THE ROLE OF ASSET QUALITY, LIQUIDITY RISK, LOW COST FUNDS, AND SUSTAINABLE BONDS AS DETERMINANTS OF NET INTEREST MARGIN, WITH LOAN GROWTH AS THE MODERATING VARIABLE:

A Case Study on Big-Size and Mid-Size Conventional Banks in Indonesia from 2017 - 2023

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We hereby declare that this Thesis is from the student's own work, has been read and presented to Sekolah Tinggi Manajemen IPMI Board of Examiners, and has been accepted as part of the requirements needed to obtain a Bachelor of Business Administration Degree and has been found to be satisfactory.

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NON-PLAGIARISM DECLARATION FORM

This Thesis is a presentation of our original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgment of collaborative research and discussions.

Also, this work is being submitted in partial fulfilment of the requirements for the Bachelor of Business Administration degree and has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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ABSTRACT

This study examined the role of asset quality, liquidity risk, low cost fund, and sustainable bonds as determinants of net interest margin, with loan growth as the moderating variable. The research object is mid-size and big-size banks listed on the Indonesian Stock Exchange (IDX) during the 2017-2023 period. Data were collected from 13 banking companies that fall under the category of KBMI III and KBMI IV. This study was carried out using a panel data regression model with a total of 91 observations. According to the test, it suggest the author to use Fixed Effect Model (FEM) for the parameter estimation. The study confirms that the net interest margin can be significantly influenced by liquidity risk and low cost fund, where both of which have a negative effect on the net interest margin. On the other hand, asset quality and sustainable bonds were stated to have no significant influence on net interest margin. Additionally, this study found that loan growth was not capable of moderating the relationship between net interest margin and the determinant factors, due to its insignificant effect. These findings are expected to shed light on the mixed findings of previous research and offers new insight on the specific topic of determinant factors of net interest margin.

Keywords: Net Interest Margin, Asset Quality, Liquidity Risk, Low Cost Fund, Sustainable Bonds, Loan Growth, Panel Data.

CHAPTER I

INTRODUCTION

1.1. Background

The banking sector becomes the backbone of a country's economy, acting as a vital intermediary that fuels growth and development. Through its core functions of mobilizing and allocating resources, facilitating domestic and international trade, and enhancing the mobility of capital, banks significantly contribute to the prosperity of various sectors like trade, industry, agriculture, and commerce (Sharma & Sharma, 2014). A stable and efficient banking system acts as the circulatory system of the economy, ensuring smooth financial transactions and fostering an environment conducive to business expansion and investment (Khairullah & Rosita, 2022). The undeniable impact of the banking sector on a country's economic health necessitates close attention from policymakers. They play a crucial role in implementing regulations that promote stability and efficiency within the banking industry, thereby safeguarding the financial system and ultimately, the economic well-being of the nation.

Banking companies constantly adapt to meet the evolving financial needs of society. They perform the critical function of collecting public funds and strategically redistributing them as credit to those who require it. This process facilitates the smooth flow of money within the economic system, fostering a more favorable environment for businesses to thrive. Beyond their function as intermediaries ensuring efficient payment systems, banks hold another significant responsibility, which is to act as an instrument for implementing government policies, particularly monetary policy. The relation between a healthy banking system and a robust national economy highlights the importance of maintaining the financial well-being of individual banks and the banking system as a whole.

When viewed from the perspective of the capital market, the Indonesian Stock Exchange (IDX) Composite Index – which reflects the performance of all listed stocks – is heavily influenced by the financial sector. Data from Stock Up Indonesia (as of January 2024) reveals the financial sector's dominance with a staggering 37.6% share, far exceeding other sectors like basic consumer goods (12.7%), infrastructure (12.6%), and energy (10.7%). Furthermore, four major Indonesian banks – Bank BCA, Bank BRI, Bank Mandiri, and Bank BNI – significantly impacted the IDX Composite, ranking among the top 10 driving companies. Notably, Bank BCA, Bank BRI, and Bank Mandiri hold the top three positions with respective shares of 9.3%, 9.2%, and 8.4%.

Due to its very important function and contribution to maintaining the country's economic stability, therefore, every country continues to strive to maintain banking in a healthy, safe and stable condition. Banking policy basically aims to support the implementation of development in order to increase economic growth and national stability towards improving community welfare. Banking policies are also directed at making banks healthy, both individually and nationally. Therefore, banking health and performance is an important aspect that needs to be considered. Moreover, knowing that in recent years there have been various kinds of issues or conflicts, most of which have resulted in quite a significant impact on banking companies and the sector as a whole. Many of them ultimately could not survive during that time, experienced financial distress and even ended up in bankruptcy.

One case that has become a hot topic of discussion in recent years is the bankruptcy of one of the largest banks in the United States, namely Silicon Valley Bank (SVB). This could occur due to the global economic turmoil that took place in early 2023. Initially, there was an increase in the money supply because the Fed injected money into the economy, which led to an increase in liquidity. This initiative was carried out with the aim of keeping interest rates low, which in turn allowed bond prices to rise. This was the trigger that encouraged SVB to invest its funds in government bonds, especially after the statement from the Fed that interest rates would be kept low.

However, in reality, things did not go according to the scenario. At that time there was a high spike in inflation rates, which caused interest rates to move in line with this increase. As interest rates increase, bond prices fall at that time. Therefore, the SVB portfolio experienced a very significant decline. This was made worse by several SVB customers who withdrew their deposits due to the sudden need for fresh capital. This triggered a wave of deposit withdrawals from SVB, which caused the company's cash balance to become negative. This resulted in the emergence of negative sentiment, and ultimately led to a bank run because many people withdrew their money from SVB.

The Indonesian economy might have also significantly impacted by the instability in the global economy. Massive sales of stocks and debt securities may result from the restoration of substantial sums of money during an economic crisis. As a result of this circumstance, the prices of debt instruments and stocks decline, which lowers the stock price index. Debt instruments that pay a fixed income, will see a spike in interest rates. A fall in share prices will result in capital losses, which will reduce the capital and capital adequacy ratio of the business. This may result in a sharp increase in demand for dollars and a decrease in trust in the domestic market, lifting the dollar's value relative to the rupiah. In addition to being directly caused by the previously mentioned withdrawal of funds, the depreciation of the rupiah may worsen because its rate of depreciation is higher than that of other currencies besides the US dollar. Due to this circumstance, dollars become more scarce and consequently more in demand, which drives up the price of dollars.

Changes in exchange rates will affect rising prices or high inflation and provide a rational foundation for the expectation of high inflation to continue to emerge, which will be fulfilled in rising prices or inflation that keeps escalating. This circumstance makes the decision to convert rupiah to dollars seem desirable. Therefore, under these circumstances, every economic scenario has the potential to make the rupiah's exchange rate against the US dollar worse. Furthermore, public funds may shift to foreign and high-quality domestic banks through currency substitution due to

fluctuations in exchange rates and forecasts of a significant depreciation of the rupiah. This may cause bank debtors to face difficulty in running their businesses, which will make it difficult for them to pay the bank's principal and interest. Consequently, banks encounter challenges with liquidity, which raises the cost of financing and prevents banks from meeting their commitments to third parties.

The same is the case with the economic turmoil in Indonesia in 2023. Operating costs in banking likewise increase in tandem with inflation. Costs associated with interest, administration, and other bank operations are included in this. Cost increases have the potential to lower bank profit margins, thereby increasing the risk of loan default by the bank. On top of that, Bank Indonesia raised interest rates in response to growing inflation. An increase in interest rates can make borrowing more expensive for borrowers, which will make loan repayment more challenging for them. Given that more borrowers were unable to make their loan payments, banks were forced to accept an increase in the percentage of non-performing loans (NPL).

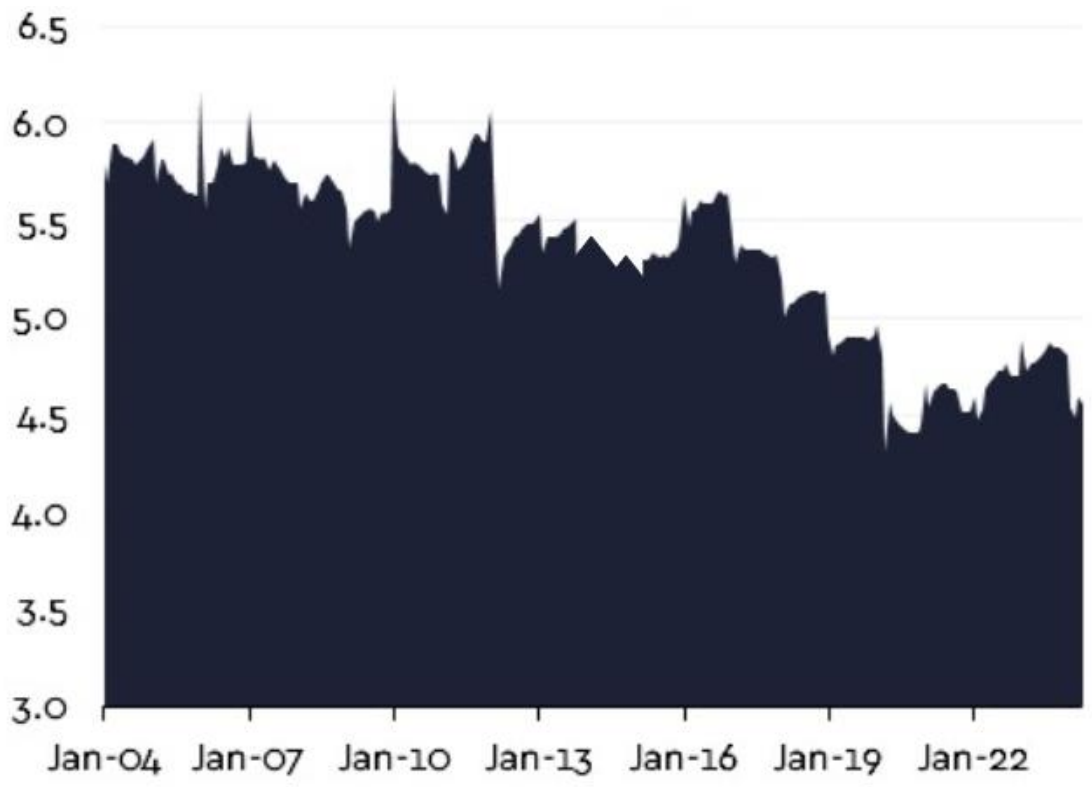
If the banking industry is built on trust, then this is something that needs to be considered. As a financial entity that offers trust and services, banks persistently endeavor to draw in clients and investors, augment their capital, and expand their credit and service offerings, all with the aim of elevating the banking industry's prominence and strategic importance. An economy that wishes to expand and thrive must have a large number of financially healthy banks, both as a system and as individuals. However, a slowdown in investment activity and economic growth may arise from any disturbance of the financial intermediation function in Indonesia, whether brought on by geopolitical difficulties, economic turbulence, or recession. Despite the importance and significance banks play in a nation, there is still a chance that they will face challenges in carrying out their daily operations. The performance of the bank itself is one of the challenges that banks are powerless to overcome. As a result, determining whether or not a bank is doing healthily is crucial.

The enhanced level of efficiency and profitability, which is evident from the likewise raised level of capital, demonstrates the performance and health of banking from year to year (Diko, 2019). The recent global financial turmoil has demonstrated that banks are assessed based on how well they are able to absorb or amplify the effects of shocks to the real economy. The banking industry needs sufficient capital to sustain the degree of financial stability and economic growth, and this can be achieved with a high level of profitability (Angori et al., 2019). A bank's performance will be reflected in its profitability, which makes it crucial to have a decent level of profitability while evaluating the state of the banking industry. Knowing that the interest income from borrowers and the interest expenses paid by depositors are their main sources of income, thus, net interest margin, or NIM, is a key metric for assessing the profitability and risk-reduction tactics of banks (Dwitanto et al., 2023).

The NIM is one way to gauge the degree of profitability in the banking industry. The difference between the interest earned from loans and the interest paid to customers who deposit their funds with the bank is computed using net interest margin, or NIM. The effectiveness of financial intermediation will be shown by the NIM level and dynamics. Pham & Vo (2017) state that NIM is a fundamental measure for evaluating the efficacy and profitability of a bank, since it accounts for between 70% and 80% of bank revenue; hence, a bank's income would rise as this ratio rises. Furthermore, it is important to remember that banks are not the only participants in the financial services sector. The increasing number of underbanked individuals has led to the rise in prominence of non-bank financial firms. It is possible to gain insight into how banks modify their strategies, product offerings, and risk management procedures in order to stay competitive by looking at NIM in light of the prominence of non-bank financial institutions (Dwitanto et al., 2023). Thus, NIM continues to be a crucial indicator for evaluating the performance and financial health of banks.

The Financial Services Authority in Indonesia – *Otoritas Jasa Keuangan (OJK)* – reported that, as of the end of 2022, the average NIM for the banking sector was 4.80%. The average bank NIM increased to 4.92% by the end of 2023, confirming its

status as one of the highest in Southeast Asia. It has been noted that Indonesian banks' NIM positions have remained steady at 4% throughout the previous year. As a matter of fact, Indonesia came in second place in Southeast Asia in May 2023 with a NIM of 4.88%. As per OJK's most recent data, the banking NIM for January 2024 was 4.54%, a little decrease from the previous month. High loan interest rates seemed to be the cause of the thick NIM stance. According to Bank Indonesia, in September 2023, the weighted average interest rate on banking loans was 9.36%. In the meantime, a 12-month tenor's deposit interest rate is a mere 5.02%.



Source: Sucor Sekuritas

Figure 1. 1 Average NIM in Indonesia from 2004-2023

In Indonesia, several banks are still able to report high NIM ratios. In fact, the bank's NIM is comparatively high when measured against the area. A wide NIM typically denotes strong bank profits. On the one hand, banks should be pleased when they make large profits, but when those earnings are fueled by high NIMs, banks will

find it harder to extend credit quickly. This is due to the fact that high credit interest rates will make financing less popular. According to Mediatama (2023), Banking Analyst, Paul Sutaryono, argues that banks ought to be permitted to lower their NIM due to their high NIM position. This is so that the increase in credit interest rates will not be excessively high due to the reduction in NIM. Even though it is correct to say that a high NIM ratio indicates a good bank profitability. However, when it comes to Indonesia, other expenses like credit and overhead must also be taken into account. These prices are substantial and come with hazards. It is crucial to keep in mind that the higher NIM of Indonesian banks relative to those in other nations may potentially be the result of less competitive and efficient market circumstances.

Therefore, it is deemed necessary to conduct research on what factors can cause NIM fluctuations, so that it can produce insights to maintain healthy NIM levels. In general, there are several factors that shape a bank's NIM, from internal factors (management), to external factors such as the industrial climate (market concentration) and macro factors (inflation rate and economic growth). If specifically focused on internal aspects, there are several factors that can be pointed out, one of which is the quality of asset, which can be measured by the level of the non-performing loans (NPL) ratio of a bank. The NPL ratio is used as a tool to measure the level of credit risk carried by a bank. Customers' inability to complete their commitments within the allotted time frame gives rise to credit risk itself. This risk will be higher if the bank is unable to expand or enhance the quality of credit that it extends, as banks essentially spend a portion of their reserves in credit with the goal of boosting earnings. Since NPL can determine a bank's capacity to pay back the bad loans it encounters, it is referred to as a ratio to evaluate credit risk. The bank is taking on less risk if this percentage is low. Vice versa, if it gets bigger, it means the problem loans faced by the bank are also bigger and this will create a negative impact on the bank's profits. Bank Indonesia has determined that the NPL ratio is still considered healthy if it does not exceed 5%.

Liquidity risk may have also created an impact on NIM. Loan-to-deposit ratio (LDR) is a metric used to quantify a bank's level of liquidity risk. A bank's ability to

use its liquid assets to meet its depositor obligations can be demonstrated by its liquidity risk. When money is disbursed in the form of credit and is higher than what the public deposits or saves at a bank, it frequently fails to perform its obligations. Both the liability side and the asset side of a bank's balance sheet may be vulnerable to this risk. Regarding liabilities, the amount of withdrawals from deposits is undetermined. Large-scale withdrawals of deposits might spell disaster for the bank. On the other hand, delays in debtor payments might lead to liquidity issues on the asset side. As a result of LDR's ability to display the percentage of total money acquired from clients (third party funds) that the bank channels through loans, it is believed to be a ratio to monitor liquidity risk. There are less funds available to meet short-term requirements like withdrawing client funds when the LDR is higher, and a larger percentage of funds are funneled through loans. This suggests a greater risk to liquidity as, in the event of a significant fund withdrawal, banks might not be able to accommodate clients' requests. A good LDR ratio for banks is found to be between 78% and 100%, according to Bank Indonesia.

Furthermore, there is also a factor of low cost funds, that can be measured by current account savings account (CASA) ratio. Apart from being used to measure liquidity risk, CASA can be used to manage funding and market risks that a bank may encounter. An overview of the potential financial losses the business may experience as a result of using debt or other financial resources, is given by funding risk. In other words, funding risk results from a company's reliance on outside financial sources to support its operations. Banks that have a high enough CASA can reduce their reliance on debt, hence reducing their exposure to market risk, which takes the shape of interest rate changes. Because rising market interest rates have the potential to raise bank interest costs, which would ultimately lower profitability. Due to the nature of CASA as an inexpensive fund with generally lower interest rates than term funds, it is claimed to be able to control funding risk. As a result, banks with high CASA can reduce funding costs and eventually boost profitability. A significant portion of CASA is helpful in mitigating market risk because of its insensitivity to fluctuations in market

interest rates. Therefore, having a high CASA can lessen the chance that a drop in market interest rates will result in a drop in interest income for banks.

In connection with the increasing topic of sustainability, which currently acts as one of the considerations in determining the feasibility of a business, it is felt that the presence of sustainability bonds in a bank can have an impact on the level of profitability. Having more or less the same function as CASA, to manage funding risk, makes sustainable bonds another option for banks to obtain cheap funds. Commitment to sustainability can be an attraction and competitive advantage for companies to attract more customers and business partners. This can be a strategy to increase access to capital, by attracting new investors, especially investors who focus on sustainable investment. Investors who value sustainable business practices will be more willing to lend money to companies at lower interest rates. Obviously, this can provide its own benefits for banks to be able to increase their level of profitability. Bearing in mind that lower cost of funds can increase the proportion of NIM that will be obtained by banks. In addition, supposedly there is also an influence of loan growth issued by a bank. As credit increases, banks have more borrowers paying interest on their loans. Banks can reduce the average cost per loan by spreading their operating costs across a larger number of customers due to credit/loan growth. This can undoubtedly boost net interest income – the primary component of NIM – and bank efficiency. Banks can lower credit risk and improve income stability by diversifying their credit portfolio. Long-term stability in NIM can be sustained by banks using this.

Therefore, based on the background description above, the author is interested in conducting research with the title "**The Role of Asset Quality, Liquidity Risk, Low Cost Funds, and Sustainable Bonds as determinants of Net Interest Margin, with Loan Growth as the Moderating Variable: A Case Study on Big-Size and Mid-Size Conventional Banks in Indonesia from 2017 - 2023**".

1.2. Problem Statements and Research Gap

From the background that has been described, in-depth analysis of company performance is essential, particularly within the banking sector. The information obtained is able to serve as a valuable metric in assessing a bank, and can be utilized as decision making material, whether for decision to become a customer or evaluating investment opportunities. One of the key indicators that can be used as a relevant benchmark to assess a bank's health and performance is its net interest margin (NIM). Besides, this aspect could also be influenced by several other factors, including the asset quality, liquidity risk, low cost funds, and even the composition of the bank's sustainable bonds.

However, after conducting research on other studies related to the topic, there is a research gap in previous studies, where differences in results were found on the four factors above. In research regarding the effect of NPL on NIM, there are differences between the research of Putra (2019) and Soares (2018). According to Putra (2019), the NPL factor negatively influences NIM, while research by Soares (2018) states that the level of NPL has a positive but insignificant effect on NIM. There are also differences in research regarding the influence of LDR on NIM, where in Widi & Aini's (2017) research, it was found that the LDR has no significant positive effect on the NIM. However, according to Setiawan & Wisna (2021), LDR has a positive significant influence on NIM.

Other than that, past research on the relationship between the CASA and NIM also presents conflicting findings. Wahyudin's (2021) study concluded a positive influence, suggesting a higher CASA ratio leads to a higher NIM. Conversely, Janakiraman's (2018) research found no significant impact of CASA on NIM, highlighting the need for further investigation in this area. Similarly, the influence of sustainable bonds on NIM remains unclear. Tang & Zhang's (2018) research concluded a neutral effect, suggesting sustainable bonds/green bonds do not meaningfully influence NIM. However, Alonso-Conde & Rojo-Suárez (2020) found a positive

influence of green bonds on NIM, highlighting the need for further exploration to resolve this divergence in findings.

It is the inconsistency of the results from one research paper with another that encourages further research on the effect of NPL, LDR, CASA and sustainable bonds on NIM. Also, as far as the author knows, there are rarely any studies attempting to explain the mixed findings. Hence, the author suggests that loan growth acts as a moderator in the relationship between NIM and the four variables: LDR, NPL, CASA, and sustainable bonds. Economic progress depends heavily on the expansion of credit in the banking sector, but this growth must be carefully controlled to prevent unfavorable outcomes. Previous studies have shown that loan growth has a significant impact on bank profitability (Antoshin et al., 2017; Kohlscheen & Contreras, 2018). By including loan growth as a moderating variable, this study aims to determine varied effects of LDR, NPL, CASA, and sustainable bonds on NIM. To be more specific, this research will examine companies in the banking sector that are listed on the Indonesia Stock Exchange and included in the list of KBMI III and KBMI IV banks, with the time period of 2017 - 2023.

1.3. Research Questions

Judging from the problem above, the research questions that can be formulated are as follows:

1. How does Asset Quality affect Net Interest Margin (NIM)?
2. How does Liquidity Risk affect Net Interest Margin (NIM)?
3. How does Low Cost Funds affect Net Interest Margin (NIM)?
4. How does Sustainable Bonds affect Net Interest Margin (NIM)?
5. How does Loan Growth moderate the effect of Asset Quality on Net Interest Margin (NIM)?

6. How does Loan Growth moderate the effect of Liquidity Risk on Net Interest Margin (NIM)?
7. How does Loan Growth moderate the effect between Low Cost Funds on Net Interest Margin (NIM)?
8. How does Loan Growth moderate the effect of Sustainable Bonds on Net Interest Margin (NIM)?

1.4. Research Objectives

Based on the formulation of the research problem that has been presented above, the purpose of this study is as follows:

1. To analyze the effect of Asset Quality on Net Interest Margin (NIM)
2. To analyze the effect of Liquidity Risk on Net Interest Margin (NIM)
3. To analyze the effect of Low Cost Funds on Net Interest Margin (NIM)
4. To analyze the effect of Sustainable Bonds on Net Interest Margin (NIM)
5. To analyze how Loan Growth moderate the effect of Asset Quality on Net Interest Margin (NIM)
6. To analyze how Loan Growth moderate the effect of Liquidity Risk on Net Interest Margin (NIM)
7. To analyze how Loan Growth moderate the effect of Low Cost Funds on Net Interest Margin (NIM)
8. To analyze how Loan Growth moderate the effect of Sustainable Bonds on Net Interest Margin (NIM)

1.5. Research Benefit

This research aspires to contribute valuable insights that can benefit a diverse range of stakeholders. The benefits that can be obtained from this research are as follows:

1. Academic

   The benefit of this research is to expand knowledge in the banking literature discussing different types of KBMI banks. This study exclusively compares the impact of asset quality, liquidity risk, low cost funds, and sustainable bonds of the two biggest KBMI groups – KBMI III and KBMI IV – on net interest margin (NIM). Furthermore, it can be used as reference material and provide insight and information to contribute to the development of science and the nation's economy, especially in terms of banking. Therefore, this study can later be a reference for future studies.

2. Practitioner

   By analyzing the performance and health of KBMI III and KBMI IV banks during the observed period, this study offers valuable insights for banking industry practitioners. The knowledge can be leveraged to develop targeted strategies that enhance the financial well-being and operational effectiveness of these institutions. In essence, the study empowers practitioners to make data-driven decisions that optimize performance and ensure the continued strength of KBMI III and KBMI IV banks.

3. Public

   This study serves as a crucial reference point for analyzing company performance within the banking sector, specifically through the lens of net interest

margin (NIM). By incorporating these insights, investors/public can conduct more comprehensive assessments of banks, ultimately leading to informed investment decisions in related companies.

1.6. Research Limitations

To ensure data consistency and generalizability, this study exclusively focuses on conventional publicly listed banks classified under the KBMI III and KBMI IV categories in Indonesia. Furthermore, the analysis is restricted to banks that possess a complete annual report encompassing a five-year timeframe, ranging from 2017 to 2023. It is crucial to note that the scope of this study is confined to evaluating six variables, including: 1) Asset quality, 2) Liquidity risk, 3) Low cost funds, 4) Sustainable bonds, 5) Loan growth, and 6) Net interest margin (NIM).

1.7. Research Outline

This research consists of five chapters analyzing the effect of Asset Quality, Liquidity Risk, Low Cost Funds, and Sustainable Bonds on Net Interest Margin (NIM). Each chapter consists of several sub-chapters and the systematic outline of the writing is as follows:

1. Chapter 1: Introduction

   This opening chapter serves as a foundation for the entire research project. It establishes the context by explaining the background problem that motivated this research. Following this, the chapter defines the specific problem statement and identifies any gaps in knowledge left by previous studies. The research objectives and the anticipated benefits of conducting this study are then presented. Finally, the chapter concludes by acknowledging any limitations inherent to the research design and provides a roadmap, outlining the content covered in each subsequent chapter.

2. Chapter 2: Literature Review

The second chapter will dive into the theoretical foundation of this research. It explores established theories related to bank, focusing on key concepts such as the Net Interest Margin (NIM), Loan Growth, Asset Quality, Liquidity Risk, Low Cost Funds, and Sustainable Bonds. By drawing insights from relevant prior research, this chapter establishes a strong foundation for understanding the study. Subsequently, the chapter proceeds to formulate specific hypotheses that will be rigorously tested throughout the research process, alongside with the research framework.

3. Chapter 3: Research Methodology

Chapter three delves into the methodological process of this research. It meticulously details the research design employed, along with the measuring variables used under this research. The chapter clearly defines the target population and outlines the sampling technique utilized to select the subjects of observation. Finally, it sheds light on the data analysis techniques that will be used to extract and interpret meaningful insights from the collected data.

4. Chapter 4: Findings, Analysis and Discussion

Chapter four centers on the highly anticipated results of this study. It meticulously explores the effect of Asset Quality, Liquidity Risk, Low Cost Funds, and Sustainable Bonds on the Net Interest Margin (NIM), with Loan Growth as the moderating variable. This chapter delves into the analysis of the formulated hypotheses, explaining the employed techniques and their outcomes. Subsequently, discusses the processed data, presenting the key findings and the implications.

5. Chapter 5: Conclusion and Recommendations

As for the final paragraph, it will provide the conclusion of the study and recommendations based on research conducted by the author.

CHAPTER II

LITERATURE REVIEW

2.1. Theoretical Basis

2.1.1. Bank

2.1.1.1. Definition of Bank

According to a study by Khairullah and Rosita (2022), banks are an essential part of the contemporary financial system. By taking deposits from people, these organizations serve a crucial role as financial intermediaries. In light of this fundamental role, banks are significant players in the financial markets where these loans and other financial instruments are exchanged, placing them at the heart of the financial system. An economy that functions properly must include financial intermediaries like banks because they create a link between the ones who have money and the ones who need money, encouraging investment and economic progress. Financial intermediaries fall into two primary types: banks and non-bank organizations, both are playing an important role in boosting the economy by reducing costs associated with saving and investment decisions. (Kiani, 2019). Banks are experts in one particular set of tasks, including taking deposits from the general public, turning those deposits into loans, and managing transfers and payments to ensure that money moves freely throughout the economy. Banks are financial institutions that receive savings from the general public and reinvest them in the form of loans (credit) and/or other forms in order to improve the standard of living for a large number of people, according to Law Number 10 of 1998 regulating banking.

In essence, banks serve as key hubs that link people and companies with excess capital (additional savings) to those in need of

financial resources (loans), as noted by Disemadi (2019) Due to their role as middlemen, banks have significant influence over the economy. As a result, trust becomes a crucial component for banking institutions to even survive. This action requires a high degree of confidence in the bank's capacity to handle the funds in an ethical and secure manner. This idea is further supported by Basaran and Bagheri (2020), who contends that a bank's capacity to foster confidence and trust among the public is essential to effective bank administration. Credible proof of the company's performance and a solid reputation serve as the cornerstones of this trust. Depositors are significantly more likely to be drawn to and remain with banks that continuously exhibit financial stability, prudent lending practices, and a dedication to consumer security. Essentially, the financial intermediary system relies on a healthy degree of public trust in banks to ensure a continuous flow of capital throughout the economy and promote overall growth.

Although banks are generally seen as financial intermediaries that protect deposits, they actually have a far larger impact on the economy (Berger et al., 2020) They take on the role of issue solvers, resolving information asymmetry by carefully evaluating borrowers and lowering lender risk. As a result, there is less uncertainty and an atmosphere conducive to better informed investing. In addition to being lenders, banks also manage risk by using financial tools and loan assessments to defend against defaults that can cause economic instability (Radojević, 2023). They also guarantee a seamless transfer of funds from savers to borrowers by serving as intermediaries. Consistent circulation encourages investment and corporate expansion, which in turn drives economic growth. Furthermore, banks have the ability to influence corporate governance through voting rights and lending policies. As a result, they can encourage ethical business

conduct and openness, which helps to maintain a sound and stable economy. In essence, banks are complex organizations that are vital to advancing both financial stability and economic expansion.

2.1.1.2. Functions of Banks

According to Triandaru & Budisantoso, which has been expanded by Sahri (2024), banks can function more specifically as follows:

1. Agent of Trust

   All banking operations are built on trust, which supports the distribution of loans as well as the collecting of deposits. Banks receive deposits from people who trust them with their hard-earned money, trusting that it will be securely held, prudently managed, and easily accessed when needed. The bank's ability to maintain its financial stability and stave off bankruptcy is essential to this trust. Similar to that, banks grant credit to debtors on the grounds that they believe the loan money will be spent sensibly, paid back on schedule, and that the debtor has a sincere desire to meet their financial commitments. A sound and efficient banking system is essentially dependent on the mutual trust that exists between banks and their clients.

2. Agent of Development

   The complex relationship between the monetary sector, which is mainly made up of banks and the real sector, which includes the production and consumption of goods and services,

determines the state of a country's economy. These two industries influence and support one another in a mutually beneficial connection rather than operating as separate entities. A healthy real sector depends on a well-run banking system that effectively collects and distributes money. By acting as catalysts, banks help people and companies move goods and services, make investments, and engage in consumption. These economic activities are, after all, dependent on the use of money, and banks are essential to maintain the free flow of that currency.

3. Agent of Service

Banks provide the general public with a broader range of services in addition to their primary duties of receiving and disbursing money. These services provide a direct benefit to essential economic operations. Money transfer services, safekeeping valuables in lockboxes, bank guarantees to reduce risk in financial transactions, and bill payment management for client convenience may all be included in this enlarged portfolio. By providing such a wide range of services, banks hope to turn into one-stop shops for all of their customers' financial needs.

2.1.1.3. Types of Banks

According to Taswan, which has been developed by Fitriana (2021), types of banks can be classified into several categories based on the characteristics of those banks. The categories are as follows:

1. Based on Function, it can be classified into:

- Commercial Bank

  Banks where time deposits and demand deposits account for the majority of revenue. This kind of bank offers short-term financing to the majority of people.

- Development Bank

  Banks that primarily take time deposits and conduct fundraising. In the development sector, it also extends medium- and long-term loans.

- Savings Bank

  Banks that handle money collection, take savings deposits, and print bills.

2. Based on Ownership, it can be classified into:

   - Central Government Bank

     Banks that the central government owns a majority of. This could be a development bank, savings bank, or commercial bank.

   - Regional Government Bank

Banks that the regional government owns in their entirety. This includes a development bank, a commercial bank, or a bank savings account.

- National Private Bank

  A bank that is owned by national citizens.

- Foreign Private Bank

  A bank whose majority of the ownership is owned by foreign nationals.

- Mixed Private Bank

  A bank that is owned by both national citizens and foreign nationals.

3. Based on Foreign Exchange Activities, it can be classified into:

   - Foreign Exchange Bank

     Banks that can purchase, sell, store, and conduct international transactions abroad with authorization from Bank Indonesia.

   - Non-Currency bank

Banks that are prohibited to purchase, sell, store, and conduct international transactions abroad with authorization from Bank Indonesia.

4. Based on Market Segment, it can be classified into:

   - Retail Banking

     Banks with a major business to serve cooperatives, small enterprises, and individuals

   - Wholesale Banking

     Banks that sell their services primarily to consumers or major organizations

5. Based on Core Capital, in POJK regulation No.12/POJK.03/2021, it can be classified into:

   - KBMI I

     Banks with a core capital of less than IDR 6 trillion.

   - KBMI II

     Banks with a minimum core capital of IDR 6 trillion and a maximum of IDR 14 trillion.

- KBMI III

  Banks with a minimum core capital of IDR 14 trillion and a maximum of IDR 70 trillion.

- KBMI IV

  Banks with a core capital of more than IDR 70 trillion.

2.1.2. Net Interest Margin

Puspitasari et al (2021) define net interest margin (NIM) as the division of a bank's total assets by the difference between interest earned and interest expended. The NIM ratio is frequently employed as a tool or point of reference to assess how well bank management is able to produce net interest income from its productive assets. As a result, NIM can serve as a primary indicator of a bank's stability and performance in terms of finances. It represents the difference between a bank's interest income and interest expenses as a percentage of average interest-bearing assets. Due to this, the NIM ratio is essential for assessing the stability and effectiveness of banks, particularly in the context of asset structure optimization (Barik & Raje, 2019).

NIM is a crucial metric for assessing the efficacy of the banking sector since it can reveal the cost, health, and price power of financial intermediation (Barik & Raje, 2019). When a bank's NIM is high, it means that interest income exceeds expenses, hence increasing profitability. It also shows how successfully the bank is maintaining a suitable risk-to-return ratio and monitoring its lending practices. According to Hao et al (2023), NIM is a crucial indicator for evaluating a bank's capacity to handle interest rate risk. Interest rate fluctuations will affect the bank's interest income and expenses. Therefore,

as interest rates rise, some bank assets and liabilities will be valued at a higher level, which will result in an increase in interest revenue and interest costs.

NIM reflects market risks that arise due to changes in market conditions, which can be detrimental to the bank. Apart from market conditions, the NIM of banking companies is also influenced by a range of factors. According to Hamadi & Awdeh in Puspitasari et al. (2021), NIM is assumed to be determined by four types of factors: 1) Bank-specific factors, 2) Industry-specific factors, 3) Monetary policy factors, and 4) Macroeconomic factors. At the bank-specific level, the factors in question include, capital sufficiency, current account savings account (CASA), operational costs, loan book size, and credit and liquidity risk. If a bank's NIM is more than 2%, it is considered healthy. Hence, lowering the cost of funds is required in order to increase the acquisition of NIM (Carindri & Untara, 2019). The interest that the bank pays to each of the relevant funding sources is the cost of funds. The bank's overall expenditures will dictate the percentage at which it must set the credit interest rate offered to its clients in order to generate net profits.

2.1.3. Loan Growth

In general, banks have a function as financial intermediary institutions that facilitate the flow of funds from surplus spending units/savers to deficit spending units/borrowers. Funds that will later be distributed to parties in need are called loans/credit. According to the Basic Banking Law no. 7 of 1992, loans/credit are defined as the provision of money/bills that can be equated with it, based on lending agreement between the bank and another party, which requires the borrower to carry out the amount of interest in return. For enterprises, loans are special broad-sense mechanism of mutual trust and credit-giving on economic interests, which plays an essential role in the existence or development of the businesses. Loans are viewed as the professional moral code

that entrepreneurs must abide by because it is related to the success of their business (Worku, 2021). For company scale, loans/credit are seen as commercial body with the capacity to perform promises and gain trust, while also serving as incorporeal property that helps companies gather capital (Duarte et al, 2012).

The quality and growth of loans are some crucial components of bank credit. High expansion of loan growth can have a negative selection effect and be linked to lower credit quality since risk-taking increases during these times, which lowers the amount of non-performing loans (Erdinç & Abazi, 2014). Credit/loans growth is seen as a reliable sign of the stability of the banking industry. Loan growth refers to the expansion of a bank's loan portfolio over time. It can have significant implications for bank profitability, solvency, and overall performance (Wijayanti & Mardiana, 2020). Thus, loan growth rates are of importance to central banks, investors, and scholars. It makes sense that increased profitability would be linked to higher rates of loan growth. As increased profitability would provide banks with more motivation to offer loans/credit. Furthermore, since lending has a larger expected return than safer investments, there would also be reverse causation connecting higher profitability to higher loan growth, meaning that higher profitability of banks would, on average, result from the increase of its loan/credit growth (Wijayanti & Mardiana, 2020). Banks have increased capacity to carry out lending operations more profitably. In this case, an increase in credit is expected to positively correlate with bank profitability.

Theoretically, according to Kiss et al., which has been developed by Tunay et al. (2020), credit growth can be divided into three categories: boom, cycle, and trend - which represents financial deepening. The identification of the boom component is the main focus of empirical studies on credit growth. It attempts to differentiate between equilibrium movements in credit (trend deepening and cyclical pattern) and a potentially hazardous credit boom (Tunay

et al., 2020). In transition economies, where credit ratios have increased from extremely low levels, it is particularly difficult. Loan/credit growth in developing markets frequently results in a large real increase in the value of the nation's currency and higher stock prices, which are then frequently followed by a sharp decline in these asset prices. A boom burst or an extreme slowdown in loan/credit growth can cause a recession and seriously damage banks' balance sheets. Loan/credit growth that surpasses a particular threshold around the trend is referred to as the credit boom. The thresholds can be calculated as both an absolute and a relative divergence from the trend.

2.1.4. Asset Quality

According to Anugrah & Yatna (2020), asset quality can be measured using the non-performing loans (NPL) ratio, which assess by comparing the total non-performing loans with the total credit given to debtors. NPL is an expression of the non-quality of part of bank lending/loans, reflected by their proportions in the total volume of loans granted by banks (Flip, 2014). Hence, this ratio can provide an idea of the extent to which existing problematic loans can be met with productive assets owned by a bank. The extent of a bank's ability to meet problem loans is what can determine the level of credit risk a company has. Hence, NPL is an important indicator of the health of bank asset quality. The smaller the NPL, the lower the credit risk that banks have to endure, which shows that the performance and function of the bank is working well. On the other hand, the higher the ratio indicates the greater amount of loans that have not been collected, which can result in declining bank profitability and cause the possibility of a bank in troubled condition getting bigger.

The level of credit risk can be proxied by NPL (Surjaningsih et al, 2018). Credit risk itself is one of the risks faced by banks, which refers to non-payment of credit that has been given. Based on Bank Indonesia Regulation No.

13/23/PBI/2011, credit risk is the risk of financial damage that is caused by the failure of bank customers, silence, or market counterparties in fulfilling their contractual obligations to the bank under agreement. NPL itself is a credit risk that arises as a result of non-repayment of loans given by banks to debtors. Hence, this type of credit risk is categorized as substandard, doubtful, and loss (Fannywati & Daryanto, 2019). Abel (2018) reveals that poor credit quality, greater cost inefficiencies and the size of the banking industry can significantly increase NPLs, while greater bank profitability reduces NPLs. To minimize risk and optimize performance, when providing credit, banks conduct an analysis of the debtor's ability to repay their obligations. After the credit is granted, the bank is obliged to monitor the use of the credit as well as the debtor's ability and compliance in fulfilling its obligations. Banks review, assess and bind collateral to minimize credit risk (Simon, 2018).

Sari & Septiano (2020) argue that NPL is a key indicator in assessing the bank's function performance, high NPL value can serve as an overview of the bank's failure to manage the business causing liquidity (inability to pay third parties), profitability (non -billable debt), and solvency (reduced capital) problems. Meanwhile, falling profits are one consequence because banks practically lose sources of income besides having to set aside reserves according to credit collection. Knowing that NPL is a loan that is in default or close to default, this can pose a significant challenge to the banking industry (Kumar et al, 2020). Therefore, banks should be able to manage this NPL ratio, because if it allows this ratio to increase significantly, it will affect the decline in profits, and eventually the bank's profits performance will fall (Sari & Septiano, 2020). This also means that the impact on net interest margin (NIM) is no exception. If the NPL is high, the interest income earned by the bank will decrease, which can cause the NIM to decrease (Purba & Triaryati, 2018).

2.1.5. Liquidity Risk

Liquidity risk refers to the risk of a bank's inability to meet its payment obligations when they are due. It includes withdrawing customer deposits. According to Ihrig et al (2021), a bank is considered to potentially have sufficient liquidity when the bank can receive the needed funds quickly, with ease, and at a reasonable price. One of the key indicators used in the banking sector to assess liquidity risk is loan-to-deposit ratio (LDR) (Mabwe, 2022). This ratio shows the ability of a bank to meet its obligations in withdrawing funds demanded by its depositors. In other words, LDR is a liquidity risk that banks must manage in order to meet credit demand and savers' simultaneous withdrawal of all of their funds (Vellanita et al, 2019). This makes liquidity management a complex problem in bank operational activities, because most of the funds managed by banks are funds from the public which are short term in nature and can be withdrawn at any time. The liquidity of a bank indicates that the bank has sufficient sources of funds available to meet all obligations. Apart from being able to influence bank liquidity, LDR is also an indicator of the bank's success in carrying out its function as a financial intermediary.

LDR is a ratio that characterizes the comparison between a credit granted by a bank and the total amount of third party funds collected by a bank, according to Cashmere in Sari & Septiano's (2020) research. This percentage will demonstrate the bank's capacity to manage cash raised by the relevant bank from third parties. LDR is another tool that can be used to assess a bank's capacity to fulfill its immediate obligations. This capability's amount will subsequently be related to a bank's degree of liquidity. Accordingly, LDR is a financial ratio for banks that has a strong correlation with the liquidity component (Anugrah & Yatna, 2020). Vallanita et al. (2019) state that a low ratio denotes a liquid bank with excess financing capacity that is available for lending, whereas a high ratio suggests that a bank lends all of its money (loan-up) or is highly illiquid. Government regulations, financial constraints, and

macroprudential policy are some of the variables that affect LDR (Mabwe, 2022). Therefore, in order to prevent unfavorable consequences, banks must maintain a balanced LDR within specific bounds.

According to research by Islam and Nishiyama (2016), LDR is used as an indicator to determine how many loans have been funded by deposits and other funding sources that have a determined significance to the NIM. It is also used to assess the strength of funding. The impact of LDR on the asset maturity structure of the bank is one manner in which it can have a favorable effect on NIM. Banks are typically better protected from fluctuations in short-term interest rates when their long-term asset ratio is larger than their total asset ratio. This implies that short-term interest rate fluctuations have less of an impact on their NIM, which over time may result in a more stable NIM. In periods of low interest rates, such as during the COVID-19 pandemic, banks with a higher LDR – indicating a higher proportion of long-term assets – might experience a more stable NIM compared to banks with a lower LDR – indicating a higher proportion of short-term assets (Hinton & Polson, 2021).

2.1.6. Low Cost Funds

In banking terms there are two types of funds, namely low-cost funds (cheap funds) and high-cost funds (expensive funds). According to Subairi et al. (2022) cheap funds or low-cost funds are banking funds that come from savings and current accounts, or usually referred to as current account saving account (CASA). It is called cheap funds because usually the interest given on these two banking products is relatively small, banks usually offer interest of around 2% -5% per year. In contrast, the source of expensive banking funds is deposits. Banking offers higher deposit interest than savings and current accounts. The advantage of CASA compared to deposits is that the transaction process is easier, so that people will be more interested in carrying out

transactional banking (Jennifer et al, 2022). Banks also use CASA to reduce pricing which has been an obstacle because it is considered expensive. CASA is the ratio of savings in current accounts to total savings. A higher CASA ratio indicates a lower cost of funds, because banks usually provide low interest on savings and current accounts. If most of a bank's deposits come from these funds, that means the bank obtained the funds at a relatively low cost.

CASA is a source of funds from current accounts and savings which have a lower financing margin than deposits (Singh, 2022). CASA is a source of funds from third party funds – *dana pihak ketiga (DPK)*. According to Yani et al. (2021), what it meant by third party funds are funds collected by banks from the public, consisting of current accounts, savings and deposits. The existence of third party funds itself is an important aspect in the banking world, thus making CASA have an important role for a banking company. As a means of boosting the growth of third party funds through current and savings account products that result in higher interest income, CASA is crucial for banks (Jennifer et al., 2022). CASA also aims to keep banks' liquidity intact. An increase in banking liquidity may be prompted by the growth of these deposits (Dewi & Rianita, 2021). Therefore, an increase in this ratio has the potential to maintain the stability of banking financial performance, which indicates that CASA is a ratio that can provide an overview of the level of financial health of a bank.

It is commonly known that a greater NIM is a direct result of a higher CASA ratio (Jennifer et al., 2022). A greater portion of bank deposits from current and savings accounts, which are cost-effective sources of funding, are represented by high CASA. Better bank operational efficiency is indicated by a higher NIM and lower funding costs associated with a higher CASA ratio. Increased profitability is a result of this. Hence, in an effort to cut expenses and improve efficiency, banks keep trying to raise additional low-cost financing from the general population. Retail deposits are a low-cost source of capital for

banks, which increases their NIM. Barik & Raje (2019) contend that this is a well acknowledged premise in the banking industry.

2.1.7. Sustainable Bonds

Bonds that are intended to finance initiatives that benefit society and the environment are called sustainable bonds, often known as green bonds and sustainability-linked bonds (Vulturius et al., 2022). The Green Bond Principles, which place a strong emphasis on disclosure and openness, regulate this type of bonds (Fatica, 2020). By tackling environmental and social issues, these relationships can increase a company's worth to its stakeholders. When it comes to early childhood education, affordable housing, education, food security, and healthcare accessibility, among other social implications, sustainability bonds give firms a competitive edge over stakeholders by emphasizing environmental aspects (AlAhbabi & Nobanee, 2020). With the help of these bonds, money can be raised and invested in initiatives that benefit society and the environment. It is important to note that companies issue sustainable bonds in the hopes of achieving positive stock market reactions by funding projects that have positive socioeconomic and environmental effects (Mathew & Sivaprasad, 2023). As a result, investing in renewable energy sources, reducing the effects of climate change, protecting the environment, and promoting sustainable development projects will all be made possible by sustainable bonds.

Loans known as sustainability bonds are only used to fund a variety of environmentally and socially conscious projects. The principal objectives of the underlying projects are taken into consideration by the issuer when classifying a particular bond as a sustainability bond. Sustainability bonds aim to encourage constructive social and environmental transformation (ICMA, 2018). Since these bonds enable the financing of a far wider range of projects than ones that could solely produce environmental or social benefits, they could be viewed as

generally more comprehensive. The attraction of this product, from the standpoint of an ESG-focused investor, might be found in the complementary results of investing in initiatives that achieve socially and environmentally relevant goals (Mocuna et al., 2021). Furthermore, sustainability bonds are a well-liked investment option due to growing investor knowledge of ESG issues. A growing number of investors seek to match their financial gains to globally acknowledged sustainability objectives, including the UN SDGs or the Paris Agreement (Paetzold et al., 2022). Furthermore, when the use of the funds from the issuance of these bonds is disclosed, concerns regarding greenwashing are reduced and it becomes easier for ethical investors to evaluate the results from an environmental or social standpoint (Mathew & Sivaprasad, 2023).

Sustainable bonds can promote economic expansion and demonstrate a company's dedication to sustainability in developing nations (Kiseleva, 2019). Governments so frequently provide tax cuts or other financial aid in exchange for the issuance of green bonds. Through these incentives, banks may be able to lower their cost of issue and increase their profitability. Aside from that, banks can improve their standing as socially and environmentally conscious organizations by practicing sustainable finance. Positive brand perceptions have the capacity to draw in new customers and investors who respect sustainability, which could result in more profitable ventures and business prospects. Investors are becoming more committed to sustainability, and as a result, they are giving Environmental, Social, and Governance (ESG) aspects more weight when making decisions. Due to the increased demand, banks may be able to sell these bonds at interest rates that are lower than those of ordinary bonds. This means that the bank will have additional funding options, including sustainable bonds, at a lower cost of funding. The bank's profitability will undoubtedly increase as a result of lower funding costs, especially from the aspect of net interest margin (NIM).

2.2. List of Previous Studies

Merry et al. (2022) researched the effects of non-performing loan (NPL), loan-to-deposit ratio (LDR), and operating expenses operating income on return on assets (ROA) with net interest margin (NIM) as an intervening variable. In this study, the sample used was 26 banking companies listed on the Indonesian Stock Exchange in the 2019 to 2021 period. The researchers used non-performing loan (NPL), loan-to-deposit ratio (LDR), and operating expenses operating income as independent variables, while the dependent variables used were net interest margin and return on assets. This research used secondary data, with the multiple linear regression model as the analytical method used. As a result, it is shown that the non-performing loan and loan-to-deposit ratio have no significant effect on net interest margin, while operating expenses operating income has a significant effect on net interest margin. Moreover, non-performing loan, loan-to-deposit ratio, and operating expenses operating income have an effect and significant on return on assets.

In the research of Digdowiseso & Alfirah (2023), the researchers had the objective of examining the effect of non-performing loan (NPL), equity to total assets (EQTA), and operating expense on the net interest margin (NIM) of banks in Indonesia. This study used secondary data from a sample population of 10 companies in the banking sub-sector that are still listed on the Indonesian Stock Exchange during the 2017-2021 period. The researchers used non-performing loan, equity to total assets, and operating expense as independent variables, and the dependent variable was net interest margin. The analytical method used was panel data regression, where the results obtained in this research indicate that the non-performing loan and operating expense have a negative and significant effect on net interest margin, whereas, equity to total assets has a positive and significant effect on net interest margin.

Lestari et al. (2021) researched the effects of bank size, lending scale, credit risk, equity capital, loan-to-deposit ratio (LDR), management efficiency and inflation rate on net interest margin (NIM). In this study, the sample used was 37 conventional

banks listed on the Indonesian Stock Exchange in the 2015 to 2019 period. The researchers used bank size, lending scale, credit risk, equity capital, loan-to-deposit ratio, management efficiency and inflation rate as independent variables, and the dependent variable used was net interest margin. Using secondary data obtained from the annual financial reports of those conventional banks during 2015 to 2019 period, the data was then analyzed using the multiple panel regression method. As a result, it is shown that bank size, credit risk, equity capital, and inflation rate have a significant negative effect on net interest margin, while the loan-to-deposit ratio and management efficiency have a significant positive effect on net interest margin. Apart from that, another result shows that lending scale has no effect on net interest margin.

In the research of Solichah & Hersugondo (2021), the researchers had the objective of examining the determinants of net interest margin (NIM) in commercial banks in Indonesia, with bank size and age as control variables. This study used secondary data from a population of 40 banks listed on the Indonesian Stock Exchange during the 2015-2019 period. The researchers used lending scale, credit risk, equity capital, loan-to-deposit ratio (LDR), management efficiency, and inflation rate as independent variables, and the dependent variable was net interest margin. The analytical method used was multiple linear regression analysis, where the results obtained in this research show that equity capital and inflation rate have a positive and significant effect on net interest margin, while management efficiency has a negative and significant effect on net interest margin. Furthermore, lending scale, credit risk, loan-to-deposit ratio are negatively non-significant to net interest margin.

Barik & Raje (2019) used bank-level data for 42 Indian banks across 25 quarters from March 2011 to March 2017 to investigate the impact of different factors on the net interest margin (NIM). The research uses a dynamic panel generalized method of moments (GMM) framework to examine how three different sets of characteristics affect banks' net interest margins. First, there are bank-level factors, such as past values of the NIM, quality of loan books, the capital-to-risk weighted assets ratio (CRAR), size of the loan book, operating costs, current account saving account (CASA), and fee-

based income. Second is system-level factors, such as the monetary policy rate, credit growth and yields on government securities. Lastly, there are macro-variables, such as GDP growth and inflation. The findings show that the primary factors influencing NIM are the size of the loan book, operating costs, the proportion of CASA, and the CRAR levels of banks. The economy's growth and the repo rate are examples of macro factors that positively impact the NIM.

The objective of Amuthan & Chandran's (2011) study was to investigate how CASA deposits affected the bottom lines of nationalized banks and new generation banks in India that were listed on the National Stock Exchange (NSE). The secondary data used in this study came from a sample size of eight banks divided into two groups: the nationalized banks segment, which includes four banks, and the new generation section, which also includes four banks. Andhra Bank, Oriental Bank of Commerce, State Bank of India, and Indian Overseas Bank are the names of the nationalized banks. HDFC Bank, ICICI Bank, Axis Bank, and IDBI Bank are the names of the new generation category. The researchers discovered that, regardless of a bank's size, it is obvious that only credit demand and deposit growth will boost profitability. In addition to keeping the number of branches constant, CASA will demonstrate positive growth in net interest margins as spread (interest received - interest payment) rises, which will lead to an incredible increase in operating profits. This analysis concludes that, in the instance of nationalized banks, CASA deposits had no beneficial effects on any of the three criteria variables. Profitability is therefore only attained by other reasons. On the other hand, CASA had a variety of favorable effects on branch expansion, net interest margin, and operating profits in the case of new generation banks.

Zhou & Cui (2019) used several Chinese listed companies that issue green bonds – sustainable bonds – as research object to explore the impact of green bond issuance on companies, including the impact of the announcement of green bond issuance on companies' stock prices, as well as the impact of green bond issuance on companies' financial performance and corporate social responsibility (CSR). This study uses data from Chinese listed firms that have been issuing green bonds since 2016

to analyze the green bond market in China. The findings show that stock prices of corporations rise in response to announcements of green bond issuing. In another context, while the promise of greater environmental protection does draw some investors, the interest inspired by green bonds is not very long-lasting. Furthermore, the issuing of green bonds actively contributes to the enhancement of businesses' capacity for innovation, profitability, and operational success. The findings demonstrate that the issue of green bonds can have a substantial positive impact on the economy and environment and is not just a means of promoting environmental preservation and sustainable development.

In the research of Hameed et al. (2023), the researchers had the objective to demonstrate the impact of Canadian banks introducing green bonds in their list of investments and the extent of their impact on the prices and returns of their shares. The study relied on the most important test for normal distribution, which is the Kolmogorov-Smirnov test, and a time series for a period of 18 years, from 2005 - 2022, as the bank did not deal in green bonds for the period of 2005 - 2013, and the green bonds were dealt with for the period of 2014 - 2022. The study sample is divided into two parts, where the first part contains pre-test, that is, before investing in green bonds, and then a post-test, after the introduction of bonds or dealing in green bonds by the banks in the current study sample. The study concluded that investing in green bonds has had a positive impact on the share price as well as its profitability for the banks sampled in the study. The rise indicates positive expectations for decisions to finance clean energy projects, which encourages investors to deal with these banks by depositing or buying their shares as they are profitable institutions.

In the research of Mery & Dony (2021), the researchers had the objective to examine the effect of credit growth on risk and performance of conventional banks in Indonesia. The objective of this study was to investigate how Indonesia's conventional banks' risk and performance were affected by lending expansion. The Generalized Method of Moment (GMM) technique is applied to dynamic panel data in this study. The first hypothesis, which will be investigated using a credit loss approach, concerns

the relationship between credit growth and credit risk. Second, the relationship, as determined by a bank interest income approach, between loan expansion and bank profitability. Third, the link, as measured by the capital-to-asset ratio, between credit growth and bank solvency. The information used in this study comes from 93 traditional commercial banks that were registered between 2009 and 2019 within the Indonesia Financial Service Authority – *Otoritas Jasa Keuangan (OJK)*. The findings demonstrated that while credit growth significantly increases the profitability and solvency of Indonesia's conventional commercial banks, it significantly decreases credit risk.

Bilgin et al. (2023) conducted a study on the impact of non-cash credit and the maturity split of cash credit on corporate performance. This study examined a sample of 174 non-financial companies that were listed on the Borsa Istanbul. Profitability was the study's dependent variable, and total credit, non-cash credit, cash credit, short-term cash credit, medium-term cash credit, and long-term cash credit were the independent variables. The research indicates that while non-cash and long-term cash credit have a significant beneficial impact on businesses' profitability, cash credit with a shorter maturity does not significantly contribute to profitability. Inflation, firm size, cash ratio, and financial risk are other variables that have been discovered to have a major impact on a firm's financial success. Furthermore, interest rates may increase in a short amount of time in an inflationary economy like Turkey's, which would make long-term debt a more attractive choice for businesses. It can be impossible to get various results for cash credit depending on the maturity term if fixed interest rates are applied to bank credit. In addition, a number of important factors, including business size, cash ratio, inflation, and financial risk, can affect a company's profitability.

Table 2. 1 Summary of Previous Studies

Title	Author	Variable	Method	Result
The Effect of Non-Performing Loans, Loan to Deposit	Merry et al. (2022)	Non-performing loan (NPL), loan-to-deposit ratio	Multiple linear regression model	Non-performing loan and loan-to-deposit ratio have

Ratios of Operating Expenses and Operating Income On Return on Assets with Net Interest Margin as an Intervening Variable in Banking Companies Listed in Indonesia Stock Exchange Period 2019 -2021		(LDR), operating expenses operating income, net interest margin and return on assets.		no significant effect on net interest margin, while operating expenses operating income has a significant effect on net interest margin. Moreover, non-performing loan, loan-to-deposit ratio, and operating expenses operating income have an effect and significant on return on assets.
Pengaruh Non-Performing Loan (NPL), Equity to Total Assets (EQTA), Operating Expense (OE) terhadap Net Interest Margin (NIM) Bank di Indonesia Periode 2017-2021	Digdowiseso & Alfirah, (2023)	Non-performing loan (NPL), equity to total assets (EQTA), operating expense, and net interest margin (NIM)	Panel data regression	Non-performing loan and operating expense have a negative and significant effect on NIM, whereas, equity to total assets has a positive and significant effect on NIM.
Determinants of Net Interest Margin on Conventional	Lestari et al. (2021)	Bank size, lending scale, credit risk, equity	Multiple panel regression method	Bank size, credit risk, equity capital, and

Banking: Evidence in Indonesia Stock Exchange		capital, loan-to-deposit ratio (LDR), management efficiency, inflation rate, and net interest margin (NIM)		inflation rate have a significant negative effect on net interest margin, while the loan-to-deposit ratio and management efficiency have a significant positive effect on net interest margin. Apart from that, another result shows that lending scale has no effect on net interest margin.
DETERMINAN NET INTEREST MARGIN PADA BANK UMUM DI INDONESIA DENGAN SIZE DAN BANK AGE SEBAGAI VARIABEL KONTROL (STUDI PADA BANK UMUM KONVENSIONAL YANG TERDAFTAR DI BURSA EFEK INDONESIA	Solichah & Hersugondo (2021).	Lending scale, credit risk, equity capital, loan-to-deposit ratio (LDR), management efficiency, inflation rate, and net interest margin	Multiple linear regression method	Equity capital and inflation rate have a positive and significant effect on net interest margin, while management efficiency has a negative and significant effect on net interest margin. Furthermore, lending scale, credit risk, loan-to-deposit ratio

PERIODE 2015-2019)				are negatively non-significant to net interest margin.
Net Interest Margins of Banks in India	Barik & Raje, (2019)	Bank-level factors, such as past values of the NIM, quality of loan books, the capital-to-risk weighted assets ratio (CRAR), size of the loan book, operating costs, current account saving account (CASA), and fee-based income. Second is system-level factors. Lastly, there are macro-variables, such as GDP growth and inflation.	Dynamic panel generalized method	The findings show that the primary factors influencing NIM are the size of the loan book, operating costs, the proportion of CASA, and the CRAR levels of banks. The economy's growth and the repo rate are examples of macro factors that positively impact the NIM.
The Impact of CASA deposit growth on the profitability of NSE listed nationalized banks and new generation banks in India–A comparative study	Amuthan & Chandran (2011).	Credit deposit, CASA, net interest margin (NIM)	Multiple linear regression method	CASA demonstrate positive growth in net interest margins as spread (interest received - interest payment) rises, which will lead to

				an incredible increase in operating profits. This analysis concludes that, in the instance of nationalized banks, CASA deposits had no beneficial effects on any of the three criteria variables. Profitability is therefore only attained by other reasons. On the other hand, CASA had a variety of favorable effects on branch expansion, net interest margin, and operating profits in the case of new generation banks.
Green bonds, corporate performance, and Corporate Social Responsibility	Zhou, & Cui (2019)	Green bond issuance, Announcement of green bond issuance, stock prices, financial performance and	Multiple linear regression method	The findings show that stock prices of corporations rise in response to announcements of green bond

		corporate social responsibility (CSR).		issuing. In another context, while the promise of greater environmental protection does draw some investors, the interest inspired by green bonds is not very long-lasting. Furthermore, the issuing of green bonds actively contributes to the enhancement of businesses' capacity for innovation, profitability, and operational success.
Investing in green bonds and its impact on stock prices and profitability for banks A study of his analysis of a sample of Canadian banks, Royal Bank, as a model For the period (2005-2022)	Hameed et al. (2023)	Green bonds in their list of investments, share prices, return on share price, and bank's profitability	Multiple linear regression method	The study concluded that investing in green bonds has had a positive impact on the share price as well as its profitability for the banks sampled in the study. The rise indicates positive

				expectations for decisions to finance clean energy projects, which encourages investors to deal with these banks by depositing or buying their shares as they are profitable institutions.
The effects of credit growth on risk and performance of conventional banks in Indonesia.	Mery & Dony (2021).	Credit growth, credit risk, loan expansion, bank solvenvy, and bank profitability.	Dynamic panel data method	The findings demonstrated that while credit growth significantly increases the profitability and solvency of Indonesia's conventional commercial banks, it significantly decreases credit risk.
Unlocking profitability in Borsa Istanbul: The impact of noncash credit and maturity breakdown of cash	Bilgin et al. (2023)	Total credit, non-cash credit, cash credit, short-term cash credit, medium-term cash credit, long-	Panel data regression method	The research indicates that while non-cash and long-term cash credit have a significant

credit on Corporate Performance		term cash credit, and bank profitability		beneficial impact on businesses' profitability, cash credit with a shorter maturity does not significantly contribute to profitability. Inflation, firm size, cash ratio, and financial risk are other variables that have been discovered to have a major impact on a firm's financial success

There are three things that need to be pointed out, which are felt to be novelty from this study. First, this study uses sustainable bonds as one of the independent variables that will be tested for significance, whereas in previous studies no one specifically tested the effect of sustainable bonds on bank's profitability, especially net interest margin. Second, the fact that loan growth is often used as an independent variable in analyzing the determinants of net interest margin, but in this study loan growth will be used as a moderating variable. Lastly, this study will analyze the effect of CASA on net interest margin, which in previous studies has not been specifically discussed.

2.3. Hypothesis Development

2.3.1. Effect of Asset Quality on NIM

In this study, the asset quality will be measured by the non-performing loans (NPL). NPL itself is debts that are past due or at risk of default, according to a Khairi et al. (2021) study. High interest rates, low bank profitability, or even low borrower creditworthiness are some of the causes of this issue. An essential indicator that banks use to evaluate the risk attached to their loan portfolio is the non-performing loans (NPL) ratio. The value of non-performing loans is essentially compared to the total assets of the bank. A better loan portfolio and lesser default risk are indicated by a lower NPL ratio. As more loans are being returned as agreed upon, this results in increased net interest income for the bank. The bank's net interest margin (NIM) may therefore rise in tandem with a reduced NPL ratio.

This is in line with the results of research conducted by Widana et al (2021) that NPL has a significant effect on NIM. The study also explains that NPL has a negative influence, so that the lower the level of NPL, the better the NIM will be. Therefore, the hypothesis is set as follows.

H1: Asset Quality has a negative effect on NIM

2.3.2. Effect of Liquidity Risk on NIM

The liquidity risk in this study will be measured by the loan-to-deposit ratio (LDR). According to End (2016), LDR is a tool used in macroprudential policy to examine cycles and patterns between loans and deposits in addition to lowering liquidity risk. A high LDR indicates that the bank is making more loans than it is receiving in deposits. The bank will be able to pay out more money at greater interest rates as a result, which might boost bank profits. This

situation benefits the net interest margin (NIM) since it increases net interest income, which is the primary variable used to determine the NIM.

Further supporting that notion, research by Zulfikar & Pengestuti (2018) demonstrates a significant positive relation between the LDR and NIM. In other words, as the LDR increases, there is a tendency for the NIM to rise as well. Therefore, the hypothesis is set as follows.

H2: Liquidity Risk has a positive effect on NIM

2.3.3. Effect of Low Cost Funds on NIM

In this study, the low-cost funds is measured by the current account saving account (CASA) ratio. Ardiansyah et al. (2023) state that CASA is a low-cost funding source that banks acquire in the form of current accounts and savings accounts, offering more inexpensive interest than deposits. In contrast to deposits, which are costly funds, CASA is referred to as inexpensive funds because banks do not have to pay a lot of money to obtain both kinds of third-party funds. The rise in CASA deposits causes banks' net interest income to increase. The reason for this is the growing difference in interest paid on these deposits compared to the interest earned from them. The net interest margin (NIM) rises in direct proportion to the spread, since wider spreads result in higher net interest income.

This is in accordance with the research conducted by Barik & Raje (2019) that CASA has a significant positive effect on NIM. The higher the CASA, the higher the level of profitability. Therefore, the hypothesis is set as follows.

H3: Low Cost Funds has a positive effect on NIM

2.3.4. Effect of Sustainable Bonds on NIM

Financial products known as sustainable bonds, such as social, sustainability-linked, and green bonds, are designed to advance social and environmental well-being (Zaheeruddin, 2022). Due to this type of bond being concerned with social and environmental effects, it differs from bonds in general. Purchasing sustainable bonds allows investors to support sustainable development in addition to receiving financial returns. Banks that issue sustainable bonds are eligible for additional incentives from a number of investors and financial institutions. This may facilitate banks' access to less expensive capital and boost their profitability.

This is in line with research conducted by Hameed et al. (2023) that sustainable bonds demonstrate a positive impact towards bank profitability. Therefore, the hypothesis is set as follows.

H4: Sustainable Bonds has a positive impact on NIM

2.3.5. Moderating Effect of Loan Growth on the Relationship between the Independent Variables and NIM

As mentioned above, non-performing loans (NPL) negatively impact the net interest margin (NIM). A high NPL ratio indicates a greater risk of default, leading to higher insurance premiums to cover this risk, which in turn raises costs and reduces NIM. However, when loan growth increases—often signaling economic improvement—the risk of default typically declines, lowering the associated insurance costs. As a result, loan growth can moderate the relationship between NPL and NIM, acting as a catalyst by mitigating the negative effects of NPL on NIM. Hence, the hypothesis can be set as follows.

H5: Loan Growth moderates the effect of Asset Quality on Net Interest Margin (NIM)

Loan-to-deposit ratio (LDR) has a positive impact on NIM. When a bank utilizes a greater proportion of its assets for loans, the potential for generating higher interest income increases, which in turn leads to an improvement in NIM. This effect becomes even more significant when there is an increase in loan growth, as it indicates a stronger economy and provides the bank with more opportunities to profit from lending activities. In such favorable economic conditions, banks can capitalize on higher loan demand, thereby enhancing their overall profitability. As a result, loan growth can serve as a moderating factor in the relationship between LDR and NIM, amplifying the positive effects of LDR by further boosting interest income and improving margins. Hence, the hypothesis can be set as follows.

H6: Loan Growth moderates the effect of Liquidity Risk on Net Interest Margin (NIM)

The Current Account Savings Account (CASA) has a positive influence on NIM primarily due to its nature as a low-cost source of funds for banks. As CASA allows banks to fund loans at a lower cost, it directly enhances NIM by improving profitability. This effect is expected to be even more pronounced when there is an increase in loan growth. During periods of economic improvement, abundant liquidity becomes available, giving banks greater potential to attract more CASA deposits. This additional liquidity enables banks to issue more loans at lower funding costs, further boosting their NIM. Therefore, loan growth is expected to provide a moderating effect on the relationship between CASA and NIM, magnifying the positive impact of CASA as a low-cost fund. This dynamic can also apply to sustainable bonds, which are similarly a low-cost funding source compared to traditional bonds. Given their ability to lower funding expenses, sustainable bonds further support the

positive relationship between funding sources and NIM. Hence, the hypothesis can be set as follows.

H7: Loan Growth moderates the effect of Low Cost Funds on Net Interest Margin (NIM)

H8: Loan Growth moderates the effect of Sustainable Bonds on Net Interest Margin (NIM)

2.4. Research Framework

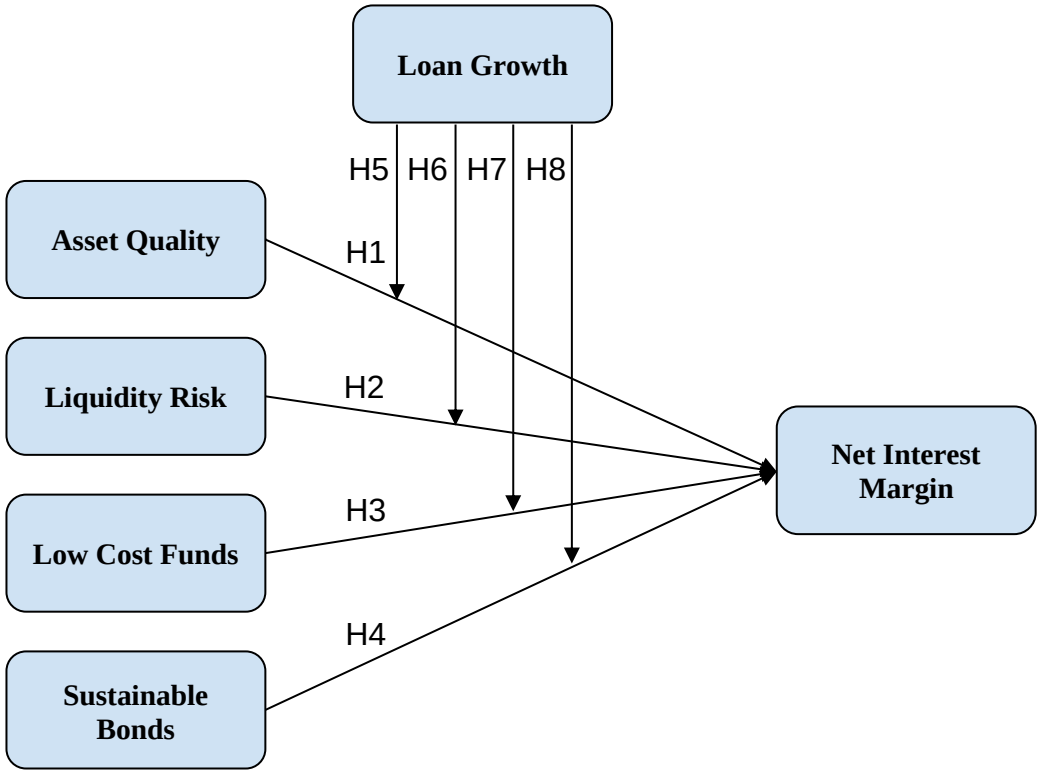


Figure 2. 1 Research Framework

CHAPTER III

RESEARCH METHODOLOGY

3.1. Operational Variables

The types of variables used in this study are dependent, independent, and moderating variables.

3.1.1. Dependent Variables

Dependent variable is the interval variable that shows a meaningful range of values as well as a natural order (Hurlin, 2013). In this study the dependent variable used is net interest margin (NIM). Sari & Septiano (2020) state that NIM is a comparison of average productive assets to net interest income. This ratio demonstrates the capacity of banks to place profitable assets and produce net interest income. The bank performs better at producing interest income if this ratio is higher. Assuming interest revenue should be reinvested to improve the bank's capital, however, one must ensure that this is not the result of high intermediation costs (Taswan, 2010). According to SE BI No. 13/24/DPNP, Indonesian banks must adhere to a minimum NIM norm of 3%. Furthermore, the formula to calculate NIM is:

$$NIM = \frac{Net\ Interest\ Income}{Average\ Productive\ Assets}\ x\ 100\% \qquad (3.1)$$

3.1.2. Independent Variables

Independent variable is one that affects the dependent variable and modifies a phenomenon (Kumar, 2012). In this research four factors were used as independent variables, which can be listed as follows:

1. Non-Performing Loan (NPL)

Vellanita et al. (2019) define non-performing loans (NPL) or credit risk as the possibility of bank losses due to debtors' failure to repay bank-issued loans. The likelihood of a bank in problems growing larger increases with the higher the NPL ratio, which indicates worse credit quality and a higher number of non-performing loans. According to Bank Indonesia, this ratio is deemed healthy if it does not exceed 5%. Furthermore, the formula to calculate NPL is:

$$NPL = \frac{Non-Performing\ Loans}{Total\ Credits\ Issued}\ x\ 100 \qquad (3.2)$$

2. Loan-to-Deposit Ratio (LDR)

Adenuga et al. (2021) claims that loan-to-deposit ratio (LDR) shows the extent to which banks have loaned their clients money by using depositors' funds. This ratio will demonstrate the bank's capacity to manage cash raised by the relevant bank from third parties. Since each bank typically has varying liquidity based on its size and capital, LDR is typically used to assess banking liquidity. According to Bank Indonesia No. 15/7PBI/2013, the LDR percentage ought to be between 78% and 100%. Furthermore, the formula to calculate LDR is:

$$LDR = \frac{Total\ Credit\ Given}{Third\ Party\ Funds}\ x\ 100 \qquad (3.3)$$

3. Current Account Saving Account (CASA)

Singh (2022) states that current account saving account (CASA) refers to third-party funds that come in the form of current and savings accounts and offer interest rates that are lower than those on deposits. The

reason savings and current accounts are referred to as "cheap funds" is that they have lower interest rates than deposits. In addition, the CASA ratio indicates a bank's degree of financial strength. In order to consistently maintain robust and stable banking liquidity, national banks keep working to keep the CASA ratio between 50% and 60% of total third-party funds (Widiantari & Iswara, 2021). Furthermore, the formula to calculate CASA ratio is:

$$CASA = \frac{Total\ Savings\ and\ Current\ Accounts}{Third\ Party\ Funds}\ x\ 100 \qquad (3.4)$$

4. Sustainable Bonds

Zaheeruddin et al. (2023) argue that sustainable bonds, including social, sustainability-linked, and green bonds, are financial instruments that aim to promote environmental and social well-being. Sustainable bonds are usually offered at lower interest rates than traditional bonds, because these bonds are considered a safer investment than traditional bonds. This makes sustainable bonds an option to get cheap funds, which can be a catalyst to boost bank profitability levels. In this research, the proportion of sustainable bonds will be denoted by SBOND, and the formula to calculate ratio is:.

$$SBOND = \frac{Total\ Sustainable\ Bonds}{Total\ Debt\ Securities}\ x\ 100 \qquad (3.5)$$

3.1.3. Moderating Variables

A moderating variable, as defined by Preacher & Hayes (2008), is a variable that, through at least one mediator or intervening variable, indirectly affects a dependent variable. A moderating variable conveys the influence of a

preceding variable to a dependent variable, offering a more thorough comprehension of the relationships between variables (Mackinnon & Fairchild, 2009). The variable used as a mediator in this study is loan growth. Growth in credit/loan is a key factor in economic development, especially when it comes to domestic investment and demand. In this research, loan growth will be denoted as LGR, and the formula to calculate loan growth is:

$$LGR = \frac{Total\ Loans\ at\ End\ of\ Period - Total\ Loans\ at\ Beginning\ of\ Period}{Total\ Loans\ at\ Beginning\ of\ Period}\ x\ 100 \quad (3.6)$$

3.2. Population and Sampling

The sample for this study must be determined by taking into consideration two things; 1) this study's observation period runs from 2017 to 2023, and 2) the included banks should fall under the KBMI III and KBMI IV categories and are able to give comprehensive annual reports during the observation period, while also listed on the Indonesian Stock Exchange (IDX). With that information in hand, non-probability (non-random) sampling seems like the best sample strategy for this investigation. Non-probability sampling involves five often employed techniques: quota sampling, convenience sampling, self-selection sampling, snowball sampling, and purposive sampling (Bhardwaj, 2019). The sampling technique used for this research is purposive sampling. Using this technique, the sample is chosen based on certain factors, such as traits that are closely associated with the population under study (Nurbani & Meiyanti, 2019). Thus, the research sample is selected based on the criteria as follows:

- Banking companies that are listed on the Indonesian Stock Exchange (IDX) from 2017 - 2023
- Banking companies that provide complete annual reports from 2017 - 2023
- Banking companies that fall under the KBMI III category with a minimum core capital of IDR 14 trillion and a maximum of IDR 70 trillion

- Banking companies that fall under the KBMI IV category with a core capital of more than IDR 70 trillion

With these criteria in mind, this research uses the following lists of KBMI III and KBMI IV banks as the research sample.

Table 3. 2 List of Banks

Category	Name of Bank	Stock Code
KBMI IV	PT Bank Mandiri (Persero) Tbk	BMRI
	PT Bank Rakyat Indonesia (Persero) Tbk	BBRI
	PT Bank Central Asia Tbk	BBCA
	Bank Negara Indonesia (Persero) Tbk	BBNI
KBMI III	PT Bank Cimb Niaga Tbk	BNGA
	PT Bank Syariah Indonesia Tbk	BRIS
	PT Bank Pan Indonesia Tbk	PNBN
	PT Bank OCBC NISP Tbk	NISP
	PT Bank Mega Tbk	MEGA
	PT Bank BTPN Tbk	BTPN
	PT Bank Danamon Indonesia Tbk	BDMN
	PT Bank Tabungan Negara (Persero) Tbk	BBTN
	PT Bank Permata Tbk	BNLI
	PT Bank Maybank Indonesia Tbk	BNII

Source: Kontan

Therefore, the author uses a total of 14 banks consisting of 10 banks under the KBMI III category and 4 banks under the KBMI IV category.

3.3. Data Collection Method

Quantitative data, or numerical data values that can be measured and computed, are what were used in this research. Primary or secondary data are the types of data that are gathered in quantitative research. Of the two, secondary data – data derived from easily accessible sources – are used in this study. The sources of the secondary data used in this research are:

- Website of Kontan (https://keuangan.kontan.co.id/) for the list of banks under the KBMI III and KBMI IV categories.
- Official banks' websites under KBMI III and KBMI IV categories to obtain information from their annual reports.
- Annual reports of banks under KBMI III and KBMI IV categories to obtain information regarding the NPL, LDR, CASA, Sustainable Bonds, Loan Growth, and NIM of the banks.

This study gathers data by documentation and literature review, as it is secondary data research. Documentation is used in the analysis process to look at a variety of document kinds. Furthermore, the author does literature research by gathering relevant data to support the study analysis. Numerous readings from a variety of sources, including books, journals, essays, news, and websites, are included in these compilations.

3.4. Data Analysis Technique

Panel data regression analysis is the analytical method employed in this study. According to Bretó (2018), panel data is a group of time series that are connected by both unit-specific and shared parameters, but there is little to no dynamic interaction between the units. The Eviews software is used in this study as a data analysis tool. The following formula represents the general panel data regression model:

$$Yit = \beta 0 + \beta 1X1it + \beta 2X2it + \beta nXnit\ldots + \beta nZit + \beta n(X1*Z)it + \beta n(X2*Z)it + \beta n(Xn*Z)it\ldots + \varepsilon it \quad (3.7)$$

Where:

Y: Dependent variable

X1, X2, Xn: Independent variables

Z: Moderating variable

$\beta 0$: Constant

$\beta 1, \beta 2, \beta n$: Coefficients Regressions

i: Entity

t: Time series

ε: Error

3.4.1. Panel Data Regression Estimation Model

There are three analytical methods for panel data analysis, including the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM).

1. Common Effect Model (CEM)

   The simplest model is the Common Effect Model (CEM), which simply mixes time series data with cross-section data and ignores the time and spatial aspects of panel data. Thus, this model is equivalent to all other linear regression models. Differences across people or over time, however, cannot be noticed due to the combination of the data. According to Cao & Zhou (2022), CEM is a helpful technique for evaluating dynamic heterogeneous panels with non-stationary multifactor error structures since it assumes that the intercept and slope are the same for every subject and time. Then the combined data is treated as a single observation using the Ordinary Least Square (OLS) approach. In a linear regression model, OLS is a technique for estimating unknown parameters by minimizing the sum of squared vertical distances between observed and anticipated responses

(Good, 2012). The equation for panel data regression using the CEM can be stated as follows:

$$Yit = \beta 0 + \beta 1X1it + \beta 2X2it + \ldots + \beta nXnit + \varepsilon it \quad (3.8)$$

With the *n* representing the number of cross-sectional data sets, the *i* represents the *i*-th individual, and the *t* represents the *t*-th period.

2. Fixed Effect Model (FEM)

The fixed effect model's methodology makes the assumption that while the slope between cross section units is constant, the intercept for each cross section unit is distinct. Including dummy variables to offer variances in various parameter values, both across cross section units and times series units, is one method to pay attention to cross section units or times series units. Thus, the Least Square Dummy Variable (LSDV) approach is used for parameter estimation in the fixed effect model (Greene, 2020). LSDV is a technique for estimating linear regression parameters in a model with a dummy variable as one of the independent variables by applying the Least Squares Method. The equation for panel data regression using the FEM can be stated as follows:

$$Yit = \beta 0 + \beta 1X1it + \beta 2X2it + \ldots + \beta nXnit + \alpha it + \varepsilon it \quad (3.9)$$

Where αit is the unobserved time-invariant individual effect and εit is the error term.

3. Random Effect Model (REM)

The cross section unit employed in the random effect model (REM) is selected at random from a population rather than having it predetermined

(Greene, 2020). Every cross section unit is assumed to have a distinct intercept in the REM approach. By accounting for errors from cross sections and time series, as well as the possibility of error correlation between cross-section and time series units, the random effects approach enhances the effectiveness of the least squares technique. The OLS model cannot be used in this technique to obtain an efficient model. Generalized Least Square (GLS) with homoscedastic assumptions and no cross section relationship is the suitable model for REM estimation. The equation for panel data regression using the REM can be stated as follows:

$$Y_{it} = \beta 0 + \beta 1 X1_{it} + \beta 2 X2_{it} + \ldots + \beta n Xn_{it} + \varepsilon_{it} + u_{it} \qquad (3.10)$$

Where u_{it} is the error component of each cross-section unit and ε_{it} is the error component of the time series unit.

3.4.2. Selection of Panel Data Regression Model

The model that best fits the goals of the research will be selected among the three panel data regression estimation models. There are several kinds of tests, such as the Chow and Hausman tests, that can be used as a tool to help determine which regression model to utilize in research.

1. Chow Test

   The Chow test was carried out to find out which model is more appropriate to use between the Common Effect Model (CEM) and the Fixed Effect Model (FEM). The hypothesis in the Chow test is as follows:

   Ho : Common Effect Model (CEM) is valid to be used

   Ha : Fixed Effect Model (FEM) is valid to be used

   Criteria:

If sig. value > α then Ho is accepted

If sig. value < α then Ha is accepted

2. Hausman Test

The Hausman test was carried out to find out which model is more appropriate to use between the Random Effect Model (REM) and the Fixed Effect Model (FEM). The hypothesis in the Hausman test is as follows:

Ho : Random Effect Model (REM) is valid to be used

Ha : Fixed Effect Model (FEM) is valid to be used

Criteria:

If sig. value > α then Ho is accepted

If sig. value < α then Ha is accepted

3. Lagrange Multiplier Test

The Lagrange Multiplier test was carried out to find out which model is more appropriate to use between the Random Effect Model (REM) and the Common Effect Model (CEM). The Lagrange Multiplier test should be employed if the Chow test indicates that the CEM is superior to the FEM, and the Hausman test indicates that the REM is superior to the FEM. Hence, the hypothesis in the Lagrange Multiplier test can be stated as follows:

Ho : Common Effect Model (CEM) is valid to be used

Ha : Random Effect Model (REM) is valid to be used

Criteria:

If sig. value > α then Ho is accepted

If sig. value < α then Ha is accepted

3.4.3. Multicollinearity Test

Multicollinearity test is a technique to evaluate the degree of multicollinearity in correlation matrices, which might have an impact on the stability of least-squares regression results. Principal components analysis is a statistical technique that helps in the detection, quantification, and adjustment of regression coefficients for the impacts of each individual risk factor in the multicollinearity test (Lafi & Kaneene, 1992). The multicollinearity function in a multiple regression model can be used to determine whether or not the independent variables have a strong correlation. The relationship between the independent variable and the dependent variable would be disrupted if there was a significant correlation between each of the independent variables. Therefore, a decent regression model should be mutually collinear but not substantially correlated, or it should not have a correlation between the independent variables. Multicollinearity can be evaluated by utilizing tolerance and the significance of variance inflation factors (VIF). It is said that there is no multicollinearity if VIF is less than 10 and Tolerance is more than 0.01. Multicollinearity is said to exist if the VIF value is more than 10 and the Tolerance value is lower than 0.01.

3.4.4. Coefficient of Determination (Adjusted R-Squared)

The degree to which the independent variable influences the dependent variable or the extent to which the independent variable can account for

variation in the dependent variable is indicated by the coefficient of determination (R-Squared) value. A coefficient of determination value near one indicates that the independent variable does a fairly excellent job of explaining the dependent variable. However, if the R-Squared value is near to 0, it indicates that the independent variable's capacity to explain the dependent variable is severely constrained (Kuncoro, 2011). Therefore, the coefficient of determination value, which ranges from 0 to 1, indicates the quality of a regression model.

3.4.5. Hypothesis Testing

The hypothesis was tested using a panel data regression analysis model, with the equation produced is:

$$NIM_{it} = \beta 0 + \beta 1NPL_{it} + \beta 2LDR_{it} + \beta 3CASA_{it} + \beta 4SBOND_{it} + \beta 5LGR_{it} + \beta 6(NPL*LGR)_{it} + \beta 7(LDR*LGR)_{it} + \beta 8(CASA*LGR)_{it} + \beta 9(SBOND*LGR)_{it} + \varepsilon_{it} \quad (3.11)$$

This aims to predict the extent of the strength of the effects of independent variables on dependent variables using t and F tests.

1. Model Feasibility Test (F-Test)

   The F-test is used to determine if the independent variables in the regression model have any effect on the dependent variable simultaneously (Ghozali, 2016). At a significance level of 5%, all independent variables concurrently have a substantial influence on the dependent variable if the F-statistic is greater than the F-table, in which case Ho is rejected and Ha is accepted. Conversely, if the F-statistic value is less than the F-table, then all independent factors have no effect on the dependent variable simultaneously, meaning that Ho is accepted and Ha is rejected. In addition, the significance value also shows that. At a significance level of

5%, if the significance value is less than 0.05, it indicates that all of the independent variables have a combined effect on the dependent variable. The independent variable does not concurrently affect the dependent variable if the significance value is higher than 0.05. The hypothesis used is as follows:

Ho: There is no significant simultaneous effect between the independent variables on the dependent variable.

Ha: There is a significant simultaneous effect between the independent variable and the dependent variable.

2. Partial Test (T-Test)

The t-test is essentially used to determine whether each independent variable partially or individually has a substantial impact on the dependent variable (Gujarati, 2012). At a significance level of 5%, the independent variable is stated to partially influence the dependent variable if the significant value is smaller than 0.05 (Ho is rejected, Ha is accepted). On the other hand, the independent variable is stated to partially not affect the dependent variable if the significant value is greater than 0.05 (Ho is accepted, Ha is rejected). Hence, the hypothesis used is as follows:

Ho: $\beta = 0$

Ha: $\beta \neq 0$

3.5. Research Process

The process of doing research begins with the identification of independent and dependent variables. Making a panel data set is the next step in the research process,

which will be analyzed to find the optimal panel data model for doing regression amongst fixed-effect, random-effect, and common-effect models. The third steps in the research process are the Lagrange Multiplier Test, Hausman Test, and Chow Test. Then comes the significance test and multicollinearity test, which include tests of the adjusted r-squared, F-test, and t-test. The research process will conclude with the interpretation of the test outcomes.

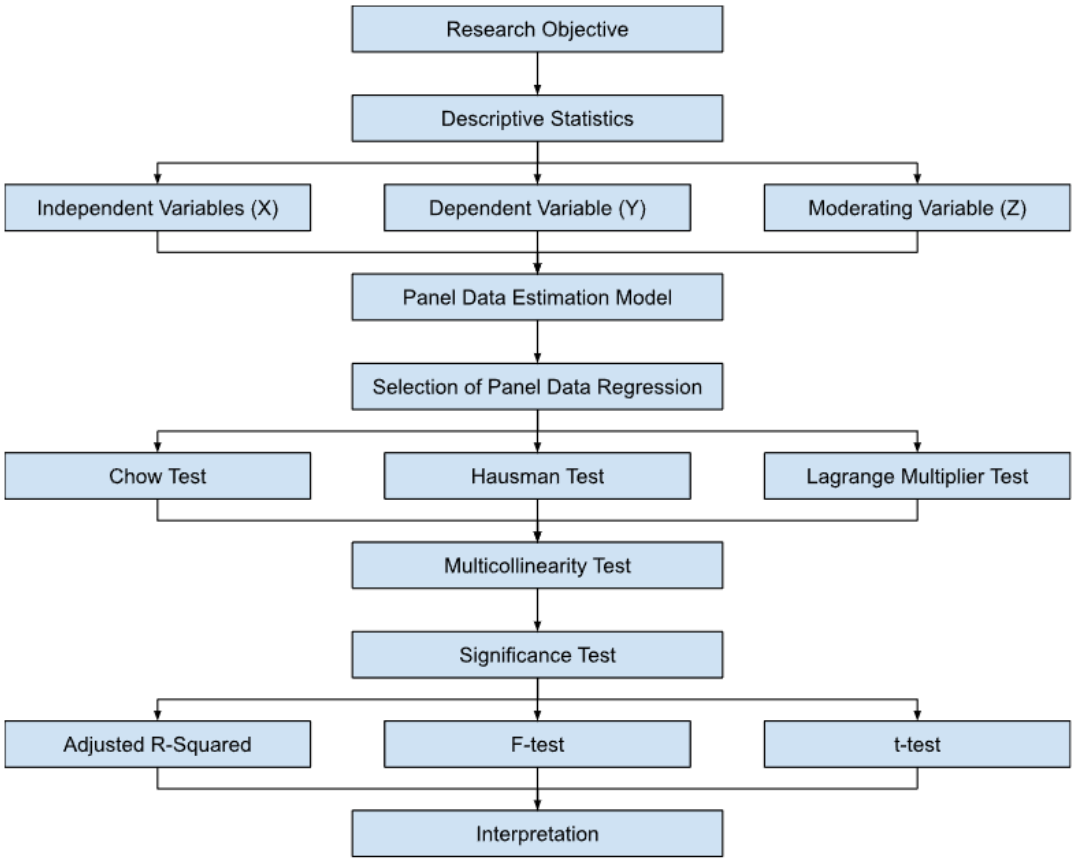


Figure 3.1. Research Process

CHAPTER IV

FINDINGS, ANALYSIS AND DISCUSSION

4.1. Findings and Analysis

In the research conducted, the unit of analysis was the financial reports of banking companies listed on the Indonesia Stock Exchange (IDX) within 2017-2023. This study makes use of six variables: four independent variables, one dependent variable, and one moderator variable. This study's independent variables include asset quality (NPL), liquidity risk (LDR), low cost funds (CASA), and sustainable bonds.. Net interest margin (NIM), on the other hand, is the dependent variable in this study, and loan growth is the moderator variable. The information obtained from data processing indicates whether or not the independent factors employed have an impact on the dependent variables, and how the moderator variable mediates the relationship between the independent and the dependent variable. This study's population consists of conventional banks that are classified as BUKU III and BUKU IV banks that are listed on IDX between 2017 and 2023. Thirteen banks were chosen as samples in this study, drawn from this population and a number of criteria established in the preceding chapter. Purposive sampling was used in this study in order to select a sample that met the predetermined standards for representativeness. The author will go over the data that has been gathered from the analysis's findings in this section.

4.1.1. Descriptive Analysis

The process of gathering, presenting, and summarizing data in order to produce adequately evaluated data is known as descriptive statistics. Descriptive analysis in this study aims to fully characterize and identify the variables used. The six variables taken into consideration in this study are non-performing loans (NPL), loan-to-deposit ratio (LDR), current account saving

account (CASA), sustainable bonds (SBOND), loan growth (LGR), and net interest margin (NIM). EViews was utilized in order to obtain these outcomes. With descriptive statistics, the author may statistically characterize the acquired data and draw inferences. Variables like mean, median, maximum, minimum, and standard deviation are among them. The results of the descriptive statistics are displayed in the table below.

Table 4.1. Descriptive Statistical Results

	NIM	NPL	LDR	CASA	SBOND	LGR
Mean	5.1473	2.2552	88.8760	51.6442	1.6211	8.0940
Median	4.7148	2.2706	88.9000	51.6168	0.0000	7.6238
Maximum	11.5830	4.7807	163.1000	81.2063	47.6573	108.0524
Minimum	3.0433	0.4184	56.4700	11.6503	0.0000	-15.5555
Std. Dev.	1.6664	0.9027	17.1723	15.4703	6.3779	13.4199
Observations	91	91	91	91	91	91

As shown in the table above, there are 13 conventional banks from 2017 to 2023 that fall under the category of BUKU III and BUKU IV, with a total of 91 observations for each variable. Based on descriptive statistics, it can be seen that the mean of the NIM is 5.15%, which indicates that the average of the percentage of net interest income generated by the bank is 5.15% out of the average of productive assets owned by the bank. The median is 4.71% and the standard deviation is 1.67%, alongside with the maximum and minimum values of 11.58% and 3.04% respectively.

The mean of the NPL is 2.26%, which implies that within the research period, the average of the percentage of loans that no longer result in interest or principal payments by the debtor according to the agreed schedule is 2.26% out of the total loans. The median is 2.27% and the standard deviation is 0.90%, alongside with the maximum and minimum value, which are 4.78% and 0.42% respectively.

For the LDR, the result shows that the mean within the research period is 88.88%, which indicates that the average of the percentage of loans given to the customer is 88.88% out of the total deposits received. The median is 88.90% and the standard deviation is 17.17%, alongside with the maximum and minimum value of 163.10% and 56.47% respectively.

Different results appear for CASA, where the mean of this variable is 51.64%, which implies that within the research period, the average of the percentage of the low-cost funds proportion is 51.64% out of the total third party funds owned by the bank. The median is 51.62% and the standard deviation is 15.47%, alongside with the maximum and minimum value of 81.21% and 11.65% respectively.

While for the SBOND, since the implementation of sustainable bonds is relatively new in Indonesia, and since the implementation of sustainable bonds is relatively new in Indonesia and several banks have just started issuing these bonds in recent years, so there are still several other banks that have not yet implemented sustainable bonds as a source of funding. As a result, the median and minimum value of this variable is 0, due to the fact that there are several banks that have not yet implemented sustainable bonds. The mean value is 1.62%, alongside the standard deviation and the maximum value, which are 6.38% and 47.65% respectively.

The LGR, on the other hand, has a mean of 8.09%, indicating that during 2017 to 2023, the average loan growth experienced by all banks used as a sample for this study is 8.09%. The median is 7.62% and the standard deviation is 13.42%, alongside with the maximum and minimum values of 108.05% and -15.56% respectively.

Apart from that, one of the findings of descriptive statistics in this study is the correlation coefficient matrix. The correlation coefficient matrix can be

used to evaluate the strength of the relationship between the relative movements of two variables. The results are shown in the table below.

Table 4.2. Correlation Coefficient Matrix

	NIM
NPL	-0.3804
LDR	0.2709
CASA	-0.0667
SBOND	0.0470
LGR	0.2182

There are several conceivable outcomes when it comes to the relationship between the variables employed in this study, as indicated in table 4.2. NPL and CASA, which have respective correlation coefficients of -0.38 and -0.07, are the two variables that have a negative relationship with NIM. Aside from that, three more variables – LDR, SBOND, and LGR – have positive correlations with NIM, with corresponding correlation values of 0.27, 0.05, and 0.22.

4.1.2. Selection of Panel Data Regression Model

The Chow, Hausman, and Lagrange tests will all be used to determine which panel model is best for performing the panel data regression analysis in order to estimate the relationship between the variables. The tests that were completed are listed in the following order.

1. Chow Test

   The Chow test is used to determine whether the common effect model (CEM) or the fixed effect model (FEM) is more appropriate to use. If the probability value in the cross-section F (significance value) is greater than 0.05, then the more appropriate model to use is CEM. However, if the

probability value for the cross-section F is smaller than 0.05, then the model that will be used is FEM. The following are the results of the Chow test in this study.

Table 4.3. Chow Test Result

Effects Test	Statistic	d.f.	Prob.
Cross-section F	35.750619	(12,73)	0.0000
Cross-section Chi-square	175.462149	12	0.0000

The Chow test analysis shows that the probability value of the cross-section F is 0.00 < 0.05, as shown in table above. As a result, Ho is rejected, and a more suitable model to use based on this test is FEM. The Hausman test will then be conducted.

2. Hausman Test

The Hausman test is used to examine the relative effectiveness of the fixed effect model (FEM) and the random effect model (REM). The Hausman test is revealed by the cross-section random's probability value. If the probability value in the cross-section random (significance value) is higher than 0.05, the chosen model is a REM. Conversely, the FEM is selected if the cross-section random probability value is less than 0.05. The Hausman test yielded the following findings.

Table 4.4. Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	42.698523	5	0.0000

The Hausman test analysis shows that the probability value of the cross-section random is 0.00 < 0.05, as shown in table above. As a result, Ho is rejected, and a more suitable model to use based on this test is FEM.

3. Lagrange Multiplier Test

The Lagrange Multiplier test is used to determine whether the common effect model (CEM) or the random effect model (REM) is more appropriate to use. If the probability value of the cross-section is greater than 0.05, then the more appropriate model to use is CEM. However, if the probability value of the cross-section is smaller than 0.05, then the model that will be used is REM. The following are the results of the Lagrange Multiplier test in this study.

Table 4.5. Lagrange Multiplier Test Result

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	50.33451 (0.0000)	0.089904 (0.7643)	50.42441 (0.0000)

The Lagrange Multiplier test analysis shows that the probability of the cross-section is 0.00 < 0.05, as shown in the table above. As a result, Ho is rejected and a more suitable model to use based on this test is REM.

Due to the results of the two tests – Chow test and Hausman test – show that the fixed effect model (FEM) is a more suitable model, therefore, in this study FEM will be used as the panel data regression model selected.

4.1.3. Multicollinearity Test

To determine whether there is any relationship between the independent variables in the regression model, the multicollinearity test is employed. To ascertain whether multicollinearity existed, the Variance Inflation Factor (VIF) and Tolerance value can be utilized. It is said that there is no multicollinearity if VIF is less than 10 and Tolerance value is more than 0.01. However, it is considered to exist if the VIF is greater than 10 and Tolerance value is less than 0.01. The following are the outcomes of the multicollinearity test.

Table 4.6. Multicollinearity Test Result

Variable	Centered VIF
NPL	1.035884
LDR	1.102262
CASA	1.184251
SBOND	1.066972

As can be seen from the table above, the value of VIF for every independent variables used in the model is lower than 10, which indicates that there is no severe multicollinearity in the model and the hypothesis is accepted.

4.1.4. Significance Test

The results of the selection of the regression model show that the fixed effect model (FEM) is the most appropriate model used in this study. Hence, the significance test will be conducted using the fixed effects model. The coefficient of determination (Adjusted R-squared), simultaneous test (F-test), and partial test (t-test) are all used in this study. The following are the results of the three data sets.

Table 4.7. Significance Test Result with Moderating Variable

Independent Variable	1	2
NPL	-0.0225 [-0.2084]	0.0244 [0.2050]
LDR	-0.0331 [-3.9667]**	-0.0294 [-3.3348]**
CASA	-0.1216 [-9.3178]**	-0.1316 [-9.2253]**
SBOND	0.0001 [0.0121]	-0.0587 [-1.2653]
LGR	0.0286 [4.8065]**	0.0085 [0.1812]
Moderating Variable		
NPL_LGR		0.0044 [0.4523]
LDR_LGR		-2.18E-05 [-0.1016]
CASA_LGR		0.0005 [0.8272]
SBOND_LGR		0.0072 [1.2586]
Adj. R-squared F-statistic	0.8609 [33.7708]**	0.8614 [27.6341]**

In parentheses is t-statistic

****: significantly affect the dependent variable (prob. value < 0.05)**

1. Coefficient of Determination (Adjusted R-Squared)

   The adjusted r-squared value is used to indicate the proportion of variability in the dependent variable that can be explained by the independent variable. As can be seen in the table above, the adjusted r-squared value for model 1 is 0.86. This indicates that 86% of the NIM variable can be explained by the NPL, LDR, CASA, SBOND, and LGR

variables, while the remaining 14% is explained by other factors outside the variables used in this study. In addition, model 2 generates adjusted r-squared of 0.86, which implies that around 86% of the NIM variable is explained by all the variables listed in table 4.7. An adjusted r-squared number that is getting closer to 1 indicates that the regression model can explain the variability of the data well. This shows that most of the variables used in the model are relevant, so it is able to balance the complexity of the model and its predictive ability.

2. Simultaneous Test (F-Test)

The F-test is used to see if the independent variable has an effect on the dependent variable at the same time (simultaneously). With a 0.05 significance threshold, if the F-statistics probability value is less than 0.05, it implies that all of the independent variables simultaneously have influence on the dependent variable. Meanwhile, if the probability value of F-statistics is higher than 0.05, it implies that the independent variables do not influence the dependent variable simultaneously.

Based on the table 4.7, the F-statistics value for Model 1 is 33.77 with the probability value (F-statistic) less than 0.05. It shows that the model is significant and the variables of NPL, LDR, CASA, SBOND, and LGR are all simultaneously affecting the dependent variable, which in this case is NIM. The same result also appear in the model 2, where the probability value of the F-statistic is also less than 0.05. Therefore, the model is significant and all the independent and moderating variables are simultaneously affecting the dependent variable.

3. Partial Test (t-Test)

To determine the influence of each independent variable on the dependent variable, a partial test (t-test) is employed. There are two criteria for evaluating the findings of the partial t-test. First, if the significant value

is lower than the significance level of 0.05, the null hypothesis is rejected, indicating that the independent variables have a partial influence on the dependent variables. Second, if the significant value is greater than 0.05, the null hypothesis is accepted, and the independent variable is stated to partially not affect the dependent variable.

As can be seen from the table above, the t-test result for model 1 shows that the NPL has a regression coefficient of -0.02, with t-statistic value of -0.21 and the probability value more than 0.05, which indicate that this variable has an insignificant negative effect on the dependent variable. LDR has a regression coefficient of -0.03 with t-statistic value of -3.97 and the probability value less than 0.05, which indicate that this variable has a significant negative effect on the dependent variable. CASA has a regression coefficient of -0.12, with t-statistic value of -9.32 and the probability value less than 0.05, which indicate that this variable has a significant negative effect on the dependent variable. SBOND has a regression coefficient of 0.0001, with t-statistic value of 0.01 and the probability value more than 0.05, which indicate that this variable has an insignificant positive effect on the dependent variable. Lastly, LGR has regression coefficient of 0.03, with t-statistic value of 4.81 and the probability value less than 0.05, which indicate that this variable has a significant positive effect on the dependent variable.

For the model 2, LDR and CASA still show consistency in their significance and direction of influence, which still produces a significant negative effect on the dependent variable. Meanwhile, after being tested with the moderating variables, several variables showed different results than before. The NPL_LGR variable has a positive regression coefficient of 0.004, with a t-statistic value of 0.45 and the probability value more than 0.05, which indicates insignificant. LDR_LGR has a negative regression coefficient of -2.18E-05, with t-statistic value of -0.10 and the probability value more than 0.05, which indicates insignificant. CASA_LGR has a

positive regression coefficient of 0.001, with a t-statistic value of 0.83 and the probability value more than 0.05, which indicates insignificant. Lastly, SBOND_LGR has a positive regression coefficient of 0.01, with t-statistic value of 1.26 and probability value more than 0.05, which also indicates insignificant.

4.2. Discussion

4.2.1. The Effect of Asset Quality on Net Interest Margin

In this study, asset quality is measured using the non-performing loans (NPL) ratio as a proxy. The results of the tests conducted on both model 1 and model 2 indicate that NPL has an insignificant effect on NIM, leading to the rejection of hypothesis H1, which proposed a significant relationship. In Model 1, the analysis reveals that NPL has an insignificant negative effect on NIM. This suggests that although there is a tendency for higher NPL ratios to lead to a reduction in NIM, the effect is not statistically significant. On the other hand, Model 2 shows that NPL has a positive but similarly insignificant influence on NIM. This positive relationship suggests that there could be instances where an increase in NPL might be associated with an increase in NIM, but again, this effect is not strong enough to be considered statistically meaningful.

One possible explanation for these findings is that the NPL ratio in banks from 2017 to 2020 has remained relatively low. Despite the low number in NPL, the NIM values do not appear to reflect these changes, indicating that other variables might play a more critical role in influencing net interest income. Consequently, the minimal variation in NPL did not have a noticeable impact on the net interest income obtained by those banks. Therefore, the NPL values, which tend to be more controlled, are not capable to explain its effect on the NIM values, which tend to be more volatile and varied. The findings of this

research align with previous studies, such as the one conducted by Susilawati and Nurulrahmatiah (2021), which also concluded that NPL had no significant effect on NIM.

4.2.2. The Effect of Liquidity Risk on Net Interest Margin

In this study, liquidity risk is measured using the loan-to-deposit ratio (LDR) as a proxy. The analysis conducted on both model 1 and model 2 reveals that the LDR has a significant effect on the net interest margin (NIM). Specifically, the results show that the LDR has a significant negative influence on NIM, leading to the rejection of hypothesis H2, which stated a positive relationship between the two variables. This negative correlation suggests that as banks increase their LDR, their NIM tends to decrease. This can be attributed to liquidity tightening, where banks face increased pressure to manage their funds efficiently.

When a bank's LDR is high, it indicates that it has lent out a significant portion of its deposits, potentially limiting its liquidity and making it vulnerable to financial distress. This situation often forces banks to increase their cost of funds to maintain sufficient liquidity, especially if they need to resort to more expensive sources of funding to cover their obligations. Consequently, the increase in the LDR does not translate into an increase in NIM, as the elevated cost of funds offsets any potential gains from lending activities.

4.2.3. The Effect of Low Costs Fund on Net Interest Margin

In this study, low cost funds are measured using the current account savings account (CASA) ratio as a proxy. The analysis conducted on both model 1 and model 2 reveals that the CASA ratio has a significant effect on the net interest margin (NIM). The results from both models show that the CASA ratio has a significant negative influence on NIM, leading to the rejection of

hypothesis H3, which assumed a positive relationship between the two variables. This negative correlation suggests that as banks increase their CASA ratio, their NIM tends to decrease, contrary to the expected outcome where lower-cost funds would enhance profitability.

One possible explanation for this unexpected finding is the phenomenon of liquidity tightening, which can result in heightened competition between banks and the government to secure liquidity, commonly referred to as the "crowding out" effect. In times of economic uncertainty or fiscal tightening, governments may increase bond yields to attract investors, diverting funds away from banks. This competition for liquidity forces banks to offer "special rates" or higher interest rates to retain their customers' deposits in current and savings accounts and to maintain or increase their CASA ratio. These competitive rates can erode the cost advantage typically associated with CASA, thereby affecting the net interest margin negatively.

The necessity for banks to offer attractive rates to preserve their deposit base creates a trade-off that can impact profitability. While maintaining a high CASA ratio is generally advantageous for a bank, as it suggests a stable and low-cost funding base, the competitive pressures induced by the crowding-out effect can diminish the potential benefits. As a result, the increase in CASA does not necessarily translate into an increase in NIM, as banks must balance maintaining a competitive edge with ensuring the health of their business operations.

4.2.4. The Effect of Sustainable Bonds on Net Interest Margin

Based on tests conducted on model 1 and model 2, the results indicate that sustainable bonds have an insignificant effect on the net interest margin (NIM), leading to the rejection of hypothesis H4. In model 1, the results suggest that sustainable bonds have an insignificant positive effect on NIM, implying

that while there might be a slight tendency for sustainable bonds to enhance NIM, this effect is not statistically significant. In contrast, model 2 shows that sustainable bonds have a negative but still insignificant influence on NIM.

This lack of significant influence can be attributed to the relatively small proportion of sustainable bonds in banks' overall funding sources. Despite the growing interest in sustainable finance, the presence of sustainable bonds in banks' portfolios remains limited compared to traditional funding sources. For instance, at Bank Rakyat Indonesia (BRI), the percentage of green/sustainable bonds relative to total securities issued was only around 10% in 2023. Similarly, at Bank Mandiri, the proportion of green bonds to debt securities issued is also approximately 10%. When considering the total sources of funds available to banks, the proportion of sustainable bonds becomes even smaller, averaging only about 2%.

Given these figures, it is evident that sustainable bonds currently constitute only a minor fraction of the banks' funding strategies, leading to their negligible impact on net interest income. The limited role of sustainable bonds in funding structures suggests that their potential benefits, such as lower borrowing costs and enhanced reputation, have not yet translated into significant financial outcomes for banks. As a result, the influence of sustainable bonds on NIM remains marginal, reflecting its still-developing status within the financial ecosystem.

4.2.5. The Effect of Loan Growth as Moderating Variable on Net Interest Margin

Based on tests carried out on model 1 and model 2, it was found that loan growth did not have a significant moderating effect on the relationship between each independent variable used in this study and the net interest margin

(NIM). Despite the theoretical expectation that loan growth might influence the dynamics between these variables and NIM, the test results indicate that it does not significantly alter the nature of these relationships.

The analysis reveals that loan growth is not capable of explaining the complexity of the interactions between the independent variables and NIM, leading to the rejection of hypotheses H5, H6, H7, and H8. This finding suggests that the anticipated role of loan growth as a moderating variable might be overshadowed by other more influential factors. The lack of a significant moderating effect implies that loan growth does not have a meaningful impact on how variables like asset quality, liquidity risk, low cost fund, and sustainable bonds, affect NIM.

This could indicate that the mediating ability of loan growth is not particularly relevant to NIM, potentially due to the presence of other factors that diminish its significance. For instance, macroeconomic conditions, regulatory changes, and market competition, which might play more critical roles in shaping the relationship between the independent variables and NIM.

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The initiation to conduct this study was based on the existence of a research gap between previous studies on a specific topic of determinants factors of net interest margin (NIM) for banking companies. This study contains several objectives, which mainly is to find out what factors can have a significant effect on NIM, therefore, research was carried out on several factors, including asset quality, liquidity risk, low cost funds, sustainable bonds, and loan growth. From data that has been collected from mid-size and big-size banks listed on the Indonesia Stock Exchange (IDX) during the period 2017 to 2023, several results were found which are expected to provide additional insight for this specific research topic.

Based on the explanation in the findings and analysis chapter above, there are several results that can be pointed out. First, asset quality, which is measured using the non-performing loans (NPL) ratio, is stated to have no significant influence on NIM. Second, liquidity risk, which is measured using the loan-to-deposit ratio (LDR), is stated to have a significant negative influence on NIM. Third, low cost fund, which is measured using the current account savings account (CASA) ratio, are stated to have a significant negative influence on NIM. Fourth, sustainable bonds are stated to have no significant influence on NIM. Lastly, loan growth is stated unable to provide a significant influence in moderating the relationship between the four independent variables above and NIM.

From the results above, it can be concluded that the presence of loan growth is still not enough to explain the dynamics of the relationship between NIM, asset quality, liquidity risk, low cost funds, and sustainable bonds. Apart from that, from testing this model, it can be concluded that there are two variables that have a significant influence

on NIM, namely liquidity risk (measured by LDR) and low cost funds (measured by CASA ratio). Even though the results obtained are not in accordance with the initial hypothesis, this can actually provide insight that in real cases, the relationship between the variables tested will not always be in line with theory. This is due to the existence of other external factors which are in fact capable of intervening the relationship between variables, for instance, government policy within the period of time or other macro factors which are capable of providing a differentiating effect.

5.2. Recommendation and Limitation

This study has several implications. First, this study has expanded the theory from Ho & Saunders (1981) regarding the determinants of net interest margin (NIM), which states that the market is perfect and NIM is influenced by four factors: the degree of risk aversion, size of transaction, market structure, and interest risk. In fact, this study shows that there is another variable that has a significant influence on NIM, namely the low cost funds. Therefore, for academics, this research could expand knowledge regarding this topic, and provide insight into whether in real cases the market is imperfect.

Second, this study offers another implication for practitioners by demonstrating that, in real-world scenarios, the impact of a particular factor may diverge from theoretical expectations. This discrepancy often arises due to the influence of other variables present during the period under examination. Understanding this variation allows practitioners to craft targeted strategies that improve the financial well-being and operational efficiency of institutions, effectively bridging the gap between theory and practice. Lastly, for public/investors, by understanding these potential deviations, investors can make more informed decisions, taking into account the complexities of the market rather than relying solely on theoretical models. This awareness can help in managing risk more effectively and optimizing investment strategies to better align with actual market conditions.

However, the author also acknowledges several limitations within the scope of this study, which deserve consideration in the context of its findings and implications. One significant limitation is the exclusion of macroeconomic or country-level variables, such as the central bank interest rate, GDP growth, or inflation rate. These factors could play a crucial role in shaping the financial outcomes and trends observed within the banking sector, particularly in a developing economy like Indonesia. The absence of such variables may limit the comprehensiveness of the analysis and potentially hide broader economic influences that could impact the banking industry. Additionally, the study's focus is confined to banking companies listed exclusively in Indonesia, which may restrict the generalizability of the findings to other contexts or regions.

In light of these limitations, the author offers several recommendations for both future research and the industry to build upon and enhance the current study's framework. First, it is suggested that macroeconomic variables, such as the central bank interest rate, deposit rate, government bond yield, GDP growth, or even other factors of a government policy nature, be incorporated as moderating variables. This inclusion could provide a more nuanced understanding of the relationship between internal banking factors and broader economic conditions, potentially yielding more robust and applicable results across different time periods. Furthermore, there is a need for further research development through the exploration of additional internal variables, such as the capital adequacy ratio (CAR) or loan growth, as independent variables. These factors could offer deeper insights into the internal dynamics of banking institutions and their impact on financial performance.

The author also recommends extending the period of observation and broadening the scope of research to include a larger sample of banks or financial institutions across different regions. By increasing the number of years under study and expanding the research objects, future studies could achieve greater generalizability and relevance, allowing for more comprehensive conclusions that can be applied to a wider range of contexts. Lastly, while theoretical models provide valuable insights, the

interplay of external factors, such as macroeconomic conditions, regulatory shifts, or competition, can significantly impact NIM. Therefore, practitioners should prioritize regular monitoring and analysis of both internal and external variables affecting NIM in real time. These recommendations are aimed at refining the analytical framework and ensuring that future research on this topic is both thorough and reflective of the complexities inherent in the banking sector. The discussion could also enhance its practical implications by suggesting how banks might optimize NIM, given the findings. For instance, if low-cost funds and liquidity risk negatively affect NIM, banks might consider strategies to mitigate these issues. One of which is to focus on enhancing non-interest income through fees and commissions, as well as selectively targeting higher-yield assets within acceptable risk levels. Additionally, adopting a dynamic pricing model for loans and deposits could help sustain favorable spreads and improve margin resilience.

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