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Comparing Credit Risk Determinants: Interest free banks VS Conventional Banks in Ethiopia

***THIS THESIS IS SUBMITTED TO ADDIS ABABA
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DECLARATION

I, Anwar Nurhsien Abdu, hereby declare that this thesis entitled “Credit Risk Determinants: Interest free VS Conventional Banks in Ethiopia” submitted by me for the award of the Degree of Master of corporate finance specialization in investment management, Addis Ababa University at Addis Ababa, Ethiopia, is my original work and it has never been presented in any university. All sources and materials used for this thesis have been duly acknowledged.

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CERTIFICATION

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This is to certify that the thesis entitled, “Credit Risk Determinants: Interest free VS Conventional Banks in Ethiopia” was carried out by Anwar Nurhsien Abdu under the supervision of Tenkir Seifu (PhD), submitted in partial fulfillment of the requirements for the Degree of Master of corporate finance specialization in investment management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

This study utilized secondary panel data collected from 80–100% of Ethiopian conventional and Interest free banks, analyzed using a fixed effects regression model in E-Views, guided by the Hausman test results. The research aimed to compare the determinants of credit risk (measured as Non-Performing Loans, or NPL) for both conventional and Interest free banks in Ethiopia.

Based on empirical and theoretical reviews, it was hypothesized that NPL would exhibit:

- Positive significant relationships with real interest rate and credit growth rate.
- Negative significant relationships with GDP growth rate, capital adequacy ratio, net interest margin, income diversification, and return on assets.
- No significant relationship with bank size and market concentration ratio, for both banking models.

Key findings: For conventional banks, the credit growth rate had a positive significant relationship with NPL. Conversely, return on assets, net interest margin, GDP growth rate, and bank size exhibited negative significant relationships. The market concentration ratio showed no significant relationship with NPL, confirming expectations. However, variables such as real interest rate, capital adequacy ratio, and income diversification unexpectedly lacked significant relationships with NPL. For Interest free banks, real interest rate and capital adequacy ratio showed positive significant relationships, while bank size had a negative significant relationship with NPL. As anticipated, the market concentration ratio demonstrated no significant relationship. However, other variables, including GDP growth rate, credit growth rate, net interest margin, income diversification, and return on assets, did not display significant relationships with NPL, contrary to initial expectations.

These results highlight both similarities and differences in the determinants of credit risk for Interest free and conventional banks. Variations can be attributed to differences in economic environments, banking practices, and regulatory frameworks. The findings offer valuable insights for policymakers to consider when designing policies and regulations for the banking sector.

Keywords: credit risk, Non-Performing loan, Interest free banking, Conventional banking

LIST OF ACRONYMS

BID = Bank income diversification rate

CAR= Capital adequacy ratio

CDs = certificates of deposit

CGR = Credit Growth rate

CPI= Corruption perception index

GDP =Gross Domestic product

IRAs = individual retirement accounts

LnCnR= Natural logarithm of concentration

LnSz= Natural logarithm of bank size

NIM= Net interest margin

NPL =credit risk (Non-performing loan)

RIR= Real Interest rate (interest rate - inflation rate)

ROA= Return on Asset

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1. CHAPTER ONE- INTRODUCTION

1.1. BACKGROUND

A bank is a financial institution that is licensed to accept checking and savings deposits and make loans. Banks also provide related services such as individual retirement accounts (IRAs), certificates of deposit (CDs), currency exchange, personal loans, and safe deposit boxes. Interest free banking, also referred to as Interest free finance or Shariah-compliant finance, refers to financial activities that adhere to Shariah (Interest free law). Two fundamental principles of Interest free banking are the sharing of profit and loss and the prohibition of the collection and payment of interest by lenders and investors (Investopedia).

Interest free Banks operate based on Shariah law, which prohibits interest (Riba) and promotes risk-sharing. This means that Interest free banks often engage in profit-and-loss sharing arrangements, such as Mudarabah (profit-sharing) and Musharakah (joint venture), where both the bank and the borrower share the risks and rewards. Interest free Banks tend to have lower credit risk exposure due to the risk-sharing nature of their financial products. The prohibition of speculative activities (Gharar) also reduces exposure to high-risk investments. However, Interest free banks may face higher operational risks due to the complexity of Shariah-compliant contracts. Interest free Banks use asset-backed financing methods such as Murabaha (cost-plus financing), Ijarah (leasing), and Istisna (manufacturing contracts). These products involve tangible assets, which can mitigate credit risk.

Conventional Banks operate on an interest-based system where the bank lends money and earns interest regardless of the borrower's financial performance. The primary risk management tool is collateral, and the bank bears the credit risk if the borrower defaults. Conventional Banks have higher credit risk exposure as they rely heavily on interest-based lending. The focus is on the borrower's ability to repay the loan with interest, which can be affected by economic downturns and changes in interest rates.

Conventional Banks offer a wide range of interest-based products like personal loans, mortgages, and credit cards. The credit risk is primarily managed through credit scoring and collateral.

Generally, Both Interest free and conventional Banks have a fundamental role in a Country's Economic growth (Shaheen et al, 2024). Success in financial institutions such as banks would have a considerable developmental role on the economy of countries.

Definition of credit is the realistic belief or expectation, upon which a lender is willing to act, that funds advanced will be repaid in full in accordance with the agreement made between the party lending the funds and the party borrowing the funds (J. Golin & P. Delhaise). According to CFI, "risk is defined as the probability of deviation of the actual results from expected results." Combining both we can define the credit risk as "credit risk is the risk resulting from uncertainty in counterparty's ability or willingness to meet its contractual obligations. In this study NPL is used as a proxy for the credit risk. By definition, a loan is considered non-performing when its payment is past due by at least 90 days (IMF, 2005, p. 8)

The critical role of non-performing loans (NPLs) in bank failures is well-documented, particularly following financial crises (Salas & Saurina, 2002; Samad, 2012). The US subprime mortgage crisis starkly illustrated this, highlighting NPLs as a key indicator of systemic risk. This crisis, the most severe since the Great Depression, overwhelmed regulators and exposed the fragility of the global financial system. The surge in NPLs not only crippled US banks but also triggered a domino effect, impacting interconnected financial institutions worldwide.

Similarly, the Eurozone crisis underscored the devastating impact of accumulated NPLs. In 2013, EU banks held €1 trillion in NPLs (ECB, 2017), with Greece and Cyprus experiencing alarmingly high ratios of 46% and 45%, respectively (ECB, 2017). Major European economies like Spain, Italy, Portugal, Slovenia, and Ireland were also severely affected, teetering on the brink of collapse due to their substantial NPL stockpiles. This crisis led to increased funding costs and undermined the entire European financial sector.

However, the uneven distribution of NPLs across the EU, with countries like Finland and Luxembourg maintaining ratios below 2%, presented a significant puzzle. This disparity has fueled academic and policy interest in understanding the drivers of loan losses. Consequently, NPLs have become a top priority for policymakers, who recognize their profound impact on economic stability.

Banks are financial intermediary, which is, it collects money from the savers (surplus) and lends to the borrowers (deficit). Bank's failure affects the economy negatively, let alone to the huge number of savers. Among other risks, credit risk can ruin the banking sector. Hence, the credit risk matters a lot for Both Interest free bank or conventional bank.

According to Maryem Naili & Younes Lahrichi (2019), 1980s financial crash in the US and the 1990s and 2000s Asian financial crises was caused by unmanaged credit risk. Similarly, the disaster of the European credit crisis was caused by credit risk. The world was also affected by these crises and had a negative impact on their financial and economical developments. Central bankers agreed that the credit risk expressed in the level of NPL carried by commercial banks was the main point that needs to be addressed so as to avoid from happening similar problems.

According to NATIONAL Bank of Ethiopia (NBE), International banking history reveals that credit risk poses the greatest risk. Loan defaults are a major driver of bank failures globally, highlighting the critical need for banks to manage credit risk effectively, both at the portfolio level and for individual loans.

To avoid failure and make positive growth banks have to manage risks associated with them. Credit risk is generally segmented into two components: systematic and unsystematic. Systematic risk arises out of fluctuations in economic, social and political circumstances and affects all financial (capital and monetary) markets and securities (financial assets) that are traded in markets (Yurdakul, 2014). Unsystematic credit risk is subject to the characteristics of the industry in which the firm operates. It is composed of elements such as poor management, new innovations, technological developments, and changes in consumer preferences. Management, operational, financial and industrial risks

are identified as unsystematic risks (Yurdakul, 2014). In the business model of banks, loans are the main and profitable operation of the banks. Hence, Identification of Factors that determine the credit risk of banks will help regulators and policy makers in regulating the banking sector.

Even if the conventional banks have been in operation for long periods, currently Interest free banking (Interest free banking) is expanding in Ethiopia and globally. According to Shaheen et al, (2024) Interest free Banking Industry is growing its importance around the world, and not only in the Interest free world but also in non-Interest free countries of the world.

Credit risk management has been practiced for long in conventional banks. Finding and comparing whether the credit risk determinants of conventional banks with the newly expanding Interest free banking shortens the learning curve. Managing credit risk is done by identification, understanding, and measuring of the risk factors. Making such comparative research will give an insight to Professionals in the regulatory body and banks management.

1.2. PROBLEM STATEMENT

Ethiopian banking business like many other countries comprises both Interest free and conventional banks. Each type of bank operates under different principles and frameworks, which can significantly influence their credit risk profiles. Despite the growing presence of Interest free banking in Ethiopia, there is limited empirical research comparing the determinants of credit risk between Interest free and conventional banks in the country. This gap in the literature presents a challenge for policymakers, regulators, and banking professionals who seek to understand the unique risk factors associated with each banking system.

The primary problem addressed in this thesis is the lack of comprehensive comparative analysis on the determinants of credit risk in Interest free versus conventional banks in Ethiopia. Specifically, the study aims to identify and compare the key factors that

influence credit risk in both types of banks, and to assess how these factors impact the overall stability and performance of the banking sector.

1.3. BASIC RESEARCH QUESTION

This research will try to address the problem by answering the following questions as a research question.

Q1. What are the key determinants of credit risk in Interest free banks in Ethiopia?

Q2. What are the key determinants of credit risk in conventional banks in Ethiopia?

Q3. How do the determinants of credit risk differ between Interest free and conventional banks?

Q4. Which of these determinants have is the largest impact on the stability and performance of the banking sector in Ethiopia?

1.4. OBJECTIVES

This study aims to investigate and compare the credit risk metrics that can be employed by Interest free banks and Conventional banks operating in Ethiopia. The paper will have four objectives.

Objective1. To identify the determinants of credit risk in Interest free banks in Ethiopia

Objective2. To identify the determinants of credit risk in conventional banks in Ethiopia

Objective3. To compare the credit risk determinants between Interest free and conventional banks

Objective4. To evaluate the impact of these determinants on the stability and performance of the banking sector

1.5. SIGNIFICANCES

According to the bank for international settlements (2000), credit risk is the leading source of financial stability in the banking sector. Furthermore, Interest free bank is new but growing fast segment of the financial sector; especially in Ethiopia sharia complaint banks are new. Studies in the credit risk management across the conventional and Sharia compliant banks are rare.

This study will provide valuable insights for policymakers, regulators, and banking professionals by highlighting the unique risk factors associated with Interest free and conventional banking systems. The findings will help in formulating effective risk management strategies and regulatory policies tailored to the specific needs of each banking system, thereby enhancing the overall stability and performance of the Ethiopian banking sector.

1.6. SCOPE

The scope of this thesis on credit risk determinants in banks, with a focus on comparing Interest free and conventional banks, encompasses several key areas. I will explore the various factors influencing credit risk, such as macroeconomic variables, bank-specific characteristics, and regulatory frameworks. This includes examining how elements like bank size, profitability, capital adequacy, and market conditions impact credit risk differently in Interest free versus conventional banking systems. By comparing the two banking models, my research aims to provide insights into their respective strengths and weaknesses in managing credit risk, ultimately contributing to the broader understanding of financial stability and risk management in the banking sector.

1.7. LIMITATION

The study will acknowledge potential limitations, such as data availability, and the variability of the data time since the establishment of Interest free banks has happened recently, the accuracy of self-reported data, and the generalizability of findings to other

contexts. Last but not least, acknowledging these limitations the research will try to overcome these shortcomings as far as possible.

1.8. ORGANIZATION OF THE PAPER

This research paper will be organized in such a way that both theoretical and empirical literatures will be reviewed along with the conceptual frame of work and hypothesis in section two. In section three possible methodologies will be discussed and a selection the efficient methodology for the paper will be selected and employed. Collection of data and analysis will be part of this section.

In section four the result of the research will be presented accompanied by conclusion and recommendation.

2. CHAPTER TWO- LITERATURE REVIEW

2.1 THEORETICAL REVIEW

2.1.1 *What is risk*

When we say risk we are not saying uncertainties. These two terms, risk and uncertainties are related in a way that one is the subset of the other but not same. Historically, Knights (1921) approached risks on basic mathematical theory that ‘risk’ arises from randomness with knowable probabilities, whereas ‘uncertainty’ reflects randomness with unknowable probabilities. Putting it in more simple words, according to Knight, risk is measurable uncertainty.

According to the Risk doctor David Hillson however risk is defined as “risk is ‘uncertainty that matters’ (Hillson 2004, 2009)”

In modern days risk is defined more on short and precise phrases. According to the International organization for standardization (ISO 31000) risk is defined as “the effect of uncertainty on objectives, whether positive or negative.” This definition is far apart from Conventional definition of risk involves the exposure to danger, with potential for injury or loss.

Furtherer, ISO31000 classifies risks into three categories:

1. Hazard (if the uncertain event occurs, there will be negative outcomes)
2. Control (the results of the uncertainty are themselves uncertain)
3. Opportunity (if the uncertain event occurs, there will be positive outcomes)

Risks can be categorized in various ways depending on the context. Here are some common classifications:

Broad Categories of Risk

- **Strategic Risk:** This arises from an organization's business strategy and objectives. It includes risks related to market changes, competition, technology shifts, and economic conditions.
- **Operational Risk:** This encompasses risks associated with day-to-day operations, including human error, systems failures, supply chain disruptions, and natural disasters.
- **Financial Risk:** This involves risks related to an organization's financial performance,
- **Compliance Risk:** This refers to the risk of violating laws, regulations, or industry standards, leading to legal and financial consequences.

Other Risk Classifications

- ♠ **Systematic Risk:** Affects the entire market or economy (e.g., interest rate risk, inflation).
- ♠ **Unsystematic Risk:** Affects a specific company or industry (e.g., product recall, lawsuit).
- ♠ **Pure Risk:** Involves only the possibility of loss (e.g., natural disasters, accidents).
- ♠ **Speculative Risk:** Involves the possibility of both gain and loss (e.g., investing in stocks).

2.1.2 Financial risk

As far as I searched, the definition of financial risk can be summarized as “Financial risk is defined as the probability of incurring a financial loss in investment or business activities” It's the uncertainty about the potential financial loss or gain associated with a particular financial decision. This definition of financial risk is in some way differs from the context of the definition of ISO31000. It focuses on the negative side of the risk. There exists a theoretical gap between these two definitions.

However, Williams (1998) defines financial risk as “Financial risk is a potential variation in outcomes and exposure to a potential loss”. Similarly, (Khan and Jain, 2004) defines Financial risk is as “financial risk is the variability of the actual return from the expected returns associated with a given asset or investment”

In addressing the specific financial risk it worth’s classifying financial risk. Hence, Based on the cause’s financial risk can be classified into

- * **Market Risk:** This arises from fluctuations in market prices, such as interest rates, exchange rates, and stock prices. It can impact investments, derivatives, and businesses with exposure to these markets.
- * **Credit Risk:** This refers to the risk of loss caused by a borrower's default on a debt obligation. It's prevalent in lending, bond investments, and trade credit.
- * **Liquidity Risk:** This refers to the risk of not having enough cash or liquid assets to meet financial obligations. It can affect businesses, individuals, and financial institutions.
- * **Operational Risk:** This encompasses the risk of losses due to inadequate or failed internal processes, people, and systems, or external events. It includes fraud, errors, natural disasters, and system failures.
- * **Legal Risk:** This refers to the risk of financial loss due to lawsuits, regulatory violations, or changes in legislation.
- * **Foreign Exchange Risk:** This is the risk of loss due to fluctuations in exchange rates, affecting international trade and investments.
- * **Interest Rate Risk:** A subtype of market risk, this refers to the risk of loss due to changes in interest rates, affecting bond prices and investment returns.
- * **Equity Risk:** This is the risk of loss in the value of stocks or other equity investments.
- * **Counterparty Risk:** This refers to the risk that the other party to a financial contract will default on their obligations.
- * **Model Risk:** This arises from relying on incorrect or flawed financial models for decision-making.

2.1.3 Credit risk

we can define credit as ‘A transaction between two parties in which one (the creditor or lender) supplies money, goods, services or securities in return for a promise of future payment by the other (the debtor or borrower) (Ciby Joseph, 2013). In the world we live to day credit plays a life blood role for the economy, hence indicating the importance of managing risk emanating for the credit.

According to Ciby, the world economy survives because a small percentage of debtors won’t pay back their credit as promised and majority of debtors meet their commitment. However, He stressed that the exponential growth of credit and credit products in recent decades has proven a big challenge not only to the leaders of in the finance sector but also to the bank regulators of several countries. The 2008 Global credit Crises that negatively impacted the financial world can be taken as an example.

Credit [is] nothing but the expectation of money, within some limited time. (John Locke)

Credit is at the heart of not just banking but business itself. Every kind of transaction except, maybe, cash on delivery—from billion-dollar issues of securities to getting paid next week for work done today— involves a credit judgment. . . . Credit . . . is like love or power; it cannot ultimately be measured because it is a matter of risk, trust, and an assessment of how flawed human beings and their institutions will perform. (R. Taggart Murphy)

According to investopedia “Credit risk is the probability of a financial loss resulting from a borrower's failure to repay a loan. Essentially, credit risk refers to the risk that a lender may not receive the owed principal and interest, which results in an interruption of cash flows and increased costs for collection”. According to Ciby, credit risk is the probability of financial loss due to counterparty’s inability or unwillingness to honor their contractual debt obligations, regardless of the cause, Similarly, According to the Basel III framework, credit risk is defined as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms.

However, this definition lacks to address the complete aspects of credit risk. Creditors end up losing even if the debtor pays back its principal and interest in the following situations

- a) In situation inflation rate is more than interest rate.
- b) In situation of devaluation of foreign currency

Hence, the definition lacks to address these issues. Moreover, a risk doesn't have only negative component but also positive component in the definition of ISO31000.

Credit risk originates from the possibility of an impairment resulting in economic loss to the financial institution. Specifically, bank credit risk arises from loans and advances to customers as well as off balance sheet activities including guarantees, undertakings and letters of credit (Lawrence Asamoah & Doris Adjare, 2015).

Banks plays the biggest role in the credit worldwide. Banks are among the important suppliers of credit in any country with the same argument they are main players in Ethiopia credit market. Banks lend money for individuals and institutions to make profit. The large stake of those banks profit is from the lend money interest and related fees. But, those banks faces a challenge of collecting the money they lend which we call credit risk (Basel Committee, 2001). Hence credit risk is vital to the survival of banks. Accordingly, credit risk is one of the primary concerns of commercial banks and regulators.

2.1.4 Conventional Banks

Conventional commercial banks have a long history dating back to ancient civilizations, where early forms of banking were practiced in Mesopotamia, Greece, and Rome. However, modern banking as we know it began in the Renaissance period with the establishment of banks like the Medici Bank in Italy. The 17th century saw the creation of the Bank of England, which set the foundation for central banking and the regulation of commercial banks. Over the centuries, commercial banks evolved to become integral

parts of the financial system, providing essential services such as deposit-taking, lending, and payment processing.

Conventional commercial banks operate on the principle of financial intermediation, which involves channeling funds from savers to borrowers. They accept deposits from individuals and businesses, offering various types of accounts such as savings, checking, and fixed deposits. These deposits form the primary source of funds for the bank. In return, depositors earn interest on their savings, though the rate is typically lower than the interest charged on loans. Hence, this difference between the interest paid on deposits and the interest earned on loans is referred to as net interest margin (NIM), where conventional banks consider it as main source of their profit.

Another fundamental principle is the provision of credit. Commercial banks lend money to individuals, businesses, and governments for various purposes, including personal loans, mortgages, business loans, and credit lines. The lending process involves assessing the creditworthiness of borrowers through credit scoring and risk assessment models. Banks charge interest on these loans, which is higher than the interest paid on deposits, allowing them to generate income. Additionally, banks may offer other financial services such as wealth management, foreign exchange, and payment processing, further diversifying their revenue streams.

Commercial banks also adhere to principles of liquidity and solvency to ensure they can meet their obligations. Meeting short term demands such as customers withdrawals by maintaining sufficient cash can be termed as liquidity management. This is achieved through a mix of cash reserves and easily sellable securities. Solvency, on the other hand, ensures that the bank's assets exceed its liabilities, maintaining financial stability and trust among depositors and investors. Basel III accords have set regulatory framework such as capital adequacy ratio in order to help ensure that banks operate within safe and sound parameters.

Credit risk is a significant concern for commercial banks, as it represents the potential for losses due to borrowers failing to meet their debt obligations. This risk can arise from various financial instruments, including loans, bonds, and derivatives. The primary

drivers of credit risk include the borrower's creditworthiness, economic conditions, and the bank's exposure to specific sectors or regions. Managing credit risk entails assessing the probability of default and loss given default, which helps banks determine appropriate interest rates, loan terms, and reserve requirements. By maintaining a diversified loan portfolio and implementing robust credit assessment frameworks, banks can mitigate the role of credit risk on their financial stability.

To manage credit risk, commercial banks employ various strategies and tools. These include credit scoring models, stress testing, and credit derivatives. Credit scoring models evaluate the likelihood of a borrower defaulting based on historical data and predictive analytics. Stress testing helps banks understand how their portfolios would perform under adverse economic scenarios, allowing them to adjust their risk exposure accordingly. Additionally, credit derivatives, such as credit default swaps, enable banks to transfer credit risk to other financial institutions. By continuously monitoring and adjusting their practices of credit risk management, commercial banks can improve their capability against potential defaults and maintain their overall financial health

2.1.5 *Interest free banks*

Interest free banking, also known as Sharia-compliant finance, has its roots in the principles of Interest free law (Sharia), which prohibits the collection and payment of interest (riba) and emphasizes profit-sharing and ethical investments. The modern resurgence of Interest free banking began in the 1960s, with the establishment of the first interest-free banks in Egypt and Malaysia. The sector gained significant momentum in the 1970s and 1980s, with the founding of major institutions like the Interest free Development Bank in 1975. Today, Interest free banking has grown into a global industry, with over 560 banks and 1,900 mutual funds operating in compliance with Interest free principles. The high demand for ethical financial products and economic development has led to the growth Interest free banks in The Muslim-majority countries.

Interest free commercial banks operate based on the principles of Shariah law, which prohibits the payment or receipt of interest (riba). Instead, they engage in profit and loss

sharing arrangements, such as Mudarabah (profit-sharing) and Musharakah (joint venture). These banks also use trade-based modes of financing like Murabaha (cost-plus financing) and Ijarah (leasing). The focus is on ethical investments and ensuring that all financial transactions are backed by tangible assets. This approach aims to promote fairness and transparency in financial dealings, aligning with the ethical and moral values of Islam¹.

In contrast, conventional banks operate on an interest-based system where the primary source of income is the interest charged on loans and advances. They offer a wide range of financial products, including savings accounts, fixed deposits, and various types of loans, all of which involve interest payments. Conventional banks are driven by profit maximization and often engage in speculative activities, which can sometimes lead to financial instability. Their operations are governed by secular laws and regulations, focusing primarily on financial performance and shareholder value².

One of the key differences between Interest free and conventional banks is their approach to risk management. Interest free banks share risks with their customers through profit and loss sharing mechanisms, which can lead to a more stable financial environment. This risk-sharing model encourages prudent lending and investment practices, as both the bank and the customer have a vested interest in the success of the venture. On the other hand, conventional banks transfer most of the risk to the borrower, which can sometimes result in higher default rates and financial crises³.

Despite these differences, both types of banks aim to provide financial services to individuals and businesses. However, Interest free banks often emphasize social justice and economic development, ensuring that their operations contribute positively to society. Conventional banks, while also contributing to economic growth, primarily focus on profitability and efficiency. The choice between the two banking systems often depends on the customer's ethical beliefs, financial needs, and risk tolerance.

Credit risk management in Interest free commercial banks is distinct due to the principles of Shariah law, which prohibits interest (riba) and emphasizes risk-sharing. Interest free banks manage credit risk by engaging in profit-and-loss sharing contracts, such as

Mudarabah (profit-sharing) and Musharakah (joint venture), where both the bank and the borrower share the investment risk. This approach inherently aligns the interests of both parties, encouraging prudent risk management and reducing the likelihood of default. Additionally, Interest free banks often require tangible assets as collateral, which can be sold in case of default, further mitigating credit risk.

In contrast, conventional banks primarily rely on interest-based lending and use various financial instruments to manage credit risk, such as credit derivatives and securitization. These banks assess creditworthiness through credit scoring models and maintain capital reserves as per Basel III regulations to absorb potential losses. While conventional banks have more flexibility in their risk management tools, they also face higher exposure to systemic risks due to their interconnectedness with global financial markets. Overall, while both banking systems aim to minimize credit risk, Interest free banks' risk-sharing mechanisms and asset-backed financing provide a unique approach compared to the interest-based models of conventional banks

2.2 EMPIRICAL REVIEW

2.2.1 Credit risk measurement

The last two decades have witnessed the development of a range of credit risk measurement techniques, broadly grouped as follows: accounting based, external ratings agencies, and market based (Nurul Kabir, et al, 2022). Non-performing loan (NPL) analysis, and Altman's- Z score can be described as the accounting based credit risk measurement technique. Recently Merton's probability of Default (DD), value at risk (VAR), Credit Metrics TM are actively used in measuring credit risk based on the market data. Moreover, other system of measuring credit risk is using credit rating agencies such as poor's Moody's and others ratings.

In this research, the accounting based measuring technique is to be used. This is due to the lack of availability of market data on stock prices on Ethiopian context, creating a problem to estimate the standard deviation component.

A stage 3 or non-performing loan (NPL) is a loan category that is in default due to the fact that the borrower has not made the scheduled payments for a specified period. Although the exact elements of nonperforming status can vary depending on the specific loan's terms, "no payment" is usually defined as zero payments of either principal or interest. (<https://www.investopedia.com>)

The specified period also varies, depending on the industry and the type of loan. Generally, however, the period is 90 days or 180 days. (<https://www.investopedia.com>)

Many researchers such as Yuksel (2017), Ahmed and Arif (2007), Salim et al (2016), Fiordelisi et al (2010), Misman et al (2019), Nurul Kabir et al (2022), Gizaw Tole et al (2019), Ghosh (2017), Salas & Saurina, (2002), Louzis et al. (2012), Zhang et al., (2016), Shehzad, De Haan, & Scholtens, (2010) are used NPL ratio as proxy for credit risk . Hence among the alternative ways of measuring credit risk NPL ratio is selected.

Furthermore, NPL ratio can be used for both banking systems: for conventional banking system and for the sharia compliant banking system. A ratio of Non-performing loan (Stage 3) to total loan exposure is a widely used standard statistics for evaluating financial performance of banks (Serwa, 2013).

2.2.2 Determinants of Credit Risk in both Conventional Banks and Interest free Banks

Research on the determinants of credit risk in banks is extensive, with most studies categorizing influencing variables into three major classifications: external factors, internal (bank-specific) factors, and industry-specific factors. External factors such as economic growth (GDP), real interest rate, and corruption perception index have been widely examined by various researchers, as they shape the macroeconomic environment

in which banks operate. Meanwhile, internal bank-specific factors—such as capital adequacy ratio (CAR), credit growth rate, net interest margin (NIM), income diversification, and management performance (measured through return on assets, ROA)—are crucial indicators of a bank’s financial stability and risk exposure. Lastly, industry-specific factors considered in this study include bank size and market power (concentration), both of which influence the competitive dynamics and operational strategies of financial institutions.

These determinants were chosen because they collectively capture the multifaceted nature of credit risk. External factors reflect the broader economic climate, internal factors highlight the financial health and strategic decisions within banks, and industry-specific factors account for structural characteristics affecting credit risk management. This holistic approach ensures a comprehensive analysis of credit risk drivers.

In the Ethiopian banking industry, these variables are particularly relevant due to the country’s unique financial landscape. Ethiopia’s banking sector operates in a developing economy with a largely closed financial system, making external factors like GDP growth and interest rates crucial indicators of economic fluctuations affecting credit risk. Internal factors, such as capital adequacy and credit growth, are essential for assessing the resilience of banks, especially in a sector undergoing rapid expansion and regulatory changes. Additionally, market concentration remains a critical industry-specific factor, given that Ethiopia's banking industry is dominated by a few large institutions, such as the Commercial Bank of Ethiopia, which influences credit risk dynamics across the sector.

By selecting these factors, this study aims to provide insights into the key risks faced by Ethiopian banks, contributing to more effective credit risk management and policy development in the country's financial sector.

2.2.2.1 External Factors

1. **Economic Growth (GDP):-** Non-performing loan (NPL) is determined by the GDP growth. Researchers such as Louzis et al (2011), Jimenez and Saurina
-

(2004), Khemraj & Pasha (2009), have found strong negative relationship between NPL and GDP growth. They reasoned out that economic growth creates profit for corporations consequently for individuals creating capability to pay back their loan there by creating NPL to reduce. To the contrary decrease in economic growth creates shortage of revenue creating difficulty to pay back their loan, this creates increase NPL.

Beck, Demirgüç-Kunt, and Levine (1999): have found a negative correlation between NPL and GDP growth rate, suggesting that higher NPL ratios are associated with lower GDP growth rates. Demirgüç-Kunt and Detragiache (1998): got similar findings a negative relationship between GDP growth and NPLs, particularly in developing countries.

2. **Real interest rate (RIR):-** According to Kabir Md. Nurul & Andrew Worthington (2022) the real interest rate which is the net value of between nominal interest and inflation affects the NPL of banks. They explain that the relationship between real interest rate and NPL is positive. An increase in real interest rate may lead to an increase the cost of capital to the borrower which in return puts the borrower in difficult situation for repayment, hence this increases the NPL.

Even if the sharia compliant banks operate on the bases of interest free principle, in practice the banks use real interest rate as bench mark for their operation. This is because they are operating on the same jurisdiction with the conventional bank the Interest free banks are also affected by the real interest availed within the jurisdiction.

3. **Corruption Perception Index (CPI):-** A high level of corruption often indicates weak governance and a lack of accountability, which can create opportunities for fraudulent activities and mismanagement of financial resources. This can lead to higher NPLs as loans may be granted based on political connections or personal interests rather than sound economic principles. However, High NPLs can create a moral hazard problem, where borrowers may expect to be bailed out by the government or other institutions, reducing their incentive to repay their loans. This can contribute to a culture of corruption and impunity.

Mishra and Sahoo (2011): in their study they found a positive correlation between corruption and NPLs in developing countries, suggesting that higher levels of corruption can increase the likelihood of loan defaults. Similarly, Chen and Wang (2015): analyzed data from Chinese banks and found that banks operating in regions with higher levels of corruption were more likely to have higher NPLs.

2.2.2.2 Bank specific Factors

1. **Capital Adequacy ratio (CAR):-** A higher CAR allows banks to maintain a larger loan portfolio, which can increase revenue but also expose them to higher credit risk. It also provides a cushion to absorb losses from NPLs without jeopardizing the financial stability of banks.

A regulatory standard requires Banks to maintain a minimum CAR percentage. A lower CAR can increase the risk of regulatory actions and fines. Following the 2008 worldwide financial crises, bank of international settlements (BIS) proposed Basel III, accordingly a CAR of at least 10.5% should be kept by banks. This is 2% increase from pervious requirement of Basel II which was 8.5% (Li et al, (2016).

Higher CAR is indicates bank's ability to survive even in case of loss. Thus, it increases the trust of depositors towards the bank to deposit more money which increases bank's liquidity and ability to generate profit (christaria, kurnia, (2016)

According to the result of Sinkey & Greenawalt, (1991) banks with higher CAR have a high loan quality and also lower NPL ratio. Another researchers, Beck, Demirgüç-Kunt, and Levine (1999): found a negative correlation between CAR and NPLs, suggesting that banks with higher CARs are less likely to experience loan defaults. Demirgüç-Kunt and Detragiache (1998) also found a negative relationship between CAR and NPLs, particularly in developing countries.

2. **Credit Growth ratio (CGR):-** Excessive credit growth can contribute to asset price bubbles, which may eventually burst, causing economic downturns and

increasing NPLs. credit growth has been identified as one of the most important causes of increasing Non performing Loan (Clair, 1992). A positive correlation between credit growth and NPLs, was found many researchers such as (Demirgüç-Kunt and Detragiache (1998), Peric & Konjusak, 2017; Salas & Saurina, 2002; Vithessonthi, 2016) , Bhattacharya and Thakor (2007). Suggesting that rapid credit expansion can increase the risk of loan defaults.

The variable is constructed by finding the annual percentage in loan portfolio in each bank.

3. **Net Interest margin (NIM):-** is a financial ratio that measures a bank's profitability from its lending activities. It is calculated as the difference between interest income and interest expense, divided by average earning assets.

A high NIM generally indicates a bank's ability to generate profits from its lending activities, while high NPLs can erode profitability of banks. Banks that are high NIM may be more inclined to lend to riskier borrowers in order to maintain or increase its interest income. This can increase the risk of NPLs.

Bhattacharya and Thakor (2007): in their study found that banks with higher NIMs may be more likely to engage in riskier lending practices. Chen and Wang (2015): analyzed data from Chinese banks and found a negative relationship between NIM and NPLs, suggesting that banks with higher NIMs may be more resilient to economic downturns. Beck, Demirgüç-Kunt, and Levine (1999): also found a negative correlation between NIM and NPLs, suggesting that banks with higher NIMs may be more likely to engage in riskier lending practices.

4. **Bank Income Diversification (BID):-** refers to a bank's strategy of generating revenue from multiple sources, rather than relying solely on interest income from loans. This can include fees from non-interest-bearing services, investment income, and other sources. It is constructed as the ratio of non-interest income to total income.

Many studies found a negative correlation between income diversification and NPLs, suggesting that banks with more diversified income streams are less likely to experience loan defaults. The following researches (Ghosh, (2017); Koju et al.,

(2018); Louzis et al., (2012); Stiroh, (2004) Beck, Demirgüç-Kunt, and Levine (1999), Demirgüç-Kunt and Detragiache (1998)

5. **Management performance (ROA):-** A higher ROA indicates that a bank is generating more profits relative to its assets, which can provide a buffer against losses from NPLs. Banks with lower ROAs may be more willing to take on riskier loans in an attempt to boost their profitability, which can increase the likelihood of NPLs. This variable can be constructed as a ratio of net income to total assets. Kabir Md.Nurul, Andrew Worthington (2022), Beck, Demirgüç-Kunt, and Levine (1999); Demirgüç-Kunt and Detragiache (1998) Chen and Wang (2015) have found a negative relationship between ROA and NPL.

2.2.2.3 Industry specific factors

1. **Bank Size (LnSz):-** While larger banks may have certain advantages, they can also be more exposed to the risk of NPL. Larger banks often have a more diversified loan portfolio, which can reduce their exposure to credit risk. However, they may also be more likely to take on riskier lending practices to maintain their growth.
Chen and Wang (2015): found in their analyzed data from Chinese banks and found that larger banks were more likely to have higher NPLs, particularly during periods of economic stress. However, Beck, Demirgüç-Kunt, and Levine found that a U-shaped relationship between bank size and NPLs, suggesting that both very small and very large banks may be more vulnerable to NPLs. Smaller banks may have limited resources and expertise, making them more susceptible to risks and less able to manage NPLs effectively. Larger banks may be more exposed to systemic risks, such as economic downturns or financial crises, which can increase their NPLs.
According to Mohammed M.I.Alkhawaja & Sakir Gormus, interest free banks are negatively affected by asset size.

The variable is constructed as the natural logarithm of total assets of a bank.

2. **Concentration Ratio (LnCnR):-** Concentration in the banking industry refers to the degree to which a few large banks dominate a market. It can have significant implications for competition, pricing, and financial stability, which can ultimately affect the level of Non-Performing Loans (NPLs). A highly concentrated banking market can give banks greater market power, enabling them to demand higher interest rates and stricter terms from borrowers. This can raise the risk of NPLs. A lack of competition can lead to lower incentives for banks to reduce costs and enhance their efficiency, which can also increase the risk of NPLs. A highly concentrated banking system can pose a greater systemic risk, as the failure of a few large banks can have a significant impact on the entire economy. This Concentration ratio variable will be constructed as the sum of squared market share of the top 5 largest banks or HHI.

Bhattacharya and Thakor (2007): This study found that increased competition can lead to riskier lending practices and higher NPLs. Similarly in the study made in china by Chen and Wang (2015) found a positive relationship between bank concentration and NPLs, particularly during periods of economic stress. However research done by Beck, Demirgüç-Kunt, and Levine (1999) have found a U-shaped relationship between bank concentration and NPLs, suggesting that both very low and very high levels of concentration can increase the risk of NPLs.

2.3 GAP WITH IN THE LITERATURE

The gap I have found within the literature is the incompatibility of the definition between financial risk and risk. Risk is defined in “The effect of uncertainty on objectives.”

This definition emphasizes that risk is not solely about negative outcomes but also includes the potential for positive or unexpected consequences. It acknowledges

that uncertainty is inherent in all activities and that effective risk management involves understanding and addressing both the potential benefits and drawbacks of uncertain events.

To the contrary the sub-set of risk which is financial risk is defined on the negative way only. Financial risk is the possibility of losing money on an investment or a business venture. Even the subsets of risk such as credit risk, market risk, liquidity risk and interest risk are defined in the negative perspective as a potential for loss due to uncertainty.

Here the lack of coherence in definition between the parent and subset looks like there is a gap in undertaking within the literature.

2.4 CONCEPTUAL FRAMEWORK and HYPOTHESIS

From the literatures reviewed above the following seventeen hypotheses are proposed to be tested so that we can able to answer the research question above.

H₁: There is a negative relationship between the GDP and NPL in both Conventional and Interest free banks

H₂: There is a positive relationship between the Real interest rate and NPL in both Conventional and Interest free banks

H₃: There is a positive relationship between the Corruption perception index and NPL in both Conventional and Interest free banks

H₄: There is a negative relationship between the capital adequacy ratio and NPL in both Conventional and Interest free banks

H₅: There is a positive relationship between the Credit Growth rate and NPL in both Conventional and Interest free banks

H₆: *There is a negative relationship between the Net Interest margin and NPL in both Conventional and Interest free banks*

H₇: *There is a negative relationship between the Bank income diversification and NPL in both Conventional and Interest free banks*

H₈: *There is a negative relationship between management performance expressed in ROA and NPL in both Conventional and Interest free banks*

H₉: *There is no relationship between the Bank size and NPL in both Conventional and Interest free banks*

H₁₀: *There is no relationship between the competition expressed in concentration and NPL in both Conventional and Interest free banks*

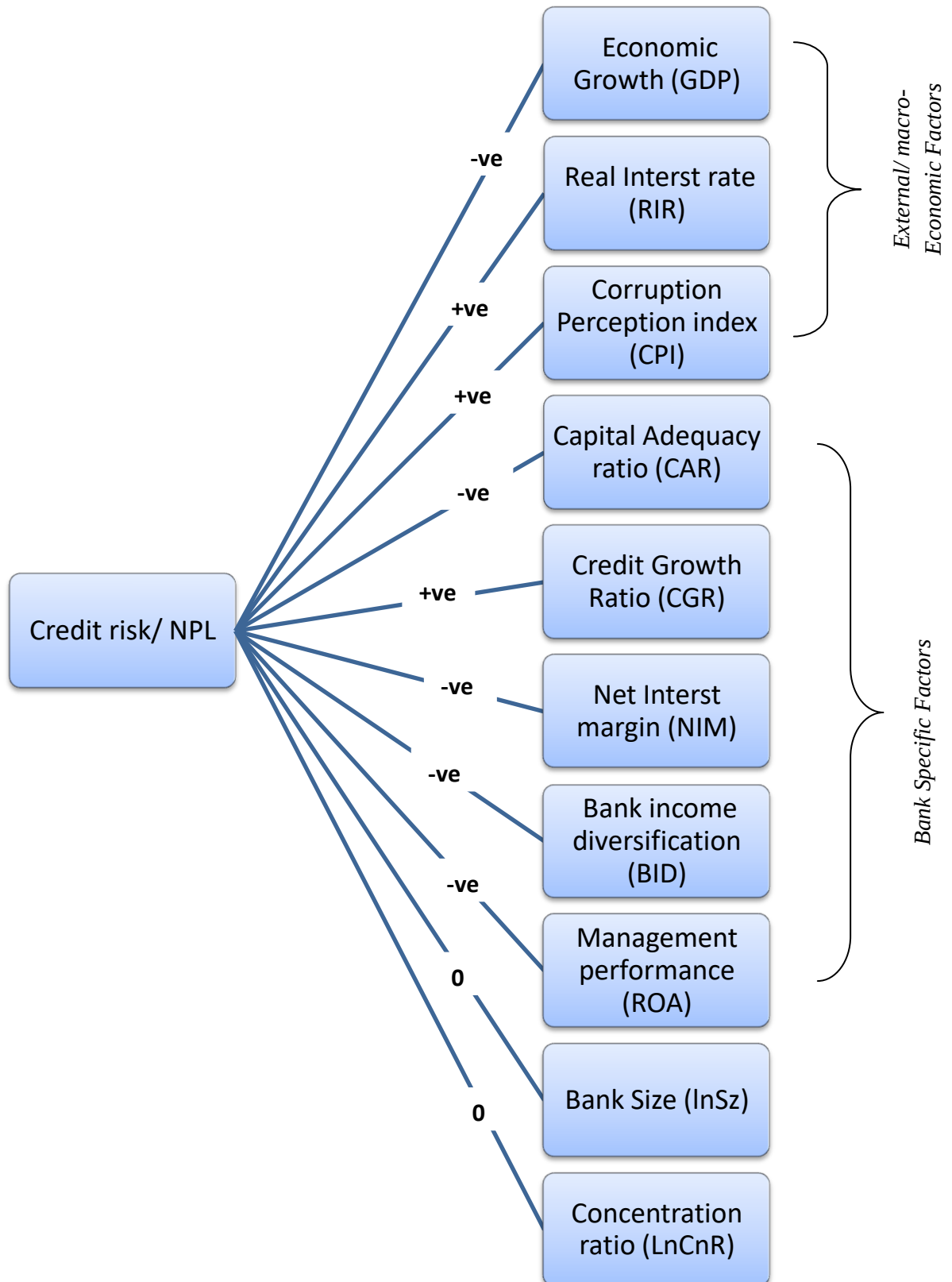


Figure 1: Conceptual frame work for both Interest free bank and conventional bank

3 CHAPTER THREE- METHODOLOGY

3.1 DESCRIPTION OF THE STUDY AREAS

As the described in the title “Comparing Credit Risk Determinants: Interest free VS Conventional Banks in Ethiopia” the study area includes all banks working within the Ethiopian jurisdiction.

Commercial banking in Ethiopia has a long history, dating back to the pre-colonial era. During the pre-colonial period, indigenous banking practices existed, primarily focused on money lending and exchange. However, the modern commercial banking system in Ethiopia began to take shape during the late 19th and early 20th centuries, influenced by European colonial powers.

Following the Italian occupation of Ethiopia (1936-1941), the Italian colonial government established the Banca d'Italia, which served as the central bank and commercial bank in the country. After Ethiopia's liberation in 1941, the Bank of Ethiopia was established as the central bank, and the commercial banking sector gradually began to develop.

In the post-war period, the Ethiopian government encouraged the establishment of private commercial banks. Several foreign banks also entered the Ethiopian market, contributing to the growth of the commercial banking sector. However, the Ethiopian government maintained a significant presence in the banking sector through state-owned banks.

Over the years, the Ethiopian commercial banking sector has undergone significant transformations. The government has implemented various reforms to liberalize the financial sector, promote competition, and enhance financial inclusion. These reforms have led to the entry of new banks, increased competition, and expanded access to financial services for the Ethiopian population.

Today, the Ethiopian commercial banking sector is a vital component of the country's economy. It plays a crucial role in providing financial services to businesses, individuals,

and the government. Commercial banks in Ethiopia offer a wide range of products and services, including loans, deposits, remittances, and investment services.

There are about 32 licensed commercial banks out of them there are four Interest free banks and the rest are conventional banks. Those banks have varying experience the pioneer commercial bank of Ethiopia have more than 75 years' experience however a bank like Siket Bank have 2 years of experience. The full-fledged Interest free banking sector has been licensed since 2020 GC. However, some conventional banks were serving partial interest free banking in windows operations format few years back.

Table 1: The table summarizes existing Conventional & Interest free banks in Ethiopia

S/No	Bank Name	Year of establishment	Remark
1	Siket Bank	07/12/2023	Conventional bank
2	Rammis Bank	03/10/2022	Interest free Bank
3	Sidama Bank	04/07/2022	Conventional bank
4	Ommo Bank	01/07/2022	Conventional bank
5	Gaddaa Bank	01/04/2022	Conventional bank
6	Amhara Bank	02/02/2022	Conventional bank
7	Tsehay Bank	01/02/2022	Conventional bank
8	Tsedey bank	03/01/2022	Conventional bank
9	Siinqee Bank	04/10/2021	Conventional bank
10	Ahadu Bank	01/10/2021	Conventional bank
11	Hijra Bank	01/09/2021	Interest free Bank
12	Goh Betoch bank	01/07/202	Conventional bank
13	Shebelle Bank	01/06/2021	Interest free Bank
14	ZamZam Bank	01/09/2020	Interest free Bank
15	Global bank	02/04/2012	Conventional bank
16	Enat bank	01/07/2011	Conventional bank
17	Addis Int. Bank	02/05/201	Conventional bank
18	Abay bank	01/07/2010	Conventional bank

19	Berhan bank	02/06/2009	Conventional bank
20	Bunna Bank	01/06/2009	Conventional bank
21	Zemen Bank	01/10/2008	Conventional bank
22	Oromia Bank	01/09/2008	Conventional bank
23	Lion int. Bank	02/10/2006	Conventional bank
24	Cooperative bank of Oromia	01/10/2004	Conventional bank
25	Nib Int. Bank	03/05/1999	Conventional bank
26	Hibret Bank	01/01/1998	Conventional bank
27	Wegagen Bank	02/06/1997	Conventional bank
28	Bank of Abyssinia	01/02/1996	Conventional bank
29	Dashen bank	01/09/1995	Conventional bank
30	Awash Bank	01/11/1994	Conventional bank
31	Commercial Bank of Ethiopia	03/08/1942	Conventional bank
32	Development Bank of Ethiopia	07/09/1909	Conventional bank

3.2 RESEARCH APPROACH

A quantitative research approach is suitable for this study entitled “Comparing Credit Risk Determinants: Interest free vs. Conventional Banks in Ethiopia” as it allows for a systematic and objective comparison of credit risk determinants between Interest free and Conventional banks in Ethiopia. This approach involves collecting numerical data from a sample of banks and analyzing it using statistical and econometric methods.

Key steps in the quantitative research approach for this study would include:

Data Collection: Gathering financial data from a representative sample of Interest free and conventional banks in Ethiopia. This data should include variables such Capital adequacy ratio (CAR), credit growth rate, Net Interest Margin (NIM), Bank Income Diversification (BID), Management performance (ROA), and macroeconomic indicators such as economic growth rate (GDP), Real interest rate (RIR) which the difference

between interest rate and inflation rate corruption perception index (CPI) and Industry specific data such as Market power concentration ration (LnCnR) and Bank size (LnSz).

Variable Selection: Identifying the relevant credit risk determinants for both types of banks, considering factors specific to Interest free banking (e.g., portion of risk-sharing loans) and conventional banking as in the listed above in the conceptual frame work.

Statistical Analysis: Using statistical techniques a correlation analysis, regression analysis, and hypothesis testing to examine the relationship between determinants of credit risk and the dependent variable a ratio of non-performing loans,

Comparison and Analysis: Comparing the results obtained for Interest free and conventional banks to identify differences and similarities in their credit risk determinants.

Interpretation and Conclusion: Drawing conclusions based on the findings and providing insights into the factors that influence credit risk in both types of banks.

3.3 RESEARCH DESIGN

A comparative case study design is selected for this research, as it allows for an in-depth examination of credit risk determinants in both Interest free and conventional banks in Ethiopia. This design involves selecting a representative sample of banks from each category and systematically comparing their characteristics and performance.

Key steps in the comparative case study design for this research would include:

Case Selection: Carefully selecting a sample of Interest free and conventional banks in Ethiopia, ensuring that the sample is representative of the population and considers factors such as variables of bank size, geographic location and/or jurisdiction, and age.

Data Collection: Gathering relevant data from both types of banks, including financial statements, regulatory data, and macroeconomic indicators.

Data Analysis: Analyzing the collected data using qualitative and quantitative methods, such as interviews, document analysis, and statistical analysis.

Comparison and Analysis: Comparing the characteristics and performance of Interest free and conventional banks, identifying similarities and differences in their credit risk determinants.

3.4 SOURCE AND TYPE OF DATA

Secondary data collected from the publication of each bank, National bank of Ethiopia, and statistical agency of Ethiopia, and ministry of revenue and international firm publications. The types of data collected are:-

- ✓ **Financial Statements:** Obtain annual financial statements of Interest free and conventional banks in Ethiopia, including balance sheets, income statements, and cash flow statements. These statements provide detailed information on the banks' financial performance and risk exposure.
- ✓ **Regulatory Data:** Collect data from the National Bank of Ethiopia (NBE), the country's central bank. This data can include information on capital adequacy ratios, non-performing loans, and other regulatory metrics.
- ✓ **Macroeconomic Data:** Gathered macroeconomic indicators from the Ethiopian Central Statistical Agency (CSA), and Transparency international, such as GDP growth, interest rates, inflation rates, and corruption perception index. These variables can have a significant impact on credit risk.
- ✓ **Industry Data:** Collect data on the banking industry in Ethiopia, including market share, competition intensity, and regulatory changes. This data can provide context for understanding credit risk trends.

3.5 SAMPLING TECHNIQUE AND SAMPLE SIZE

A purposive sampling technique is employed in this study, selecting banks that have reported data for at least three years. Out of the 32 currently registered banks in

Ethiopia, only those meeting this criterion are considered. In the conventional banking sector, 18 banks are included out of 28, accounting for 65% of the total banks. Similarly, in the interest-free banking sector, 10 banks out of the 16 offering full-fledged and window-scale operations are included, representing 62.5% of the interest-free services in the jurisdiction. Banks established from 2021 GC onwards are eligible for inclusion as the sample size, while younger banks are excluded due to insufficient historical data.

Accordingly, the conventional banking sector includes the following institutions: Global Bank, Enat Bank, Addis International Bank, Nib International Bank, Abay Bank, Berhan Bank, Bunna Bank, Zemen Bank, Wegagen Bank, Oromia Bank, Lion International Bank, Cooperative Bank of Oromia, Hibret Bank, Bank of Abyssinia, Dashen Bank, Awash Bank, Commercial Bank of Ethiopia, and Development Bank of Ethiopia. Meanwhile, the interest-free banking sector consists of Hijra Bank, Shebelle Bank, ZamZam Bank, Oromia Bank Baraka Window, Oromia Cooperative Al Huda Bank, Hibret Mubah Bank, Wegagen Amana Bank, Dashen Sahrik Bank, CBE Noor Bank, and Abay Bank Sadiq.

While purposive sampling ensures that the selected banks provide sufficient data for analysis, it introduces potential sampling bias. The exclusion of banks with fewer than three years of reported data may skew findings, as newer banks could exhibit different trends, financial performance, or operational strategies compared to older institutions. Additionally, the proportion of selected banks in conventional and interest-free banking may not fully capture the diversity of practices and services across the sector. As a result, the generalizability of findings may be limited, and caution should be exercised when interpreting conclusions in relation to the entire banking industry in Ethiopia.

3.6 METHOD OF ANALYSIS

A panel data regression model of for 10years over the selected sample of cross-section is used to evaluate the proposed hypotheses holds in Ethiopian commercial banks.

Descriptive Statistics: Calculate descriptive statistics for the collected data, such as measure of central tendency (mean and median), and a measure dispersion (standard deviation), and correlation coefficients. This provides an overview of the data distribution and other property.

3.7 MODEL SPECIFICATION

In this study, I investigate the determinants of non-performing loans (NPLs) within the Ethiopian banking sector. My baseline model draws upon established literature in financial intermediation and macroeconomic factors, positing that NPLs are influenced by both bank-specific characteristics and broader economic conditions. Specifically, I hypothesize that, macroeconomic variables like Gross Domestic Product (GDP) growth rate, the Real Interest Rate (RIR) and corruption perception index (CPI) capture the overall health of the economy and its impact on borrowers' ability to repay loans. Furthermore, bank-level factors such as the Capital Adequacy Ratio (CAR), Net Interest Margin (NIM), Credit Growth Rate (CGR), Bank income diversification ratio (BID), Return on Assets (ROA), and the natural logarithm of the Bank size (LnSz) Concentration Ratio (LnCnR) are included to account for internal bank management practices, profitability, and market structure. These variables are selected based on their established roles in influencing credit risk and financial stability within banking systems, allowing me to assess their relative importance in the context of the Ethiopian banking sector.

The model is specified as a linear regression, with NPL as the dependent variable and the aforementioned macroeconomic and bank-specific variables as independent variables. The functional form assumes a linear relationship between the predictors and NPLs, though I acknowledge potential non-linearities may exist. The natural logarithm of the Bank size (LnSz) and Concentration Ratio (LnCnR) are used to address potential issues of scale and to account for the skewed distribution often observed in concentration ratios. While alternative functional forms and variable combinations were considered, the chosen specification represents the most theoretically consistent and parsimonious model, balancing explanatory power with interpretability. Diagnostic tests, including the

Ramsey RESET test for functional form misspecification, tests for heteroscedasticity and autocorrelation, and Variance Inflation Factors (VIFs) for multicollinearity, are employed to assess the adequacy of the chosen model and ensure the robustness of the estimated coefficients. Furthermore Levin-Lin-Chu Test (LLC), Im, Pesaran, and Shin Test (IPS) and Fisher-Type Tests (FT) tests were conducted to know how stationary is affecting the model

Model is formulated as:

$$NPL_{it} = \alpha + \sum_i^n \beta_i \sum_{it}^{n,m} Var_{it} + \varepsilon_{it}$$

$$NPL_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 RIR_{it} + \beta_3 CPI_{it} + \beta_4 CAR_{it} + \beta_5 CGR_{it} + \beta_6 NIM_{it} + \beta_7 BID_{it} + \beta_8 ROA_{it} + \beta_9 LnSz_{it} + \beta_{10} LnCnR_{it} + \varepsilon_{it}$$

Where:

$\beta_1, \beta_2, \beta_3, \dots, \beta_5$ = variable coefficients

CAR= Capital adequacy ratio

α = Constant Term

CGR = Credit Growth rate

i=entity (Bank)

NIM= Net interest margin

t= Time (Year)

BID = Bank income diversification rate

NPL =credit risk (Non-performing loan)

ROA= Return on Asset

GDP =Gross Domestic product

LnSz= bank size (in Natural logarithm)

RIR= Real Interest rate (interest rate - inflation rate)

LnCnR= concentration (in Natural logarithm)

CPI= Corruption perception index

ε =error term or the residual

4 CHAPTER FOUR- DATA ANALYSIS AND PRESENTATION

4.1 DESCRIPTIVE STATISTICS

Table 2 presents comparative descriptive statistics for the variables employed in this study, disaggregated by Interest free banks and conventional banks. For the full sample, the dependent variable, Non-Performing Loans (NPL), exhibits a mean of 0.052434 and 0.031261; and a standard deviation of 0.064720 and 0.090376 for conventional banks and Interest free banks respectively. However, when comparing conventional banks and Interest free banks, we observe that conventional banks exhibits a higher mean NPL ratio of 5.243% value for conventional banks compared to Interest free banks, which has a mean NPL ratio of 3.1261% mean value for Interest free banks. This difference suggests potentially higher credit risk in conventional banks than the Interest free banks.

Test for Equality of Means Between Series

Date: 02/16/25 Time: 16:10

Sample: 2015 2024

Included observations: 180

Method	df	Value	Probability
t-test	217	1.862593	0.0639
Satterthwaite-Welch t-test*	68.05492	1.568766	0.1213
Anova F-test	(1, 217)	3.469251	0.0639
Welch F-test*	(1, 68.0549)	2.461025	0.1213

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	1	0.017776	0.017776
Within	217	1.111888	0.005124
Total	218	1.129664	0.005182

Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
NPL CONV	167	0.052434	0.064720	0.005008
NPL ISL...	52	0.031261	0.090376	0.012533
All	219	0.047407	0.071986	0.004864

Figure 2: the Test for equality of means between NPLs of Conventional and Interest free Banks

The equality test result also shows that there is a significant difference between the NPLs of conventional and Interest free banks. The T-test and the Anova F-test is significant at 10 % confidence level.

The descriptive statistics reveal significant differences between conventional and interest-free banks in Ethiopia, illustrating contrasting financial behaviors, market structures, and economic influences. One of the key variables analyzed is GDP growth, an essential macroeconomic indicator reflecting the overall economic performance within which banks operate. Conventional banks reported an average GDP growth rate of 7.6%, while interest-free banks recorded 7.3%. The difference, though marginal, suggests that both banking models function in similar economic conditions. However, the slightly lower standard deviation in conventional banks implies a more stable economic environment, whereas interest-free banks exhibit more fluctuations. This may indicate that interest-free banks, still emerging in Ethiopia, are more sensitive to economic changes due to their evolving business frameworks.

Another major distinction between conventional and interest-free banks lies in their real interest rate (RIR) dynamics. Conventional banks operate within a high-interest-rate environment, with an average RIR of 35.8%, whereas interest-free banks function under a fundamentally different model, reporting a much lower 4.46%. This stark contrast highlights the fundamental difference between these two banking structures. Interest-free banks follow Sharia-compliant principles, which prohibit charging interest, making them less affected by fluctuations in interest rates. However, broader economic conditions tied to interest rate movements—such as inflation and monetary policy decisions—still indirectly influence them. Conventional banks, on the other hand, must carefully manage their exposure to interest rate risks, as high RIR values could impact loan affordability and borrower repayment capabilities.

Financial stability is another area where conventional and interest-free banks show considerable differences, particularly in terms of their Capital Adequacy Ratio (CAR). CAR measures a bank's financial strength in relation to its risk-weighted assets, indicating its ability to absorb potential losses. Conventional banks maintain a significantly stronger CAR, averaging 18%, whereas interest-free banks exhibit a weaker CAR of 9.1%. This suggests that conventional banks have larger financial buffers, enabling them to withstand economic downturns or financial shocks more effectively. Interest-free banks, despite their lower CAR, may need to enhance their capitalization

strategies to sustain their growth trajectory and avoid vulnerabilities associated with lower reserve levels. Regulatory bodies such as the National Bank of Ethiopia (NBE) might consider imposing stricter capital requirements to ensure that rapidly expanding interest-free banks maintain adequate reserves to support their increasing lending activities.

The Credit Growth Rate (CGR) presents another contrasting aspect between both banking models. Interest-free banks reported an exceptionally high CGR of 152.3%, while conventional banks recorded a much lower 5.6%. This indicates that interest-free banks are expanding aggressively, possibly due to rising consumer demand for Sharia-compliant financial services. While rapid credit expansion signifies growth and market penetration, it also carries inherent risks, especially if banks fail to assess borrower creditworthiness thoroughly. Uncontrolled lending can lead to increased default rates, potentially destabilizing financial institutions. Conventional banks, on the other hand, display slower but more stable credit growth. This suggests that they have established lending policies that emphasize risk mitigation, ensuring long-term sustainability over rapid expansion.

Profitability measures, including Net Interest Margin (NIM) and Return on Assets (ROA), further illustrate the structural differences between these two banking sectors. Conventional banks maintain a high NIM of 35.35%, reflecting their reliance on interest-based income generation. Interest-free banks, on the other hand, report a significantly lower NIM of 4%, consistent with their business model that excludes interest earnings. Since interest-free banks rely on profit-sharing mechanisms and fee-based services instead of traditional interest-based lending, their margins tend to be lower compared to conventional banks. ROA, which measures profitability relative to total assets, is slightly higher in conventional banks (3.1%) compared to interest-free banks (2%). This suggests that conventional banks may be more efficient in utilizing their assets to generate profit, while interest-free banks could face challenges due to their alternative revenue structures. Both sectors, however, maintain relatively stable profitability levels, indicating sustainable banking operations.

One of the most significant structural distinctions appears in market concentration (LnCnR), which evaluates competition within the banking sector. Interest-free banks demonstrate an exceptionally high market concentration level, averaging 172.8, while conventional banks report a much lower concentration of 31.9. This indicates that a few dominant players control the interest-free banking sector, potentially leading to monopolistic behavior or limited competition. High concentration in interest-free banking could limit market accessibility, reducing consumer choice and restricting the entry of new financial institutions. In contrast, conventional banks operate in a more competitive and fragmented market, encouraging efficiency and innovation. Regulatory authorities may need to monitor market concentration in interest-free banking, ensuring that competition is promoted to benefit consumers and the overall financial sector.

The comparative analysis of descriptive statistics highlights several key takeaways regarding the Ethiopian banking sector. Conventional banks maintain stronger financial reserves, higher profitability, and more stable lending practices. Their reliance on interest-based income enables them to maintain high margins, but they face risks associated with high real interest rates, which could affect borrower affordability. Interest-free banks, while expanding rapidly, exhibit higher volatility in terms of credit growth and market concentration. Their business model requires alternative revenue strategies, resulting in lower profit margins and financial buffers. The exceptionally high market concentration in interest-free banking raises concerns regarding competition and accessibility.

To ensure sustainable financial growth and risk mitigation, Ethiopian banks—especially those in the interest-free sector—should focus on strengthening capital reserves, improving profitability frameworks, and establishing robust credit assessment measures. Conventional banks must carefully monitor their exposure to interest rate fluctuations, ensuring that lending practices remain adaptable to macroeconomic changes. Regulatory intervention should play a role in balancing market dynamics, encouraging competition, and safeguarding against excessive financial instability.

Would you like further refinements or additional analysis on any specific variable?.

Table 2: Descriptive statistics result of both conventional and Interest free bank

Descriptive statistics for Conventional banks											
	NPL	GDP	RIR	CPI	CAR	CGR	NIM	BID	ROA	LnSz	LnCr
Mean	0.032434	0.076000	0.358000	0.043500	0.180122	0.056064	0.353524	0.270587	0.031019	17.20330	31.99241
Median	0.033480	0.073600	0.36000	0.043500	0.159100	0.055700	0.328700	0.252319	0.029556	17.20649	35.46453
Max	0.431000	0.103900	0.390000	0.052000	0.540000	0.267499	1.236300	0.967530	0.188391	21.08537	48.51415
Min	0.00000	0.053400	0.330000	0.035000	0.06000	0.0000	-0.09010	0.0000	-0.022885	13.70100	5.047742
Std. Dev	0.064720	0.017012	0.021414	0.005659	0.075083	0.025781	0.211231	0.142174	0.019759	1.370320	14.89510
Skewness	3.429089	0.231653	0.014788	1.55E 16	1.918308	4.017928	1.128941	1.270445	4.608277	0.245339	0.797054
Kurtosis	15.85654	1.632258	1.443675	1.592100	8.073975	32.53547	5.149977	7.083337	37.87413	3.630063	2.310304
Jarque-Bera	1477.429	15.64028	18.17267	14.86636	286.6260	6909.778	71.28319	168.6545	9595.978	4.729937	22.62647
Prob.	0.0000	0.000402	0.000113	0.000591	0.00000	0.00000	0.00000	0.00000	0.00000	0.03952	0.000012
Sum	8.756502	13.68000	64.4400	7.83000	30.62078	9.923352	62.22016	47.35270	5.490283	3062.188	5758.634
Sum Sq.dev	0.695326	0.051807	0.082080	0.005733	0.952735	0.116981	7.808228	3.51715	0.068715	332.3664	39713.66
Observ.	167	180	180	180	170	177	176	175	177	178	180
Descriptive statistics for Interest free/Interest free banks											
	NPL	GDP	RIR	CPI	CAR	CGR	NIM	BID	ROA	LnSz	LnCr
Mean	0.031261	0.073983	0.044605	0.361974	0.091270	1.522879	0.040086	0.378713	0.020153	14.81719	172.8222
Median	0.007808	0.068200	0.047000	0.370000	0.025000	0.709600	0.040048	0.212012	0.013157	14.96581	126.2608
Max	0.469000	0.103900	0.052000	0.39000	0.960000	17.0000	0.130100	1.00000	0.109979	18.36278	414.5054
Min	0.00000	0.53400	0.035000	0.330000	-0.06200	-0.13200	0.0000	-0.00848	-0.066198	7.706635	2.118549
Std. Dev	0.090376	0.016193	0.005781	0.021604	0.174608	3.235110	0.032138	0.371153	0.032025	1.681733	143.8727
Skewness	4.487736	0.405199	0.32502	-0.29664	3.104719	3.799024	0.480979	0.775957	0.360609	1.26578	0.401796
Kurtosis	22.02014	1.802704	1.65118	1.535165	13.83050	17.11603	2.770367	1.960432	3.858543	7.511121	1.761596
Jarque-Bera	958.3707	6.619161	7.099865	7.909476	370.1598	567.5252	2.282216	8.286698	2.985969	63.55257	9.080851
Prob.	0.0000	0.036531	0.028727	0.019164	0.00000	0.0000	0.319465	0.015870	0.224701	0.0000	0.010669
Sum	1.625584	5.622700	3.39000	27.51000	5.282380	80.71258	2.244804	21.58667	1.148696	844.5800	17282.22
Sum Sq.dev	0.416562	0.021454	0.002506	0.035004	1.707325	544.2287	0.056807	7.713432	0.057434	158.3887	2049235
Observ.	52	76	76	76	57	53	56	57	57	57	100

4.2 CORRELATION TESTS

4.2.1 Correlation Matrix Test

To evaluate potential multi-collinearity, a correlation matrix of all independent variables was initially examined for both conventional bank and Interest free bank separately presented in figure 2 and in figure 4 respectively. This revealed notable high correlations similar variable observed in both conventional and Interest free banks. Strong positive correlations between GDP and CPI and A strong negative correlation between RIR and CPI in were found in both Conventional and Interest free banks. However by removal of the CPI Variable in both groups the multi-collinarity problem was solved as seen figure 3 and figure 5 respectively.

. pwcorr NPL GDP RIR CPI CAR NIM CGR BID ROA LnSz LnCnR										
	NPL	GDP	RIR	CPI	CAR	NIM	CGR			
NPL	1.0000									
GDP	-0.0846	1.0000								
RIR	0.0346	-0.7416	1.0000							
CPI	0.0539	-0.9015	0.9045	1.0000						
CAR	0.0956	0.0485	-0.1280	-0.0994	1.0000					
NIM	-0.3078	0.1810	-0.3725	-0.2646	-0.0167	1.0000				
CGR	-0.1548	-0.1163	0.2304	0.1796	-0.3095	0.0100	1.0000			
BID	-0.3384	0.2936	-0.3008	-0.2795	0.2662	0.3356	-0.1452			
ROA	-0.3359	0.1971	-0.1972	-0.1942	0.2008	0.2340	0.6017			
LnSz	0.2119	-0.4221	0.5517	0.4959	-0.1244	-0.4446	-0.0564			
LnCnR	0.0347	-0.4503	0.2853	0.2908	0.0265	-0.1082	-0.0505			
		BID	ROA	LnSz	LnCnR					
BID		1.0000								
ROA		0.3307	1.0000							
LnSz		-0.4835	-0.3831	1.0000						
LnCnR		-0.1958	-0.2532	0.2275	1.0000					

Figure 3: result of correlation between all variables- in conventional banking

. pwcorr NPL GDP RIR CAR NIM CGR BID ROA LnSz LnChR									
	NPL	GDP	RIR	CAR	NIM	CGR	BID	ROA	LnChR
NPL	1.0000								
GDP	-0.0846	1.0000							
RIR	0.0346	-0.7416	1.0000						
CAR	0.0956	0.0485	-0.1280	1.0000					
NIM	-0.3078	0.1810	-0.3725	-0.0167	1.0000				
CGR	-0.1548	-0.1163	0.2304	-0.3095	0.0100	1.0000			
BID	-0.3384	0.2936	-0.3008	0.2662	0.3356	-0.1452	1.0000		
ROA	-0.3359	0.1971	-0.1972	0.2008	0.2340	0.6017	0.3307	1.0000	
LnSz	0.2119	-0.4221	0.5517	-0.1244	-0.4446	-0.0564	-0.4835	-0.1958	1.0000
LnChR	0.0347	-0.4503	0.2853	0.0265	-0.1082	-0.0505	-0.1958	-0.1958	-0.1958
		ROA	LnSz	LnChR					
ROA		1.0000							
LnSz		-0.3831	1.0000						
LnChR		-0.2532	0.2275	1.0000					

Figure 4: Result of correlation after removing "CPI" from the variables- for conventional banking system

. pwcorr NPL GDP RIR CPI CAR CGR NIM BID ROA LnSz LnChR									
	NPL	GDP	RIR	CPI	CAR	CGR	NIM	BID	ROA
NPL	1.0000								
GDP	-0.1258	1.0000							
RIR	0.1520	-0.7112	1.0000						
CPI	0.1635	-0.9042	0.8925	1.0000					
CAR	0.0991	-0.2167	0.3157	0.3054	1.0000				
CGR	-0.1119	0.2522	-0.4123	-0.3388	-0.0254	1.0000			
NIM	0.0808	-0.1969	0.4668	0.3665	-0.0343	-0.1989	1.0000		
BID	0.0926	0.1447	-0.2796	-0.2110	0.1384	0.3829	-0.2138	1.0000	
ROA	-0.0444	-0.0106	0.1713	0.0906	-0.3430	-0.2030	0.6239	-0.2138	1.0000
LnSz	0.0528	-0.2737	0.5103	0.4032	-0.2269	-0.1276	0.6088	-0.2138	-0.2138
LnChR	-0.0623	-0.4023	-0.0170	0.0649	-0.1067	0.0537	-0.2386	-0.2138	-0.2138
		BID	ROA	LnSz	LnChR				
BID		1.0000							
ROA		-0.3578	1.0000						
LnSz		-0.0910	0.5052	1.0000					
LnChR		0.0558	-0.0709	-0.0565	1.0000				

Figure 5: result of correlation between all variables- in Interest free banking

. pwcorr NPL GDP RIR CAR CGR NIM BID ROA LnSz LnCnR									
	NPL	GDP	RIR	CAR	CGR	NIM	BID		
NPL	1.0000								
GDP	-0.1258	1.0000							
RIR	0.1520	-0.7112	1.0000						
CAR	0.0991	-0.2167	0.3157	1.0000					
CGR	-0.1119	0.2522	-0.4123	-0.0254	1.0000				
NIM	0.0808	-0.1969	0.4668	-0.0343	-0.1989	1.0000			
BID	0.0926	0.1447	-0.2796	0.1384	0.3829	-0.2138	1.0000		
ROA	-0.0444	-0.0106	0.1713	-0.3430	-0.2030	0.6239	-0.3578		
LnSz	0.0528	-0.2737	0.5103	-0.2269	-0.1276	0.6088	-0.0910		
LnCnR	-0.0623	-0.4023	-0.0170	-0.1067	0.0537	-0.2386	0.0558		
		ROA	LnSz	LnCnR					
ROA		1.0000							
LnSz		0.5052	1.0000						
LnCnR		-0.0709	-0.0565	1.0000					

Figure 6: Result of correlation after removing "CPI" from the variables- for Interest free banking

The correlation between GDP and RIR is observed further however since the result is less than 0.75 it is decided to remain within the equation. Moderate correlation between other variables in both cases in the conventional bank and Interest free bank is observed.

4.2.2 VIF Test

To assess potential multi-collinearity, Variance Inflation Factors (VIFs) were also calculated for both conventional bank and Interest free banks separately. In conventional bank, the VIF analysis revealed 5.1 above the common threshold of 5 in conventional banks and 13.68 for the Interest free bank respectively, before the removal of CPI.

Following this adjustment (removal of CPI), VIFs were recalculated for both conventional bank and Interest free bank, and the results showed 2.26 for conventional bank and 2.49 for the Interest free bank that all remaining VIFs fell below the threshold of 5 in both Interest free and conventional banks. The VIF results for conventional bank is showed in figure 6 and the VIF result for the Interest free bank is showed in figure 7 below.

Figure 7 The variance inflation factor (VIF) of conventional Banking

. vif			
	Variable	VIF	1/VIF
	ROA	3.62	0.276135
	CGR	3.44	0.290572
	RIR	2.96	0.337919
	GDP	2.37	0.421132
	LnSz	1.86	0.539024
	CAR	1.70	0.588790
	BID	1.67	0.599071
	NIM	1.48	0.673909
	LnCnR	1.24	0.806545
	Mean VIF	2.26	

This comparative analysis of VIFs and the subsequent model adjustments ensures that the potential impact of multicollinearity on the coefficient estimates is minimized across both conventional bank and Interest free bank, allowing for more reliable comparisons of the relationships between the dependent variables and the independent variable.

. vif			
	Variable	VIF	1/VIF
	RIR	3.83	0.261163
	LnSz	3.39	0.295151
	CAR	3.11	0.321644
	NIM	2.81	0.355584
	ROA	2.51	0.397893
	GDP	1.99	0.502082
	LnCnR	1.81	0.551343
	CGR	1.53	0.653117
	BID	1.44	0.693054
	Mean VIF	2.49	

Figure 8: The variance inflation factor (VIF) of Interest free Banking

4.3 REGRESSION MODEL TESTS

4.3.1 Hausman Test

Hausman test was conducted to select/ which model is the most appropriate model specification for panel data, comparing the fixed effects (FE) and random effects (RE) approaches, specifically for Interest free and Conventional banks. For the full sample, the Hausman test yielded a chi-squared statistic of 22.600487 with a p-value of 0.0123 for conventional bank. Similarly For the full sample, the Hausman test yielded a chi-squared statistic of 345.4158 with a p-value of 0.0000 for Interest free banks as presented in figure 8 and figure 9 respectively. These results led to the rejection of the null hypothesis suggesting the Fixed Effect model is more appropriate than random effect models for both cases

Figure 9: Hausman test result of conventional banks

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	22.600487	10	0.0123	
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
GDP	-0.532967	-0.540300	0.000542	0.7528
RIR	1.164249	-2.011309	2.135663	0.0298
CAR	0.079147	0.119931	0.000220	0.0060
CGR	0.982376	1.064233	0.004278	0.2108
NIM	-0.034945	-0.041376	0.000009	0.0362
BID	0.007993	-0.003876	0.000057	0.1147
ROA	-1.757228	-1.653919	0.005415	0.1603
LNSZ	-0.029414	-0.004829	0.000117	0.0232
LNCNR	-0.000078	-0.000217	0.000000	0.0308
(YEAR1-YEAR10)	0.009724	0.010600	0.000001	0.2628

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	345.415818	9	0.0000

** WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
GDP	0.295786	-0.619245	0.064392	0.0003
RIR	16.258139	-1.829117	9.396696	0.0000
CAR	-1.357206	0.126277	0.035714	0.0000
CGR	-0.001165	-0.005508	0.000001	0.0000
NIM	-0.195164	0.036968	0.018309	0.0862
BID	0.038521	0.036367	0.000433	0.9176
ROA	0.218348	-0.040928	0.185504	0.5472
LNSZ	-0.065728	0.004052	0.000125	0.0000
LNCNR	0.000178	-0.000067	0.000000	0.0000

Figure 10: Hausman Test result of Interest free Banks

4.3.2 Autocorrelation Test

It is customary to look at the Durbin-Watson statistic to understand the autocorrelation in the residuals of the regression model result. Here is the detailed analysis based the result of in figure 10 and figure 11.

Autocorrelation Analysis:

Durbin-Watson Statistic: 1.884818 - for conventional bank (in figure 10)

Durbin-Watson Statistic: 2.033031 – For Interest free Bank (in figure 11)

The measurement value of Durbin-Watson statistic is used to test the autocorrelation of the residuals from a regression analysis. It ranges from 0 to 4, where:

Values close up to 2: shows no autocorrelation and

Values close up to 0: shows positive autocorrelation.

Values close up to 4: Shows negative autocorrelation

Dependent Variable: NPL
 Method: Panel Least Squares
 Date: 02/17/25 Time: 13:57
 Sample: 2015 2024
 Periods included: 10
 Cross-sections included: 18
 Total panel (unbalanced) observations: 165

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.544686	0.167859	3.244904	0.0015
GDP	-0.532967	0.279601	-1.906170	0.0587
RIR	1.164249	2.055905	0.566295	0.5721
CAR	0.079147	0.058358	1.356232	0.1773
CGR	0.982376	0.237574	4.135035	0.0001
NIM	-0.034945	0.017549	-1.991225	0.0484
BID	0.007993	0.033201	0.240739	0.8101
ROA	-1.757228	0.293504	-5.987073	0.0000
LNSZ	-0.029414	0.013317	-2.208683	0.0289
LNCNR	-7.82E-05	0.000230	-0.339260	0.7349
YEAR1-YEAR10	0.009724	0.010225	0.951071	0.3432

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.790773	Mean dependent var	0.051390
Adjusted R-squared	0.749539	S.D. dependent var	0.063502
S.E. of regression	0.031780	Akaike info criterion	-3.906525
Sum squared resid	0.138366	Schwarz criterion	-3.379455
Log likelihood	350.2883	Hannan-Quinn criter.	-3.692569
F-statistic	19.17750	Durbin-Watson stat	1.884818
Prob(F-statistic)	0.000000		

Figure 11: Durbin-Watson stat on the result of conventional bank

The autocorrelation analysis for conventional bank and Interest free bank reveals small differences between the two groups. For conventional bank, the Durbin-Watson statistic is 1.884818, which is slightly below the ideal value of 2, suggesting minimal positive autocorrelation in the residuals. This indicates that while there is a slight tendency for the residuals to be positively correlated, it is not significant enough to cause concern. On the other hand, Interest free bank has a Durbin-Watson statistic of 2.033031, which is slightly above 2, indicating minimal negative autocorrelation in the residuals. This suggests that the residuals for Interest free bank tend to be negatively correlated, but again, not to a significant extent. In summary, both groups exhibit little to no autocorrelation in their residuals, with conventional bank showing a slight positive autocorrelation and Interest free bank showing a slight negative autocorrelation. These results imply that both

regression models are reliable, with minimal issues related to autocorrelation, making the estimates and inferences drawn from the analyses valid.

Dependent Variable: NPL				
Method: Panel Least Squares				
Date: 02/17/25 Time: 13:57				
Sample: 2015 2024				
Periods included: 10				
Cross-sections included: 10				
Total panel (unbalanced) observations: 50				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.157042	0.197265	0.796099	0.4322
GDP	0.940494	0.825724	1.138993	0.2637
RIR	18.05576	4.024082	4.486927	0.0001
CAR	-1.326741	0.200287	-6.624201	0.0000
CGR	-0.003008	0.002888	-1.041639	0.3059
NIM	-0.219003	0.284280	-0.770379	0.4471
BID	0.036448	0.027203	1.339866	0.1904
ROA	0.144054	0.499830	0.288206	0.7752
LNSZ	-0.063130	0.012651	-4.989999	0.0000
LNCNR	0.000189	6.17E-05	3.060395	0.0046
YEAR1-YEAR10	0.027701	0.027175	1.019349	0.3162
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.926373	Mean dependent var	0.032512	
Adjusted R-squared	0.879742	S.D. dependent var	0.091977	
S.E. of regression	0.031896	Akaike info criterion	-3.763498	
Sum squared resid	0.030521	Schwarz criterion	-2.998689	
Log likelihood	114.0875	Hannan-Quinn criter.	-3.472255	
F-statistic	19.86622	Durbin-Watson stat	2.033031	
Prob(F-statistic)	0.000000			

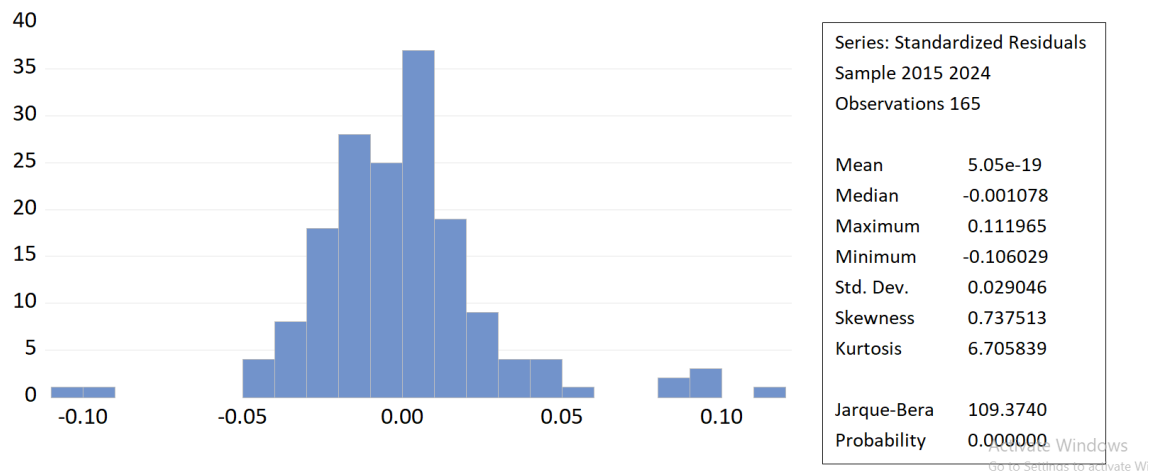
Figure 12: Durbin-Watson stat on the result of Interest free bank

4.3.3 Residual Normality Test

The distribution of standardized residuals from the panel fixed effects models reveals notable differences between conventional and Interest free banks, suggesting variations in how well the models capture the underlying data generating processes for each group. For conventional banks (Figure 13), the residuals exhibit a roughly symmetrical distribution, albeit with a slight positive skewness. The Jarque-Bera test, while not definitively indicating non-normality, suggests some deviation from a perfectly normal distribution.

The standard deviation of the standardized residuals is low (around 0.029), which warrants further investigation, as it's unexpected for standardized residuals. In contrast, the standardized residuals for Interest free banks (Figure 14) display a more pronounced negative skewness and a less bell-shaped histogram. Although the Jarque-Bera test does not reject the null hypothesis of normality in this case, the visual evidence and the negative skewness value suggest a departure from the normal distribution. The standard deviation for Interest free banks' residuals is also low (around 0.025), similar to the conventional banks. These differences in residual distributions between conventional and Interest free banks may reflect variations in the factors influencing non-performing loans (NPLs) within each group, potentially indicating the need for further investigation.

Figure 13: Histogram-Normality test for residuals for conventional banks



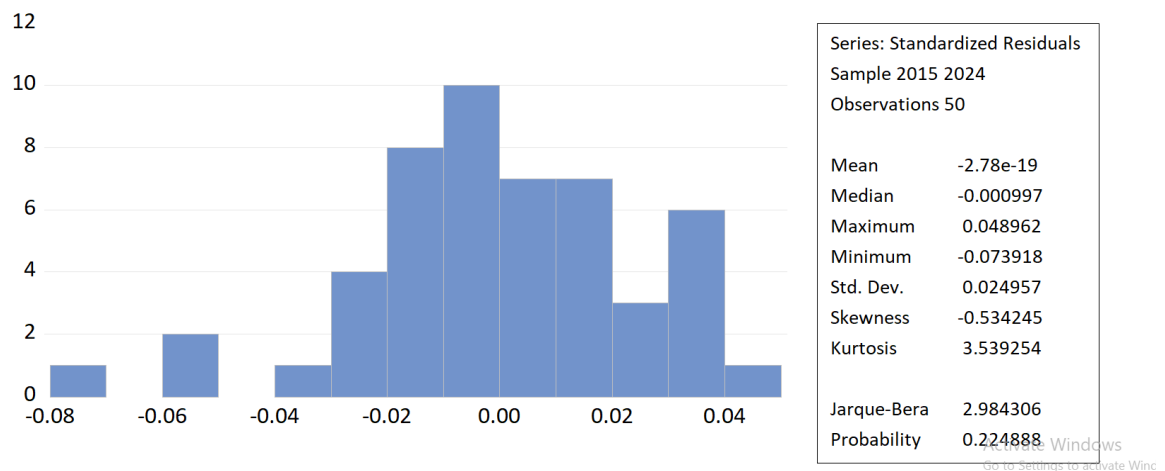


Figure 14 Histogram-Normality test for residuals for Interest free banks

4.4 REGRESSION ANALYSIS

4.4.1 Conventional Banks

The fixed effects model for conventional banks reveals nuanced relationships between several variables and non-performing loans (NPLs). Bank size (LNSZ) exhibits a statistically significant negative relationship (coefficient = -0.029414, $p < 0.10$) with NPLs. This confirms the hypotheses proposed. It was proposed there will a negative relationship with the NPL. This suggests that larger banks, perhaps due to economies of scale, more sophisticated risk management practices, or greater diversification opportunities, tend to have lower proportions of non-performing loans.

The return on asset (ROA) shows a negative relationship with NPL in confirmatory tone with the hypotheses (coefficient = -1.757228, $p < 0.10$). The result show that Non-Performing Loans (NPL) has a negative relationship with Return on Assets (ROA) in a conventional bank, it indicates that an increase in non-performing loans is associated with a decrease in the bank's return on assets. This relationship can be attributed to several key factors. Non-performing loans reflect the inability of borrowers to meet their loan obligations, which directly impacts the bank's profitability. As the number of non-

performing loans rises, the bank must allocate more funds for loan loss provisions, increasing its expenses and reducing its net income. Consequently, this reduces the overall return on assets. Additionally, non-performing loans do not generate interest income, further diminishing the bank's revenue stream. This decrease in revenue, coupled with higher provisioning expenses, leads to lower profitability and a decline in the return on assets. Furthermore, a high level of non-performing loans may also indicate poor credit risk management and operational inefficiencies within the bank, further exacerbating the negative impact on ROA. Therefore, the negative relationship between NPL and ROA in the FE model underscores the importance of maintaining asset quality to ensure the profitability and financial stability of conventional banks.

Other variable which was found to be significant with NPL from the fixed effect Model (FE) is Net interest margin (NIM). Similar with the hypotheses the FE model shows that a negative relationship between NPL and NIM (coefficient = -0.034945, $p < 0.10$). This suggests that an increase in the level of NPLs adversely affects the bank's ability to maintain a healthy margin between interest income and interest expenses. This relationship can be explained by several factors. High levels of NPLs indicate a deteriorating quality of the loan portfolio, which forces banks to allocate more resources towards provisioning for potential loan losses. This increased provisioning expense directly reduces the net interest income. Furthermore, non-performing loans cease to generate interest income while still requiring the bank to pay interest on its deposits and other borrowings. This imbalance reduces the net interest margin. Additionally, higher NPL ratio indicates poor risk management and operational inefficiencies within the bank, leading to increased operational costs and lower profitability. Hence, the negative relationship between NPL and NIM in the FE model highlights the importance of maintaining good asset quality to sustain profitability and financial stability in banking operations.

The FE Model results show that Non-Performing Loans (NPL) have a positive relationship with Credit Growth Rate (CGR) in a conventional bank (coefficient = 0.982376, $p < 0.10$), it suggests that an increase in non-performing loans is associated with a higher rate of credit growth. This relationship can be explained by the aggressive

lending practices that conventional banks sometimes adopt in pursuit of higher market share and profitability. In such scenarios, banks may lower their credit standards to rapidly expand their loan portfolios, leading to a surge in credit growth. However, this aggressive expansion often comes at the cost of increased credit risk and a higher incidence of non-performing loans, as a larger proportion of these new loans may default. Additionally, during periods of economic boom, banks might extend more credit, which temporarily boosts credit growth but can later result in a rise in non-performing loans when economic conditions deteriorate. Thus, the positive relationship between NPL and CGR in the FE model underscores the potential trade-off between rapid credit expansion and the quality of the loan portfolio in conventional banking.

The FE model results show that Non-Performing Loans (NPL) have a negative relationship (coefficient = -0.532967, $p < 0.10$), with the Gross Domestic Product (GDP) growth rate in a conventional bank, it suggests that an increase in the economic performance of a country is associated with a decrease in non-performing loans. The relationship of GDP growth rate and NPL ratio can be attributed to the in general wellbeing of the economy. During periods of economic growth, businesses and individuals experience higher income levels and improved financial stability, which enhances their ability to repay loans. Consequently, the number of non-performing loans decreases. Moreover, a robust economy boosts consumer confidence and investment, leading to more successful business ventures and reduced loan defaults. Additionally, conventional banks are more likely to implement stringent credit standards and effective risk management practices during economic growth periods, further reducing the likelihood of loan defaults. Therefore, the negative relationship between NPL and GDP growth rate in the FE model highlights the significance of a strong economy in maintaining the quality of a bank's loan portfolio and minimizing credit risk.

The FE model results show a non-significant relationship between Non-Performing Loans (NPL) and the Real Interest Rate (RIR) while hypothesizing a positive relationship in a conventional bank, several factors could explain this unexpected outcome. One possibility is that other variables are influencing the relationship, such as economic conditions, regulatory changes, or differences in bank management practices, which may

obscure the direct impact of real interest rates on non-performing loans. Additionally, the real interest rate may not be a primary driver of loan performance, with factors like borrower creditworthiness, loan terms, and overall economic health playing more significant roles. Furthermore, banks may implement risk mitigation strategies, such as stricter lending criteria or enhanced monitoring, which could minimize the role of real interest rate fluctuations on loan performance. As a result, the expected positive relationship between NPL and RIR may not manifest in a significant manner, highlighting the complexity of the factors that influence loan performance in conventional banks.

The FE model results show a non-significant relationship between Non-Performing Loans (NPL) and the Capital Adequacy Ratio (CAR) while hypothesizing a negative relationship in a conventional bank; it suggests that the expected impact of capital adequacy on non-performing loans is not as straightforward as anticipated. Several factors could contribute to this non-significant relationship. First, regulatory requirements may help that banks maintain sufficient capital buffers so as enable them to absorb potential losses from non-performing loans, thereby reducing the direct impact on the CAR. Additionally, the management practices and risk mitigation strategies adopted by banks might vary significantly, leading to diverse outcomes in terms of how capital adequacy affects loan performance. Moreover, external factors such as market competition, economic conditions, and government policies could play a more prominent role in influencing non-performing loans, overshadowing the direct impact of CAR. Lastly, the quality of the bank's loan portfolio and the effectiveness of its credit risk management practices could mitigate the anticipated negative relationship between NPL and CAR. Hence, the non-significant relationship in the FE model highlights the complexity of factors at play and suggests that capital adequacy may not be a strong predictor of non-performing loans in conventional banks.

The FE Model results show a non-significant relationship between Non-Performing Loans (NPL) and the Bank's Income Diversification Ratio (BID) while hypothesizing a negative relationship in a conventional bank; it suggests that income diversification does not have a straightforward impact on non-performing loans as anticipated. Several factors

could explain this outcome. First, income diversification strategies may vary significantly among banks, leading to diverse results. Some banks might be more effective at managing their diversified income streams, while others may not see the same benefits. Second, external factors such as economic conditions, market competition, and regulatory changes could play a more prominent role in influencing non-performing loans than income diversification. Additionally, the quality of the bank's loan portfolio and its credit risk management practices might overshadow the effects of income diversification. Lastly, income diversification might not directly address the root causes of non-performing loans, such as poor loan origination practices or borrower financial instability. Hence, the non-significant relationship in the FE model highlights the complexity of factors at play and suggests that income diversification may not be a strong predictor of non-performing loans in conventional banks.

The FE model results show a non-significant relationship between Non-Performing Loans (NPL) and the natural logarithm of the concentration ratio (LnCnR) while hypothesizing a negative relationship in a conventional bank; it suggests that the expected impact of market concentration on non-performing loans is not as straightforward as anticipated. Several factors could contribute to this non-significant relationship. First, variations in market structures and competitive dynamics among banks could lead to diverse outcomes, making it challenging to establish a clear link between market concentration and loan performance. Additionally, external factors such as economic conditions, regulatory changes, and borrower characteristics might have a more significant impact in influencing non-performing loans than market concentration. Moreover, banks within different market concentration levels may adopt varying risk management practices and lending strategies, further complicating the relationship. Lastly, the quality of the bank's loan portfolio and its credit risk management practices might overshadow the effects of market concentration. Hence, the non-significant relationship in the FE model highlights the complexity of factors at play and suggests that market concentration may not be a strong predictor of non-performing loans in conventional banks.

4.4.2 Interest free Banks

In the Fixed Effects (FE) model, the results show a non-significant relationship between the ratio of Non-Performing Loans (NPL) and Gross Domestic Product growth rate (GDP) in Interest free banks, while hypothesizing a negative relationship, and this result contrasts with the significant negative relationship observed in conventional banks, several factors might explain this discrepancy. The fundamental differences in banking models between Interest free and conventional banks could be a key factor. Interest free banks operate under Shariah law, which prohibits interest (riba) and promotes profit-and-loss sharing arrangements, potentially leading to different risk management practices. The asset-backed nature of Interest free financing, where loans are often tied to tangible assets, might mitigate the impact of economic fluctuations on loan performance, unlike conventional banks that primarily rely on interest-based lending. Furthermore, Interest free banks may have more conservative lending practices and stricter credit risk management, which could buffer the effects of GDP changes on non-performing loans. Additionally, the diversity in the operational practices and market environments of Interest free banks across different regions might lead to varied results, masking a clear relationship between GDP and NPL. Consequently, the non-significant relationship in Interest free banks highlights the unique characteristics and resilience of Interest free banking practices, in contrast to conventional banks where the economic performance has a more pronounced effect on loan quality.

In the Fixed Effects (FE) model, if the results show a positive significant relationship between Non-Performing Loans (NPL) and Real Interest Rate (RIR) in Interest free banks, while hypothesizing a positive relationship, and this result contrasts with the non-significant relationship observed in conventional banks, several factors might explain this discrepancy. One key factor is the fundamental differences in the banking models. Interest free banks operate under Shariah law, which prohibits interest (riba) and promotes profit-and-loss sharing arrangements. This distinct financial structure may make Interest free banks more sensitive to changes in real interest rates, as they often engage in alternative financial products that indirectly reflect interest rate movements. The positive significant relationship in Interest free banks suggests that higher real

interest rates may lead to an increase in non-performing loans, possibly due to the impact of higher borrowing costs on borrowers' ability to repay loans. In contrast, conventional banks primarily rely on interest-based lending, and the non-significant relationship may indicate that other factors, such as credit risk management and economic conditions, play a more dominant role in influencing non-performing loans. Additionally, the diversity in operational practices and market environments of conventional banks across different regions might lead to varied results, masking a clear relationship between NPL and RIR. Consequently, the significant positive relationship in Interest free banks highlights the unique characteristics and sensitivity of Interest free banking practices to real interest rate changes, in contrast to conventional banks where the impact is less pronounced.

In the Fixed Effects (FE) model, if the results show a negative significant relationship between Non-Performing Loans (NPL) and Capital Adequacy Ratio (CAR) in Interest free banks, while hypothesizing a negative relationship, and this result contrasts with the non-significant relationship observed in conventional banks, several factors might explain this discrepancy. One key factor is the fundamental differences in banking models. Interest free banks operate under Shariah law, which prohibits interest (riba) and promotes profit-and-loss sharing arrangements. This distinct financial structure may lead to more stringent capital management and risk-sharing practices in Interest free banks, making them more sensitive to changes in capital adequacy. The negative significant relationship suggests that higher capital adequacy in Interest free banks is associated with lower levels of non-performing loans, indicating effective risk management and prudent lending practices. In contrast, conventional banks primarily rely on interest-based lending, and the non-significant relationship may indicate that other factors, such as economic conditions and credit risk management, play a more dominant role in influencing non-performing loans. Additionally, the diversity in operational practices and market environments of conventional banks across different regions might lead to varied results, masking a clear relationship between NPL and CAR. Consequently, the significant negative relationship in Interest free banks highlights the unique characteristics and risk management strategies of Interest free banking, in contrast to

conventional banks where the impact of capital adequacy on loan quality is less pronounced.

In the Fixed Effects (FE) model, if the results show a non-significant relationship between Non-Performing Loans (NPL) and Credit Growth Rate (CGR) in Interest free banks, while hypothesizing a positive relationship, and this result contrasts with the significant positive relationship observed in conventional banks, several factors might explain this discrepancy. One key factor is the fundamental differences in banking models. Interest free banks operate under Shariah law, which prohibits interest (riba) and promotes profit-and-loss sharing arrangements. These distinct financial structures may lead to different risk profiles and growth dynamics compared to conventional banks. For instance, the risk-sharing nature of Interest free finance and the asset-backed nature of Interest free loans might result in different impacts on credit growth, making the relationship between NPL and CGR less pronounced. Additionally, Interest free banks may adopt more conservative lending practices and stricter credit risk management, which could buffer the direct impact of non-performing loans on credit growth. Moreover, the diversity in operational practices and market environments of Interest free banks across different regions might lead to varied results, masking a clear relationship between NPL and CGR. Consequently, the non-significant relationship in Interest free banks highlights the unique characteristics and resilience of Interest free banking practices, in contrast to conventional banks where rapid credit growth is more directly associated with an increment of NPL.

In the Fixed Effects (FE) model, if the results show a non-significant relationship between Non-Performing Loans (NPL) and Net Interest Margin (NIM) in Interest free banks, while hypothesizing a negative relationship, and this result contrasts with the significant negative relationship observed in conventional banks, several factors might explain this discrepancy. One key factor is the fundamental differences in the banking models. Interest free banks operate under Shariah law, which prohibits interest (riba) and promotes profit-and-loss sharing arrangements, resulting in different financial structures and risk management practices compared to conventional banks. The unique nature of Interest free banking, such as asset-backed financing and profit-sharing mechanisms, may

provide a buffer against the direct impact of non-performing loans on net interest margins. Additionally, Interest free banks may adopt more conservative lending practices and maintain stricter credit risk management, reducing the potential negative impact of non-performing loans on profitability metrics like NIM. Furthermore, the diversity in the operational practices and market environments of Interest free banks across different regions might lead to varied results, masking a clear relationship between NPL and NIM. Consequently, the non-significant relationship in Interest free banks highlights the unique characteristics and resilience of Interest free banking practices, in contrast to conventional banks where net interest margins are more directly affected by the quality of the loan portfolio.

In the Fixed Effects (FE) model, if the results show a non-significant relationship between Non-Performing Loans (NPL) and Bank Income Diversification (BID) in Interest free banks, while hypothesizing a negative relationship, and this result is similar to the non-significant relationship observed in conventional banks despite hypothesizing the same negative relationship, several factors might explain this outcome. Both Interest free and conventional banks may have diverse sources of income and varying degrees of success in managing these income streams, leading to differing impacts on non-performing loans. In Interest free banks, income diversification may include profit-sharing, leasing, and other Shariah-compliant financing methods, which could behave differently compared to interest-based income sources in conventional banks. Additionally, the unique risk-sharing nature of Interest free finance and the asset-backed structure of their financial products might mitigate the impact of income diversification on non-performing loans. Moreover, external factors such as economic conditions, regulatory changes, and borrower behavior might have a more significant impact in influencing NPL than income diversification itself. Consequently, the non-significant relationship in both Interest free and conventional banks highlights the complexity of factors at play and suggests that income diversification alone may not be a strong predictor of non-performing loans, irrespective of the banking model.

In the Fixed Effects (FE) model, if the results show a non-significant relationship between Non-Performing Loans (NPL) and Return on Assets (ROA) in Interest free

banks, while hypothesizing a negative relationship, and this result contrasts with the significant negative relationship observed in conventional banks, several factors might explain this discrepancy. The fundamental differences in banking models between Interest free and conventional banks could play a key role. Interest free banks operate under Shariah law, which prohibits interest (riba) and promotes profit-and-loss sharing arrangements. This distinct financial structure may lead to different risk profiles and financial outcomes compared to conventional banks. For instance, the asset-backed nature of Interest free financing, where loans are often tied to tangible assets, might provide a buffer against the direct impact of non-performing loans on return on assets. Additionally, Interest free banks may adopt more conservative lending practices and stricter credit risk management, reducing the potential negative impact of non-performing loans on profitability metrics like ROA. Furthermore, the diversity in the operational practices and market environments of Interest free banks across different regions might lead to varied results, masking a clear relationship between NPL and ROA. Consequently, the non-significant relationship in Interest free banks highlights the unique characteristics and resilience of Interest free banking practices, in contrast to conventional banks where the quality of the loan portfolio has a more pronounced effect on return on assets.

The fixed effects model for Interest free banks presents a similar yet distinct picture. Bank size (LnSz) again demonstrates a statistically significant negative relationship (coefficient = -0.063130, $p < 0.001$) with NPLs, echoing the trend observed in conventional banks. This suggests that larger Interest free banks also benefit from lower NPL ratios, likely through similar mechanisms as their conventional counterparts.

In the Fixed Effects (FE) model, if the results show a negative significant relationship between Non-Performing Loans (NPL) and the natural logarithm of Bank Size (Less) in both Interest free and conventional banks, while hypothesizing a null relationship, several factors could explain this unexpected outcome. One key factor is the potential impact of larger bank sizes on loan performance and risk management. In both Interest free and conventional banks, larger institutions might face more complexities and challenges in maintaining effective credit risk management practices, leading to higher levels of non-

performing loans. Additionally, larger banks may engage in more aggressive lending practices to maintain market share, increasing the likelihood of loan defaults. The negative significant relationship suggests that as bank size increases, the proportion of non-performing loans also increases, indicating potential inefficiencies in managing larger loan portfolios. Moreover, the distinct financial structures and risk-sharing practices in Interest free banks, as well as the interest-based lending in conventional banks, might both contribute to this relationship, highlighting the challenges faced by larger banks in both systems. Consequently, the significant negative relationship in both Interest free and conventional banks underscores the importance of effective risk management and prudent lending practices, irrespective of the bank's size, to minimize non-performing loans.

In the Fixed Effects (FE) model, if the results show a positive significant relationship between Non-Performing Loans (NPL) and the natural logarithm of concentration ratio (LnCnR) in Interest free banks, while hypothesizing a null relationship, and this result contrasts with the non-significant relationship observed in conventional banks despite hypothesizing the same null relationship, several factors might explain this discrepancy. One key factor is the unique market dynamics and competitive environment in which Interest free banks operate. In markets with higher concentration ratios, fewer banks dominate the market, potentially leading to less competitive pressure and higher risk-taking behaviors. This might result in an increased likelihood of non-performing loans as these dominant banks might engage in aggressive lending practices without stringent risk assessment. The positive significant relationship in Interest free banks suggests that higher market concentration is associated with an increase in non-performing loans, possibly due to these competitive and market dynamics. In contrast, conventional banks may be more diversified and operate in more competitive markets, where market concentration does not significantly impact their loan portfolio's quality. Additionally, the diversity in operational practices and market environments of conventional banks across different regions might lead to varied results, masking a clear relationship between NPL and LnCnR. Consequently, the significant positive relationship in Interest free

banks highlights the importance of market structure and competition in influencing loan performance, in contrast to conventional banks where the impact is less pronounced.

Table 3: Regression result for both Conventional and Interest free banks

Dependent Variable :NPL				
	Conventional bank		Interest free bank	
Method	Fixed Effect	pane Least Square	Fixed Effect	pane Least Square
Period include	10 year		10 years	
Cross-section included	18 banks		10 banks	
Total panel Observations	165		50	
Variables	coefficient	Prob.	coefficient	Prob.
C (constant)	0.544686	0.0015	0.157042	0.4322
GDP	-0.532967**	0.0587**	0.940494	0.2637
RIR	1.164249	0.5721	18.05576**	0.0001**
CAR	0.079147	0.1773	-1.326741**	0.0000**
CGR	0.9882376**	0.0001**	-0.003008	0.3059
NIM	-0.034945**	0.0484**	-0.2219003	0.4471
BID	0.007993	0.8101	0.036448	0.1904
ROA	-1.757228**	0.0000**	0.144054	0.7752
LnSz	-0.029414**	0.0289**	-0.063130**	0.000**
LnCnR	-0.0000782	0.7349	0.000189**	0.0046**
Dummy (Year1-year10)	0.009724	0.3432	0.027701	0.3162
R ²	0.790773		0.926373	
Adjusted R ²	0.749539		0.879742	
F-Statistic	19.17750		19.86622	
Prob (F-statistic)	0.0000		0.00000	
Durbin-Watson stat	1.884818		2.033031	

4.4.3 Comparison

Comparing the two models reveals both commonalities and differences. Both conventional and Interest free banks demonstrate a negative association between bank size and NPLs. However, the influence of the real interest rate and CAR diverges considerably. RIR exerts a much stronger positive impact on NPLs in Interest free banks, potentially reflecting the unique characteristics of their financing mechanisms. Moreover, CAR plays a significant role in Interest free banks' NPL management, with higher CAR

leading to lower NPLs, whereas it does not appear to be significant in conventional banks. These findings suggest that while some factors universally influence NPLs across different banking systems, others are specific to the unique operational and structural features of Interest free finance. Furthermore, the higher R-squared for Interest free banks indicates that the model explains more of the variability in NPLs for this group compared to conventional banks.

4.5 SUMMARY OF FINDINGS

The Fixed Effects (FE) model results indicate varying relationships between Non-Performing Loans (NPL) and different financial variables in Interest free and conventional banks. In Interest free banks, significant negative relationships were observed with Capital Adequacy Ratio (CAR) and Bank Size (LnSz), suggesting effective risk management practices and conservative lending. Conversely, a significant positive relationship with the Real Interest Rate (RIR) and market concentration (LnCnR) highlights the sensitivity of Interest free banks to interest rate changes and competitive dynamics. However, non-significant relationships were found with variables like Net Interest Margin (NIM), Return on Assets (ROA), and Income Diversification (BID), indicating that these factors may not strongly influence loan performance in Interest free banks.

For conventional banks, significant negative relationships between NPL and Return on Assets (ROA) and Capital Adequacy Ratio (CAR) underscore the impact of asset quality and capital management on loan performance. However, non-significant relationships with variables like Real Interest Rate (RIR), Bank Size (LnSz), and market concentration (LnCnR) suggest that other factors, such as economic conditions and credit risk management, play a more dominant role. Overall, these results highlight the unique characteristics and risk management strategies of both Interest free and conventional banks, emphasizing the importance of effective risk management and prudent lending practices to minimize non-performing loans.

5 CHAPTER FIVE – CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The comparative analysis between conventional bank and Interest free bank reveals that both groups exhibit minimal autocorrelation in their residuals, as indicated by the Durbin-Watson statistics of 1.884818 for Conventional bank and 2.033031 for interest free banking. This suggests that the residuals in both regression models are not significantly correlated, ensuring the reliability of the regression estimates and inferences. Significant variables impacting Non-Performing Loans (NPL) in Conventional Bank include Real Interest Rate (RIR), Capital Adequacy Ratio (CAR), Credit Growth Rate (CGR), Net Interest Margin (NIM), Logarithm of Bank Size (LNSZ), and Logarithm of Credit to Non-Residents (LNCNR). The differences in significance between the two groups can be attributed to variations in economic environment, banking practices, and regulatory frameworks.

5.2 RECOMMENDATION

Recommendations for interest free Banks in Ethiopia

Strengthening Capital Adequacy – Since a higher Capital Adequacy Ratio (CAR) is linked to lower Non-Performing Loans (NPL), interest-free banks should maintain strong capital reserves. The National Bank of Ethiopia (NBE) could enforce stricter capital requirements; ensuring banks are well-positioned to absorb credit risks.

Optimizing Bank Size for Risk Management – Larger banks demonstrate better loan performance, so smaller interest-free banks should implement risk controls similar to larger institutions, such as robust credit screening and diversified loan portfolios.

Mitigating Interest Rate Sensitivity – Despite operating under Sharia-compliant principles, interest-free banks exhibit a positive relationship between NPL and real interest rate (RIR). This suggests an indirect influence of macroeconomic factors, requiring banks to adjust pricing strategies and financial instruments to shield themselves from rate fluctuations.

Managing Competitive Pressures – The strong association between market concentration (LnCnR) and NPL highlights credit risks in highly competitive environments. Regulatory bodies should monitor aggressive market expansion strategies and encourage sustainable competition.

Reassessing Financial Performance Indicators – The study finds no significant impact of Net Interest Margin (NIM), Return on Assets (ROA), and Income Diversification (BID) on NPLs. This suggests banks should focus more on borrower-specific risk factors rather than relying on standard profitability metrics.

Recommendations for Conventional Banks in Ethiopia

Improving Asset Quality and Loan Performance – Since ROA negatively correlates with NPL, banks should prioritize higher-return assets, enhance credit portfolio diversification, and optimize revenue streams.

Maintaining Robust Capital Buffers – A strong CAR reduces NPL risks, meaning Ethiopian banks should ensure strict capital adequacy compliance under NBE regulations, particularly in sectors prone to credit defaults.

Refining Credit Risk Models Beyond Economic Indicators – The study finds that real interest rate (RIR), bank size (LnSz), and market concentration (LnCnR) do not significantly influence NPLs in conventional banks. Banks should instead strengthen borrower risk assessment frameworks and focus on industry-specific risk profiling.

Enhancing Credit Risk Policies – Since key determinants of credit risk differ between conventional and interest-free banks, banks should tailor risk mitigation strategies. For instance, conventional banks can leverage collateral-based lending, while interest-free banks can rely on profit-sharing contracts.

Generally in both cases The National Bank of Ethiopia should refine risk assessment regulations, particularly for newer banks, ensuring sustainable loan practices. And

further, banks should develop more comprehensive credit evaluation techniques, especially for SMEs and informal sector borrowers, to minimize loan defaults.

5.3 FUTURE RESEARCH AREAS

Here are some potential future research areas related to Non-Performing Loans (NPL) and their influencing factors, building on the findings from conventional bank and Interest free banks:

1. Macro-Economic Impact on NPL:

Investigate how different macro-economic variables, such as inflation, exchange rates, and unemployment rates, influence NPL across various regions and economic environments. Comparative studies can give insight into the resilience of banking systems in different economic contexts.

2. Regulatory Frameworks and NPL:

Examine the impact of varying regulatory frameworks on NPL. Research could focus on how different regulatory requirements, such as capital adequacy and liquidity ratios, affect NPL. This can help policymakers design more effective regulations to mitigate NPL.

3. Risk Management Practices:

Study the effectiveness of different risk management practices in reducing NPL. This can include evaluating credit risk assessment techniques, loan monitoring systems, and the role of financial technology (fintech) in improving risk management.

4. Bank-Specific Factors:

Explore the impact of bank-specific factors, such as management quality, governance, and ownership structure, on NPL. Understanding these factors can help banks implement better internal controls and governance practices.

5. Impact of Financial Inclusion:

Analyze the relationship between financial inclusion and NPL. Research can investigate whether increasing access to financial services for underserved populations affects NPL and overall financial stability.

6. Sectoral Analysis:

Investigate the impact of NPL in different economic sectors, such as agriculture, manufacturing, and services. Understanding sector-specific dynamics can help tailor interventions to address NPL in the most affected industries.

These future research areas can contribute to a deeper understanding of the factors influencing Non-Performing Loans and help develop more effective strategies to manage and reduce NPL, ultimately enhancing financial stability and resilience.

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