	0.177

(Source: Processed Data)

From the table 4.3 above, it can be seen that Durbin-Watson test for both models produced the p-value which are higher than the significance level of 5%. The upper (dU) and lower (dL) critical values according to Durbin-Watson test table are 1.827, and 1.512 for this research. Following the rules from figure 2.1, to accept the null hypothesis that there is no serial correlation for the residual, the test statistics needed to be in range of dU and 4-dU. It can be proved that both model's test statistics are in between of 1.827 and 2.173, therefore the second classical assumption test is fulfilled.

Multicollinearity Test

Multicollinearity test aims to determine whether there is a strong correlation between each independent variables. Independent variables in the regression model should not have a strong correlation with each other to fulfill the classical assumptions of linear regression. Multicollinearity test is being conducted by measuring the tolerance value and variance inflation factor (VIF) for each independent variables. Below are the test results of both models for each independent variables.

Table 4.4. Multicollinearity Test

Independent Variable	Model 1 (Y: ROA)		Model 2 (Y: ROE)	
	Tolerance Value	VIF	Tolerance Value	VIF
CR	0.6136876	1.629494	0.6136876	1.629494

LIQ	0.7008043	1.426932	0.7008043	1.426932
CAR	0.4446355	2.249033	0.4446355	2.249033
OE	0.5100051	1.960765	0.5100051	1.960765
INF	0.4703973	2.125863	0.4703973	2.125863
IR	0.5625854	1.777508	0.5625854	1.777508
FX	0.6358257	1.572758	0.6358257	1.572758

(Source: Processed Data)

It can be seen from the table 4.4 above that each independent variables in both models have tolerance value higher than 0.1. In addition, each variance inflation factor for the independent variable is not exceeding 10. This concludes that there is no multicollinearity found in both model, therefore the third classical assumption test is fulfilled.

Heteroscedasticity Test

Heteroscedasticity test aims to determine whether if the variance of model's residuals is constant or not. To fulfill the classical assumptions of linear regression, the variance of residuals should be constant. Below are the results of Harrison McCabe heteroscedasticity test for this research.

Table 4.5. Heteroscedasticity Test

Model	Harrison McCabe Test Statistics	P-Value
Model 1 (Y: ROA)	0.66599	0.997
Model 2 (Y: ROE)	0.68864	0.995

(Source: Processed Data)

It can be seen from the table 4.5 above that p-value for both models are higher than the significance level of 5%. Hence, it can be proved that both model's residuals have a constant variance, therefore the fourth classical assumption test is fulfilled.

4.1.3 Multiple Linear Regression

Once both models have passed all classical assumption tests, multiple linear regression results are now able to be interpreted. Below are the results for model 1.

Table 4.6. Multiple Linear Regression Model 1

Variable	Estimate	Standard Error
Intercept	0.087185	0.011860
CR: (X_1)	-0.074386	0.055536
LIQ: (X_2)	0.013241	0.004738
CAR: (X_3)	0.021291	0.015290
OE: (X_4)	-0.096625	0.005913
INF: (X_5)	0.065018	0.026319
IR: (X_6)	-0.007271	0.010657
FX: (X_7)	-0.004537	0.006688

(Source: Processed Data)

The equation for the multiple linear regression model above can be written as below

$$ROA = 0.087185 - 0.074386X_1 + 0.013241X_2 + 0.021291X_3 \\ -0.096625X_4 + 0.065018X_5 - 0.007271X_6 - 0.004537X_7 \quad (4.1)$$

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 X_1 increases by 1 unit and X_2, X_3, X_4, X_5, X_6, X_7 are constant, then commercial bank's return on asset will decrease by 0.074386.
3. Coefficient regression value of liquidity risk using loan to deposits ratio explains that liquidity risk has a parallel relationship with return on assets. The value of 0.013241 shows when X_2 increases by 1 unit and X_1, X_3, X_4, X_5, X_6, X_7 are constant, then commercial bank's return on asset will increase by 0.013241.
4. Coefficient regression value of liquidity risk using capital adequacy ratio explains that liquidity risk has a parallel relationship with return on assets.

The value of 0.021291 shows when X_3 increases by 1 unit and X_1, X_2, X_4, X_5, X_6, X_7 are constant, then commercial bank's return on asset will increase by 0.021291.

5. Coefficient regression value of operational efficiency explains that operational efficiency has a contrary relationship with return on assets. The value of -0.096625 shows when X_4 increases by 1 unit and X_1, X_2, X_3, X_5, X_6, X_7 are constant, then commercial bank's return on asset will decrease by 0.096625.
6. 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 X_5 increases by 1 unit and X_1, X_2, X_3, X_4, X_6, X_7 are constant, then commercial bank's return on asset will increase by 0.065018.
7. 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 X_6 increases by 1 unit and X_1, X_2, X_3, X_4, X_5, X_7 are constant, then commercial bank's return on asset will decrease by 0.007271.
8. 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 X_7 increases by 1 unit and X_1, X_2, X_3, X_4, X_5, X_6 are constant, then commercial bank's return on asset will decrease by 0.004537.

Table 4.7. Multiple Linear Regression Model 2

Variable	Estimate	Standard Error
Intercept	0.68496	0.09511
CR: (X_1)	-0.63074	0.44538
LIQ: (X_2)	-0.04610	0.03800
CAR: (X_3)	-0.30287	0.12262
OE: (X_4)	-0.52640	0.04742
INF: (X_5)	0.51960	0.21107
IR: (X_6)	-0.06409	0.08547
FX: (X_7)	0.04684	0.05364

(Source: Processed Data)

The equation for the multiple linear regression model above can be written as below

$$ROE = 0.68496 - 0.63074X_1 - 0.04610X_2 - 0.30287X_3 \\ -0.52640X_4 + 0.51960X_5 - 0.06409X_6 + 0.04684X_7 \qquad (4.2)$$

The equation above can be interpreted as:

1. If all independent variables are 0 or constant, then the value of commercial bank's ROE will be 0.68496.
2. Coefficient regression value of credit risk explains that credit risk has a contrary relationship with return on equity. The value of -0.63074 shows when X_1 increases by 1 unit and X_2, X_3, X_4, X_5, X_6, X_7 are constant, then commercial bank's return on equity will decrease by 0.63074.
3. Coefficient regression value of liquidity risk using loan to deposits ratio explains that liquidity risk has a contrary relationship with return on equity. The value of -0.04610 shows when X_2 increases by 1 unit and X_1, X_3, X_4, X_5, X_6, X_7 are constant, then commercial bank's return on equity will decrease by 0.04610.
4. Coefficient regression value of liquidity risk using capital adequacy ratio explains that liquidity risk has a contrary relationship with return on equity. The value of -0.30287 shows when X_3 increases by 1 unit and X_1, X_2, X_4, X_5, X_6, X_7 are constant, then commercial bank's return on equity will decrease by 0.30287.
5. Coefficient regression value of operational efficiency explains that operational efficiency has a contrary relationship with return on equity. The value of -0.52640 shows when X_4 increases by 1 unit and X_1, X_2, X_3, X_5, X_6, X_7 are constant, then commercial bank's return on equity will decrease by 0.52640.
6. Coefficient regression value of inflation rate explains that inflation rate has a parallel relationship with return on equity. The value of 0.51960 shows when X_5 increases by 1 unit and X_1, X_2, X_3, X_4, X_6, X_7 are constant, then commercial bank's return on equity will increase by 0.51960.
7. Coefficient regression value of interest rate risk explains that interest rate risk has a contrary relationship with return on assets. The value of -0.06409

shows when X_6 increases by 1 unit and X_1, X_2, X_3, X_4, X_5, X_7 are constant, then commercial bank's return on equity will decrease by 0.06409.

8. Coefficient regression value of foreign exchange rate explains that foreign exchange rate has a parallel relationship with return on equity. The value of 0.04684 shows when X_7 increases by 1 unit and X_1, X_2, X_3, X_4, X_5, X_6 are constant, then commercial bank's return on equity will increase by 0.04684.

4.1.4 Hypothesis Testing

Coefficient of Determination (R^2)

Coefficient of determination was used to measure the capability of the regression model acquired from selected independent variables to explain the dependent variable. Below are the results obtained from both models.

Table 4.8. Coefficient of Determination

Model	R-Squared
Model 1 (Y: ROA)	0.8696
Model 2 (Y: ROE)	0.8247

(Source: Processed Data)

From table 4.8 above, it can be summarized that on model 1, 86.96% of return on assets can be explained by 7 selected independent variables, whereas the other 13.04% is influenced by other factors outside of the selected independent variables. For model 2, those selected independent variables are able to explain 82.47% of the portion of return on asset, whereas the other 17.53% is influenced by other factors outside of the selected independent variables.

Adjusted Coefficient of Determination (Adjusted R^2)

Adjusted R^2 was used to determine whether adding additional independent variables will actually improve the predictor capability of a regression model or not. This test fully considers the number of independent variables and the amount of sample data used to make regression model. This will solve the existing drawbacks of R-squared. Below are the results obtained from both models.

Table 4.9. Adjusted R^2

Model	Adjusted R^2
Model 1 (Y: ROA)	0.8586
Model 2 (Y: ROE)	0.8099

(Source: Processed Data)

From table 4.9 above, it can be summarized that on model 1, 85.86% of return on assets can be explained by 7 selected independent variables, whereas the other 14.14% is influenced by other factors outside of the selected independent variables. For model 2, those selected independent variables are able to explain 80.99% of the portion of return on asset, whereas the other 19.01% is influenced by other factors outside of the selected independent variables.

Simultaneous Test (F-test)

F-test was used to examine whether there is a simultaneous relationship between all independent variables and dependent variable. Below are the simultaneous test results for both models.

Table 4.10. F-test

Model	F-Statistic	P-Value
Model 1 (Y: ROA)	79.06	2.2e-16
Model 2 (Y: ROE)	55.78	2.2e-16

(Source: Processed Data)

From table 4.10 above, it can be seen that model 1 has p-value of 2.2e-16 in which is smaller than the significance level of 0.05. In addition, the F-statistic for model 1 is higher than the critical value of 2.122 obtained from F-distribution table. In conclusion, all 7 independent variables have simultaneous relationship towards return on asset of commercial banks during 2012 to 2021.

Moreover, model 2 also has p-value of 2.2e-16 in which is smaller than the significance level of 0.05 and the F-statistic for model 2 is higher than the critical

value of 2.122 obtained from F-distribution table. In conclusion, all 7 independent variables also have simultaneous relationship towards return on equity of commercial banks during 2012 to 2021.

Partial Test (T-test)

T-test was used to examine whether there is a relationship between each of independent variables and the dependent variable. Below are the partial test results for model 1.

Table 4.11. Model 1 T-test

Variable	T-Statistic	P-Value
Intercept	7.351	1.25e-10
CR	-1.339	0.18409
LIQ	2.795	0.00645
CAR	1.392	0.16750
OE	-16.342	2e-16
INF	2.470	0.01554
IR	-0.682	0.49696
FX	-0.678	0.49939

(Source: Processed Data)

From table 4.11 above, it can be concluded that for model 1:

a) Credit risk has a p-value of 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, therefore accepting H_0 that credit risk does not have significant relationship on commercial bank's return on asset.
b) Liquidity risk using loan to deposits ratio has a p-value of 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, therefore accepting H_1 that loan to deposit ratio does have significant relationship on commercial bank's return on asset.
c) Liquidity risk using capital adequacy ratio has a p-value of 0.16750 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, therefore accepting H_0 that capital adequacy ratio does not have significant relationship on commercial bank's return on asset.

d) Operational efficiency has a p-value of 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, therefore accepting H_1 that operational efficiency does have significant relationship on commercial bank's return on asset.

e) Inflation rate has a p-value of 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, therefore accepting H_1 that inflation rate does have significant relationship on commercial bank's return on asset.

f) Interest rate risk has a p-value of 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, therefore accepting H_0 that interest rate risk does not have significant relationship on commercial bank's return on asset.

g) Foreign exchange rate has a p-value of 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, therefore accepting H_0 that foreign exchange rate does not have significant relationship on commercial bank's return on asset.

Below are the partial test results for model 2.

Table 4.12. Model 2 T-test

Variable	T-Statistic	P-Value
Intercept	7.202	2.47e-10
CR	-1.416	0.1605
LIQ	-1.213	0.2284
CAR	-2.470	0.0156
OE	-11.101	2e-16
INF	2.462	0.0159

IR	-0.750	0.4555
FX	0.873	0.3851

(Source: Processed Data)

From table 4.12 above, it can be concluded that for model 2:

a) Credit risk has a p-value of 0.1605 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, therefore accepting H_0 that credit risk does not have significant relationship on commercial bank's return on equity.
b) Liquidity risk using loan to deposits ratio has a p-value of 0.2284 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, therefore accepting H_0 that loan to deposit ratio does not have significant relationship on commercial bank's return on equity.
c) Liquidity risk using capital adequacy ratio has a p-value of 0.0156 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, therefore accepting H_1 that capital adequacy ratio does have significant relationship on commercial bank's return on equity.
d) Operational efficiency has a p-value of 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, therefore accepting H_1 that operational efficiency does have significant relationship on commercial bank's return on equity.
e) Inflation rate has a p-value of 0.0159 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, therefore accepting H_1 that inflation rate does have significant relationship on commercial bank's return on equity.
f) Interest rate risk has a p-value of 0.4555 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, therefore accepting H_0 that interest rate risk does not have significant relationship on commercial bank's return on equity.

g) Foreign exchange rate has a p-value of 0.3851 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, therefore accepting H_0 that foreign exchange rate does not have significant relationship on commercial bank's return on equity.

4.1.5 Significant Variable Regression Model

Following the results obtained from both regression model 1 and 2, some variables are proven to have a significant relationship while the other does not. Below are the regression models using only the significant independent variables.

$$ROA = 0.07899 + 0.01528\ LIQ + 0.03017\ CAR - 0.10139\ OE + 0.06694\ INFL \quad (4.3)$$

and

$$ROE = 0.61727 - 0.02674\ LIQ - 0.24646\ CAR - 0.57050\ OE + 0.67725\ INFL \quad (4.4)$$

Comparing the regression models in (4.1) with (4.3), as well as (4.2) with (4.4). The results interpretation shows no difference for the relationship of each proven significant independent variables.

Coefficient of Determination (R^2 and Adjusted R^2)

The test results below define the capability of the variance in independent variables to explain the variance in the dependent variable.

Table 4.13. R^2 Significant Independent Variable

Model	R-Squared
ROA	0.866
ROE	0.8174

Table 4.14. Adjusted R^2 Significant Independent Variable

Model	Adjusted R^2
ROA	0.8598
ROE	0.8089

Comparing the test results in table (4.13) with (4.8), as well as (4.14) with (4.9). The test results show no significant decreases in both model's R^2 and adjusted R^2. Hence proofing that the majority of variance in dependent variables are being influenced significantly by the newly selected four independent variables.

4.2 Discussion of Findings

According to the results explained in subchapter 4.1 Data Analysis, it can be summarized that:

In relation to commercial bank's return on asset:

1. Credit risk in model 1 acquired a p-value of 0.18409 and the T-statistic of -1.339 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of -0.074386 explains that credit risk has negative relationship with ROA. Summarizing these results, credit risk has negative insignificant relationship with commercial bank's ROA.
2. Liquidity risk using loan to deposit ratio in model 1 acquired a p-value of 0.00645 and the T-statistic of 2.795 which resulting a conclusion of rejecting null hypothesis. In addition, coefficient regression value of 0.013241 explains that loan to deposit ratio has positive relationship with ROA. Summarizing these results, liquidity risk using loan to deposit ratio has positive significant relationship with commercial bank's ROA.
3. Liquidity risk using capital adequacy ratio in model 1 acquired a p-value of 0.16750 and the T-statistic of 1.392 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of 0.021291 explains that capital adequacy ratio has positive relationship with ROA. Summarizing these results, liquidity risk using capital adequacy ratio has positive insignificant relationship with commercial bank's ROA.

4. Operational efficiency in model 1 acquired a p-value of 2e-16 and the T-statistic of -16.342 which resulting a conclusion of rejecting null hypothesis. In addition, coefficient regression value of -0.096625 explains that operational efficiency has negative relationship with ROA. Summarizing these results, operational efficiency has negative significant relationship with commercial bank's ROA.
5. Inflation rate in model 1 acquired a p-value of 0.01554 and the T-statistic of 2.470 which resulting a conclusion of rejecting null hypothesis. In addition, coefficient regression value of 0.065018 explains that inflation rate has positive relationship with ROA. Summarizing these results, inflation rate has positive significant relationship with commercial bank's ROA.
6. Interest rate risk in model 1 acquired a p-value of 0.49696 and the T-statistic of -0.682 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of -0.007271 explains that interest rate risk has negative relationship with ROA. Summarizing these results, interest rate risk has negative insignificant relationship with commercial bank's ROA.
7. Foreign exchange in model 1 acquired a p-value of 0.49939 and the T-statistic of -0.678 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of -0.004537 explains that foreign exchange has negative relationship with ROA. Summarizing these results, foreign exchange has negative insignificant relationship with commercial bank's ROA.

In relation to commercial bank's return on equity:

1. Credit risk in model 2 acquired a p-value of 0.1605 and the T-statistic of -1.416 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of -0.63074 explains that credit risk has negative relationship with ROE. Summarizing these results, credit risk has negative insignificant relationship with commercial bank's ROE.

2. Liquidity risk using loan to deposit ratio in model 2 acquired a p-value of 0.2284 and the T-statistic of -1.213 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of -0.04610 explains that loan to deposit ratio has negative relationship with ROE. Summarizing these results, liquidity risk using loan to deposit ratio has negative insignificant relationship with commercial bank's ROE.
3. Liquidity risk using capital adequacy ratio in model 2 acquired a p-value of 0.0156 and the T-statistic of -2.470 which resulting a conclusion of rejecting null hypothesis. In addition, coefficient regression value of -0.30287 explains that capital adequacy ratio has negative relationship with ROE. Summarizing these results, liquidity risk using capital adequacy ratio has negative significant relationship with commercial bank's ROE.
4. Operational efficiency in model 2 acquired a p-value of 2e-16 and the T-statistic of -11.101 which resulting a conclusion of rejecting null hypothesis. In addition, coefficient regression value of -0.52640 explains that operational efficiency has negative relationship with ROE. Summarizing these results, operational efficiency has negative significant relationship with commercial bank's ROE.
5. Inflation rate in model 2 acquired a p-value of 0.0159 and the T-statistic of 2.462 which resulting a conclusion of rejecting null hypothesis. In addition, coefficient regression value of 0.51960 explains that inflation rate has positive relationship with ROE. Summarizing these results, inflation rate has positive significant relationship with commercial bank's ROE.
6. Interest rate risk in model 2 acquired a p-value of 0.4555 and the T-statistic of -0.750 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of -0.06409 explains that interest rate risk has negative relationship with ROE. Summarizing these results, interest rate risk has negative insignificant relationship with commercial bank's ROE.
7. Foreign exchange in model 2 acquired a p-value of 0.3851 and the T-statistic of 0.873 which resulting a conclusion of accepting null hypothesis. In addition, coefficient regression value of 0.04684 explains that foreign

exchange has positive relationship with ROE. Summarizing these results, foreign exchange has positive insignificant relationship with commercial bank's ROE

CHAPTER V

CONCLUSION & RECOMMENDATION

5.1 Conclusion

This research was conducted to examine the impact of financial risks towards profitability of Indonesian commercial banks. To accomplish this objectives, Indonesian macroeconomic data with the addition of financial data from ten commercial banks from 2012 to 2021 were collected and analyzed. The analyses were made using multiple linear regression analysis in accordance with the specific research question stated in chapter 1. Dependent and independent variables were selected by referring previous empirical research that have been conducted on banks profitability and financial risks.

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

- Independent variables in both model was shown to be able to explain more than 80% of the dependent variable's variance.
- Credit risk was shown to have an insignificant negative relationship with both commercial bank's ROA and ROE.
- Liquidity risk using loan to deposit ratio as the metrics was shown to have a significant positive relationship with commercial bank's ROA. On the other hand, this metric was shown to have an insignificant negative relationship with commercial bank's ROE.
- Liquidity risk using capital adequacy ratio as the metrics was shown to have an insignificant positive relationship with commercial bank's ROA. On the other hand, this metric was shown to have a significant negative relationship with commercial bank's ROE.
- Operational risk was shown to have a significant negative relationship with both commercial bank's ROA and ROE.

- Inflation rate was shown to have a significant positive relationship with both commercial bank's ROA and ROE.
- Interest rate risk was shown to have an insignificant negative relationship with both commercial bank's ROA and ROE.
- Foreign exchange was shown to have an insignificant negative relationship with both commercial bank's ROA and ROE.

5.2 Recommendation

In line with the research's findings, the following suggestions have been proposed:

5.2.1 For Commercial Bank

The results obtained from the regression analysis may have indicated that among all financial risks that were used in this research, the major factor that can affect both commercial bank's ROA and ROE was operational risks and inflation. Since liquidity risk is divided into 2 metrics, there are two significant distinctions relationship with each dependent variable. Loan to deposit ratio has a significant affect to commercial bank's ROA but an insignificant affect to bank's ROE. On the other hand, capital adequacy ratio has a significant affect to bank's ROE but an insignificant affect to bank's ROA.

As a result, it is strongly advised that Indonesian commercial banks minimize the operational expenses in order to improve their profitability. Furthermore, management also needs to steadily increase risk weighted assets, as it is shown to be an opportunity to improve bank's ROE. Lastly, increasing loan to deposit ratio will also help improve bank's ROA. While credit risk was proved to be insignificant towards commercial bank's profitability in this research, it is still necessary for management to keep the exposure within organization's acceptable limit as it is assumed to have negative impact. Indonesian commercial banks also have to monitor the current movement on inflation rate as it is shown to have a significant positive relationship with bank's profitability.

5.2.2 For Future Researcher

Due to the time constraints of the research and the researcher's limited understanding, as well as the scope and limitation of this study, future research may be conducted in one of the following ways, among others:

1. Analyzing the relationship between independent and dependent variables used in this research with banking profitability in the most recent period.
2. Comparing the results obtained from BUKU 4 Banks which were used as a sample to the other BUKU Banks as the upcoming sample.
3. Using other internal and external financial risks as the independent variables to analyze their relationship with commercial bank’s profitability.
4. Using a different metrics, indicators, or ratios which represents the respective financial risks.