

UNIVERSITY OF GHANA

COLLEGE OF HUMANITIES

**FINTECH, DIVERSIFICATION, OWNERSHIP AND BANK ASSET QUALITY:
EVIDENCE FROM SUB-SAHARAN AFRICA**

BY

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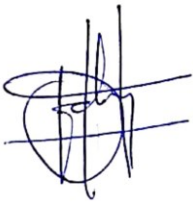
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DECLARATION

I, Thomas Achagani Kumuriwo, declare that this thesis has not been documented for presentation at this or any other university. I hereby state that this thesis is entirely my own creation and that all sources have been properly cited. Any flaws in this argument that may be detected are all my fault.



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CERTIFICATION

We hereby certify that this thesis is solely the original work of Thomas Achagani Kumuriwo and that it was supervised in full compliance with the University of Ghana’s rules, procedures and experiments.

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DEDICATION

I dedicate this thesis to my late father, Mr. Achagani Kumuriwo and mother, Mrs. Kachana Achagani.

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My utmost gratitude goes to the Lord God for bringing me this far.

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ABBREVIATIONS/ACRONYMS

AI	Artificial intelligence
Fintech	Financial Technology
GMM	Generalized Moments Methods.
NPL	Non-Performing Loan
SSA	Sub-Saharan Africa
GCC	Gulf Cooperation Council
NIITI	Non-Interest Income

ABSTRACT

Globally, the banking industry is now experiencing an upheaval due to recent advancements in Fintech. The banking industry is driven toward operational innovation by the financial technology industry's fast advancement in order to obtain a competitive, long-lasting edge. This study looked at the connection between financial technology investment and bank asset quality as well as the conditional effects of diversification and type of bank ownership. The study used the dynamic panel model estimator. The target population for the study of Fintech, diversification, ownership, and bank asset quality included banks in Sub-Saharan Africa listed on their country stock exchange markets. The research used a purposive selection approach to collect secondary data from yearly financial statements of stock exchange listed banks over a ten-year period, from 2011 to 2020.

The research found a strong negative relationship between Fintech investment and bank asset quality. The study also found that the association of Fintech investment with bank asset quality is significantly moderated by diversification. Similarly, the study also found that the association of Fintech investment with bank asset quality is significantly moderated by ownership structure. The findings can become a bedrock for policy, practice, and research purposes. Discovery of this significant relationship between Fintech investment and bank asset quality suggests that policymakers should implement policies that encourage banks to increase their investment in financial technology because this will decrease NPL and in effect enhance asset quality. This would ensure optimum performing assets which guarantee growth. Bank managers should make decisions to ensure that banks invest in financial innovations and technology in order to reap the associated benefits such as improved profitability and reduced bad loans. Last, but not the least, with the intervening effect of diversification, policymakers should implement policies that enhance

and promote the growth of the Fintech industry to provide an opportunity for the banks to take advantage of and enjoy the benefits.

Due to the limitation of the study to exploring the impact of diversification and ownership structure on fintech and Asset quality, future studies may also consider corporate governance practice dimensions such as an independent board, size of board, gender, etc. to further explore its impact on Fintech, Asset quality and Ownership relationship.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Technology has long been a crucial enabler for the financial services (FS) market, helping to generate operational efficiency and effectiveness. It also allows for product design breakthroughs and increases customer experience. Global Fintech investment increased from \$87 billion in 2020 to \$98 billion in 2021 (KPMG, 2021). According to the IMF (2019), technologies ranging from artificial intelligence (AI) to mobile applications are providing new cutting-edge solutions that seek to increase the efficiency, accessibility, and security of financial services. The FSB (2017) defined Fintech as "tech that is enhanced via financial breakthrough might lead to new solutions, apps, workflows, or tangible things with effects on financial sector, financial firms, as well as the delivery of financial services." These financial advances include big data, the Internet of Things, artificial intelligence (AI), and blockchain technology (Song, 2021). These innovations provide industries with quick information at a competitively lower cost, as well as the associated continuous improvement in service delivery (Liberti & Peterson, 2019).

Asset quality is a component of bank management that assesses a firm's assets to gauge the degree and scope of the credit risk attached to its operation (Song, 2021). Due to the advent and growth of digital financial services, an unprecedented number of individuals are now receiving formal financial services (Mostak et al., 2017). With over half of approximately 700 million individual users worldwide, Africa now has the highest concentration of digital financial service deployments worldwide. In urban and rural areas without a single bank branch, mobile money solutions and

agent banking today provide cheap, quick, and dependable alternatives for transactions, savings, credit, and even insurance. For everyone, this is essentially banking at their fingertips; it is groundbreaking (Mastercard Africa, 2018).

The effects of Fintech breakthrough cannot be overemphasized as it has translated into social benefits such as poverty reduction through job creation. This is being demonstrated ten years after Sub-Saharan Africa pioneered digital financial services. According to field studies, households with access to mobile money services now have higher daily per capita consumption levels, pulling them out of extreme poverty (Mastercard Africa, 2018). Mobile money services have transformed lives, assisting women in transitioning from subsistence farming to entrepreneurial careers and sustainable means of subsistence. For instance, the inclusion of 7.2 million new users of digital financial services (a 250 percent increase from the baseline), the hiring of 45,000 new banking agents, and the completion of \$300 million in monthly transactions have been made possible by 14 African financial services providers between 2012 and 2016 (Mastercard Africa, 2018).

The Basel Committee on Banking Supervision came up with 25 basic rules for how banks should be supervised. Seven of these rules are meant to deal with important issues like the quality of bank assets or how to manage credit risk (Basel, 1997). This suggested that financial regulatory bodies throughout the world are generally concerned about asset quality. Similar to how Nagle (1991) warned that issues with asset quality could turn into a ticking time bomb for banks, the U.S. Federal Reserve Board's safety and soundness standards took effect in 1995 and mandated that systematic asset quality monitoring be implemented by U.S financial institutions for spotting potential issues with bank asset quality, as well as to mandate banks to regularly submit asset quality reports to the board. Financial innovation emergence is driven by higher customer needs for convenience, speed,

cost, and user friendliness as well as by evolving technology (advancements in technology related to the internet, big data, mobile technology, and computer power) and changing financial regulation (changes in regulations). It is now an integral part of the banking system and, as such, has called for investment by banks to guarantee business continuity and stability.

Fintech has changed financial services product, processes, and institutions to meet the growing needs of the current millennial and young generation with the objective of providing access to financial services (Schindler, 2017). According to the literature, earlier results of Fintech investment on bank asset quality was unclear. A study by Sathya (2005) in Australia posited that transactional online banking services provided in credit unions do not affect the bank asset quality. Subsequent studies by researches have however shown outcome contrary to the earlier results. Ekinci (2019) in his studies found that investment in digitization has a positive impact on bank asset quality. Additionally, Chhaider et al. (2022) in their study about the effect of Digitization on the performance of European banks found that Fintech investment had a positive impact on overall performance of the banks including its asset quality (Chhaider et al., 2022; Wang, 2021; Kou et al., 2021; Cho & Chen, 2021). Application of modern software, hardware, and online platforms reduces the cost of accessing information (Liberti & Peterson, 2019), lowers the marginal cost of operation (FSB, 2017; Ahamed & Mallick, 2019; Dong et al., 2020), and enhances the management of credit risk. The study of Zhang and Yang (2019) in China show that Fintech investment decreases marginal cost and enhances profit to maintain bank stability (Ahamed & Mallick, 2019; and Tiriongo & Wamalwa, 2019). Fintech improves bank asset quality, improves risk control, and brings down the price of financial intermediary services (Chhaider et al., 2022; Wang et al., 2021). Further studies indicate that Fintech enhances banking credit services (Sheng,

2021; Chhaider et al., 2022) and improves revenues while managing risk (Li et al., 2021). Frame et al. (2019) and Thakor (2020) find digital technologies deployed in financial services for banking to be transformative. Even though the threat to existing processes is obvious, it turns out to make traditional banking activities more effective and efficient. It offers banks the opportunity to achieve financial inclusion (Ozili, 2020) and new revenue streams.

From the forgoing, it stands to confirm that there are lots of opportunities that financial institutions stand to benefit with the financial technology (Lin et al., 2009; Chhaider et al., 2022). According to Demirguc-Kunt et al. (2010), some of these opportunities enhance banks' business models and processes which increases bank diversification. Li et al. (2021) confirms in their study the ability of banks to improve performance by limiting the variability in revenue through income diversification. It is however imperative that the rate of adoption of this novelty is influenced by the bank ownership types (Sironi et al., 2006). In a study by Lin et al. (2009), they found that in China, large state-owned banks are less profitable than privately owned ones. Again, in a study by Sironi et al. (2006) about ownership concentration of banks, it was found out that a state-owned bank had bad asset quality.

1.2 Problem Statement

The development of the financial sector of every economy is key to its economic growth (Mwenda et al., 2011). This has made the growth of the financial sector a very crucial agenda for governments as they develop and implement policies to aid its growth. Zhuang et al. (2010) in their studies found that the financial sector's development does not only leads to economic growth

but also to poverty reduction and inclusive growth within an economy. Policy makers have therefore implemented pro-growth and sustainable policies to promote the financial sector's performance including high bank asset quality to provide a suitable environment for greater returns.

Financial technology (Fintech) is an innovation in the financial industry that improves banks performance through increased profit and enhanced asset quality (FSB 2017). This innovation according to the literature, impacts banks performance through innovative process of accessing loans at a minimal cost, time cost in assessment of entities qualified for loan among others in the financial sector (Sy et al., 2009, Liberti & Peterson,2019). Le et al. (2020) studied the phenomenon of bank performance and Fintech in China. They found in their studies that the use of innovative technologies in the delivery of bank services enhances performance including the improvement of asset quality at banks. These impacts are due to the improvement of access to information at a minimal cost (Liberti & Peterson, 2019) and its subsequent effect on cost reduction in operations (Dong et al., 2020). Further studies have also shown that fintech has reduced the cost of intermediation, which further increases banks' performance (Wang et al., 2021). According to the IMF (2019), the use of artificial intelligence, the internet of things, mobile phone applications, etc., has increased efficiency and enhanced the accessibility and security of financial services.

The importance of this innovation cannot be overemphasized as records have shown that global investment in Fintech has risen from \$87 billion in 2020 to \$98 billion in the first half of 2021 (KPMG FINTECH report 2021).

It stands to reason, therefore, that what could be the effect of fintech on the bank performance, considering the Non-performing Loans? From existing literature (Wang et al., 2021, Sy et al., 2009, Liberti & Peterson, 2019 etc.) across many parts of the world, including Asia region, European region, the USA and East Africa, Fintech has impacted positively on the performance of banks. Campanella et al. (2017), in their studies to examine the impact of online banking and new software on banks' profits, found that the use of brand-new applications and online banking has aided bankers in managing credit risk, which in turn enhances profitability. Chhaider et al., (2021) also found that the digitization is positively correlated to bank profit. Ky et al. (2019) studied the relationship between mobile money and bank performance in the East Africa Community. The authors found a positive correlation between mobile money uptake and bank performance metrics, including bank asset quality. Mustapha (2018) in Nigeria, studied about the impact of electronic payment technology on bank performance and found that there is a positive relationship between Fintech and bank profitability in Nigeria. Again, in Cameroon, Beloke et al. (2021) studied the impact of digital financial services on commercial banks' performance and found that digital financial services impact positively on bank profit, with a divergent finding that digital payment is negatively related to banks' profit. Unlike these afore mentioned regions, there is however limited research studies about the effect of Fintech on the Non performing Loan of banks in SSA. Additionally, In the literature, according to Chhaider et al. (2021) a reliable measure for fintech investment has been unavailable. And as such has made researchers use measures such as dummy variables (Dong et al., 2020), self-reported data, and hand-collected data (Ky et al., 2019) in their empirical studies. These subjective measure of fintech have limitation of inability to indicate how rigorous or sketchy a bank is in undertaking fintech investment (Chhaider et al., 2021; Baker, 2003).

1.3 Purpose of the Study

This paper seeks to examine the effect of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan African countries. The study examines the moderating impact of diversification on the link between Fintech and bank's asset quality. It also assesses the effect of ownership structure on bank asset quality across the region. Likewise, the cross-country approach is chosen with the special reason to identify other factors that enhance the adoption of Fintech in some countries as compared to other African countries.

1.4 Research Objectives

This research examines the impact of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan African countries. Precisely, the research aims to:

- i. Examine the impact of Fintech investment on bank asset quality in Sub-Saharan Africa,
- ii. Analyze how diversification affects the connection between Fintech investment and bank asset quality in sub-Saharan Africa,
- iii. Discuss how ownership of a bank affects the relationship between Fintech investment and bank asset quality in sub-Saharan Africa.

1.5 Research Questions

- i. What is the impact of Fintech investment on bank asset quality in Sub-Saharan Africa?

- ii. What is the influence of diversification on the connection between Fintech investment and bank asset quality in sub-Saharan Africa?
- iii. What is the impact of the type of ownership of a bank on the relationship between Fintech investment and bank asset quality in Sub-Saharan Africa?

1.6 Significance of the Research

With reliance on the prevalence of the digitalization lexicon in the audited yearly statements, the paper will redound to the benefit of practitioners, academia, and policymakers by increasing their understanding of Fintech investment, diversification, and ownership structure effects on bank asset quality in Sub-Saharan Africa. The research will help central banks and the government improve the effectiveness and efficiency of their regulatory roles and the setting of policies to enhance banks' asset quality. For researchers and scholars, the study will contribute to already existing knowledge, be helpful when other research is being undertaken in the same subject area, and serve as a basis for further research. The study's data and analysis will act as the foundation for future studies in the Fintech area. Finally, it will provide enough knowledge and ideas to enable practitioners (bankers) to undertake policies to enhance their firm's performance.

1.7 Organization of the Study

The work will be presented in five chapters. Chapter one will consist of the introduction to the study, while Chapter two will present the literature review. Chapter three will address the research

methodology. The results and discussions will be in Chapter four. Chapter five will present the summary, conclusions, and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explored various theoretical and philosophical literature on Fintech, diversification, ownership, and bank asset quality. Also, empirical reviews were found and the gaps were highlighted.

2.2 Theoretical Review

This section presents the theoretical foundation of the study. It provides theories underpinning the associations between the study variables. The Schumpeterian Innovation theory and the Agency Theory were reviewed.

2.2.1 The Schumpeterian Innovation Theory

Fintech, Bank Asset Quality and Diversification

The study leveraged the Schumpeterian innovation theory to explain how financial technology predicts bank asset quality as well as the interactive effect of diversification. The roots of Schumpeterian innovation theory can be found in his "Business Cycles" work. Joseph Alois Schumpeter proposed the innovation theory of entrepreneurship, based on Arthur Spiethoff's "Economic Cycles." Since its beginnings in 1932, the theory has shed light on a previously neglected aspect of entrepreneurship as well as the core motives and traits of entrepreneurs. The model depicts industry development and competitiveness as being based on the ability to innovate.

The Schumpeterian has three basic characteristics: (i) it is concerned with growth generated by innovations; (ii) innovations are the result of entrepreneurial investments motivated by the prospect of monopoly rents; and (iii) new innovations replace old technologies, implying that growth involves "creative destruction."

A "new idea, device, or approach" is a simple definition of innovation. However, superior solutions that address new requirements, unarticulated demands, or current market needs are frequently considered to be innovations. This is done by providing markets, governments, and society with more efficient goods, processes, services, technology, and business models. The term "innovation" may be defined as something new that "breaks into" the market or society by being original and more effective. According to Schumpeter, the heart and soul of an entrepreneur are creative destruction; he does not consider management of factors or resources or organization of factors or resources to be the heart and soul of an entrepreneur. Therefore, the current study argues that when banks invest in innovations such as Fintech, they are capable of improving the quality of their assets.

In terms of its significance in explaining competitiveness and growth, the Schumpeterian model of innovation's prominence in studying the association between Fintech and asset quality cannot be overstated. The system, however, has faults of its own. Schumpeter's idea has been heavily criticized for a variety of reasons. Though the critique is not conclusive, there are a few dimensions on which this theory does not adequately explore, provide light, or destroy. The creative or inventive entrepreneur, according to Schumpeter, primarily focuses on invention; opponents disagree that this is the only significant trait or function of entrepreneurs. Other criticisms include the fact that the theory only focuses on the innovation function of entrepreneurs while ignoring

other important and equally critical aspects of entrepreneurs such as organization and management skills; that the theory does not support the concept of risk bearing as strongly as it does the concept of innovation; and that the theory completely undermines or ignores the classic traits of entrepreneurship where he assembles and uses entrepreneurial factors.

2.2.2 Agency Theory

Bank Ownership, Fintech and Bank Asset Quality

Using the agency theory, the authors investigated how a bank's ownership affects the relationship between Fintech investment and bank asset quality. The theory of agency costs in capital structure can be traced to the work of Michael C. Jensen and William H. Meckling entitled "Managerial Behavior, Agency Costs, and Ownership Structure in Firm Theory" in the mid-1970s. The advancements in property theory, agency theory, and finance inspired Jensen and Meckling (1976) to develop a theory of business ownership. They realized that the economics literature had failed to examine the firm's organizational structure. In essence, it saw the company as a "black box" that was run to maximize profits by satisfying the relevant marginal conditions with regard to inputs and outputs. When the principal hires the agent to operate on his behalf, they are said to be in an agency relationship. They pointed out that the agent would behave in his own self-interest if both he and the principal are utility maximizers. To make sure the agent is acting in his best interest, the principal must provide the proper incentives and pay monitoring expenses. Given that ownership and management functions in contemporary businesses are distinct, such a connection best suits the interaction between shareholders and managers. In both privately held and state-owned enterprises, managers are believed to prioritize their own personal usefulness above that of

their owners. This disparity is reduced in private organizations by a variety of internal and external strategies, such as management ownership participation, pay plans, the board of directors, and capital and corporate controls. In state-owned firms, these processes are almost nonexistent.

According to the body of available research, ownership type affects risk-taking propensity and agency issues in organizations. Jensen and Meckling (1976) identified conflict of interest as the first issue among agency problems, which suggests that diversified shareholders are willing to take higher risks to increase their earnings while managers try to reduce risk exposures and losses in order to save their positions and to serve their own personal interests (Jensen & Meckling, 1976; Esty, 1998). Saunders et al. (1990) carried out one of the first empirical studies connecting the effect of ownership structure on bank risk-taking incentives. They proposed the hypothesis that banks that are owned by stockholders have higher risk-taking incentives than banks that are privately held. The findings confirmed the hypothesis and revealed a positive relationship between shareholder control and risk-taking incentives. They also came to the conclusion that management control and risk-taking incentives have a bad relationship. Other research, like that of Saunders et al. (1990), discovered a strong link between ownership and risk-taking incentives, although they could not agree on the direction of the relationship. Studies have discovered positive relationships, negative relationships, and U-shaped or inverse U-shaped relationships. For instance, Sullivan and Spong (2007) found that banks with managers as shareholders had stock ownership that was positively correlated with bank risk, demonstrating that in certain circumstances, bank managers run their institutions for the advantage of their shareholders.

Evidence pertaining to the quality of asset comparison between foreign and domestic, or publicly and privately held banks, has been presented in the literature that is currently available. Agency

costs in government-owned companies may lead to poor management compensation, underutilization, and resource misallocation. The agency cost perspective demonstrates that public business managers underperform relative to their counterparts in the private sector and often spend the majority of resources for their own personal gain. State-owned banks operate to assist the government's supporters, but political involvement in banks reduces efficiency and credit quality by distributing money based on political considerations (Khwaja & Mian, 2005). Studies already conducted have shown that government-owned banks are mostly linked to loans of worse quality and more NPLs (Berger et al., 2005; and Iannota, et al., 2007). Additionally, Iannota et al. (2007) came to the conclusion that commercial banks are more lucrative than mutual and government-owned banks. They also discovered that, among mutual, private, and public banks, mutual banks had the lowest NPLs and the highest quality loans, whereas publicly held banks had the largest NPLs and the worst loan quality. Additionally, Micco et al. (2007) discovered that, among all banks in emerging nations, privately held banks perform the best.

2.2.3 Technology Acceptance Model

Fintech and Bank Asset Quality (NPL)

The authors investigated how banks adopt fintech and its consequent advantage of raising bank asset quality using the Technology Acceptance Model. Davis created the theory in 1989, and its major goal was to explain the mechanism behind how technology (innovation) gets accepted. It claims that user behavioral intentions, which are in turn influenced by perceptions of the technology's usefulness in carrying out the job and perceived ease of use of its, are predictive of users' willingness to adopt new technology.

The purpose of the TMA was to forecast behavior and provide an explanation for effective information technology adoption.

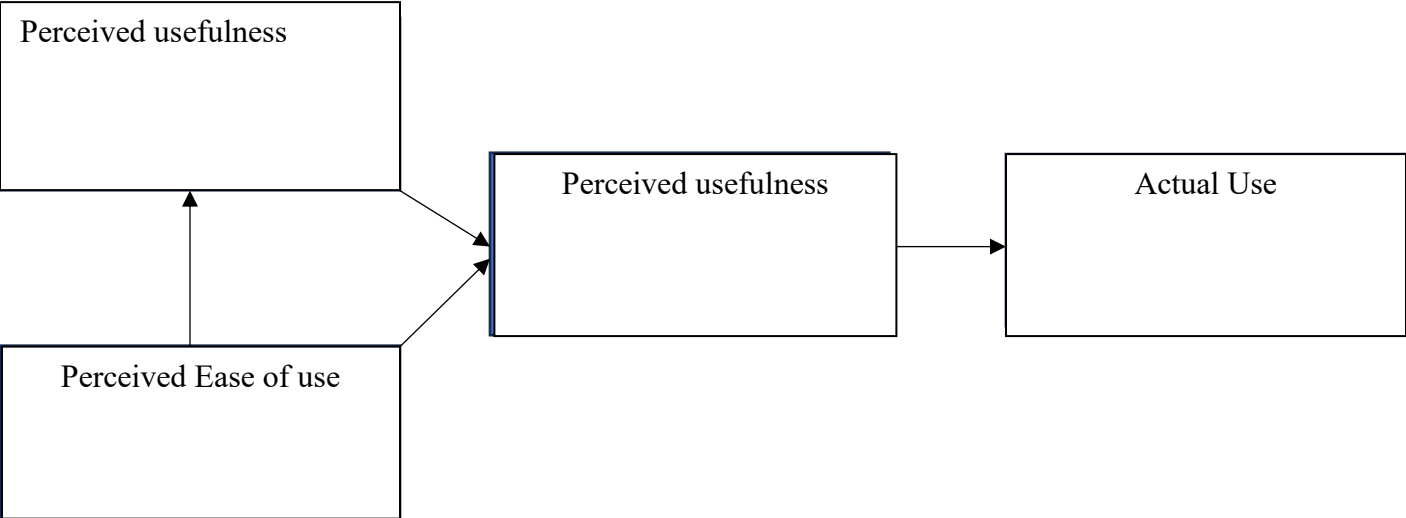
Technology acceptance, in accordance with the Technology Acceptance Model, is a process in which external factors (system design features) set off cognitive responses (perceived ease of use and perceived usefulness), which in turn result in an efficient response (attitude toward using technology/intention), influencing use behavior (Davis, 1989; Davis, 1993). TAM is a representation of the behavior as the result of perceived usefulness, perceived ease of use, and behavioral intention.

Perceived ease of use and perceived usefulness capture the expectations of positive behavioral outcomes and the belief that behavior will not be labor-consuming (Davis, 1989). According to a follow-up study, behavioral intention can be substituted by the attitude toward behavior (Davis, 1993), which is an affective evaluation of the potential consequences of the behavior (Ajzen, 2011). The higher the affective response, the higher is the likelihood that the behavior will take place. The effect of perceived usefulness on actual use can be direct, which underscores the importance of the variable in predicting behavior. Although perceived ease of use does not affect use behavior directly, it underpins the effect of perceived usefulness (Davis, 1993). The model implies that if an application is expected to be easy to use, the more likely it is that it will be considered useful for the user and the more likely it is that this will stimulate the acceptance of the technology (Davis, 1989; Davis, 1993).

According to studies, the ease of use and perceived usefulness of Fintech has enhanced its use in the banking industry. In a study by Ky et al. (2021), they noticed how increased use of mobile money technology has benefited the banks in terms of increased profitability. Again Campanella

et al. (2017), in their studies to examine the impact of online banking and new software on banks' profits, found that the adoption of brand-new application technologies and online banking has improved banks credit risk assessment. The theory is empirically justified in a study by Liberti & Peterson (2019) where they found that the use of technology to access quality information minimizes cost to the entity.

Figure 1: TMA Model



2.3 Review of Related Concepts

This section presents concepts related to the subject matter under investigation. It covers a review of subjects under Fintech, including bank asset quality, ownership structure, and diversification.

The themes are as follows: definition and measurement of Fintech investment; understanding bank asset quality; Fintech size and banking; Fintech and bank asset quality; prospects and issues in integrating Fintech in banks; new challenges associated with integrating Fintech in banks; banks' adaptation of Fintech; the effectiveness of ownership structure on banks' performance; diversification and banking.

2.3.1 Definition and Measurement of Fintech Investment

Financial technology, digitization, and digital transformation are relevant lexicons in the digitization lexicon and are used interchangeably. Chhaider et al. (2022) define Fintech investment as an innovative way of doing business with your customers through the use of new technologies. Indeed, Ky et al. (2019), in their study of Fintech and bank performance in east Africa, argued that the collaboration of banks with mobile money affords banks the opportunity to achieve income diversification and improve performance. It stands to reason that the decision to engage in Fintech is a major investment decision as it is costly and would therefore need a well-thought-out plan for implementation. Reliable Fintech measurement has been a concern for researchers. According to Chhaider et al. (2022), researchers had to resort to measures that he described as subjective and lacking the ability to show how rigorously a bank is geared towards Fintech investment. Kriebel and Debener (2019) and Barnewold and Lottermoser (2020) developed a robust definition based on the text mining methodology to overcome the criticism.

2.3.2 Understanding Bank Asset Quality

The majority of bankruptcy authors concur that a significant number of non-performing loans must exist before a bank can be declared bankrupt since bank asset quality is a leading indication for

the liquidation of banks, making it a hot topic in banking literature (Demirguc-Kunt, 1989; Whalen, 1991). Research on the production efficiency of financial institutions has shown that they have comparably greater expenses and poorer earnings than the most efficient financial organizations, and visible indicators of inefficient output include acquisition, brokerage issues, company governance, and foreign holding factors (Berger et al., 1993). It was stressed that inability to repay, as is frequently the case, banks have difficulties since such debts are occasionally written off as bad (Osayameh, 1986; Orji, 1989; Omolumo 1993). Any lending bank's balance sheet is thought to provide confirmation of this. One could therefore wonder why bad debt does happen after Orji (1989) further clarified that the ability to repay is the key factor in any loan decision. Orji and Osayameh (1986) cite a number of factors, including the lack of a bank-established lending policy, poor judgment, insufficient project management, etc.

However, there is no connection between asset quality and bank efficiency since loan and credit staff do not manage operations, and operational personnel are often not engaged in the selection and supervision of borrowers. However, banks that are on the verge of failure seem to have both a high non-performing loan percentage and a low cost of operation. According to DeYoung and Whalen (1994) and other researchers, there are a lot of extremely banks and liquidated banks (DeYoung & Whalen, 1994). Other studies discovered a negative correlation in banks with non-bankruptcy issues (Kwan & Eisenbeis, 1994).

According to DeYoung (1997), asset quality which is always a crucial aspect in rating and management evaluation has a major impact on a bank's ranking. Marshall (1999) also noted that high-quality assets are one of the distinguishing characteristics of the top community banks. Such banks can only attract deposits by offering a higher deposit rate, because low-quality assets can

cause a bank's rating to be downgraded, making it more difficult to gain depositors' trust. Together, these factors lead to the following conclusion: asset quality will affect banks' interest expenses, operational performance, and operating costs in addition to operating costs.

According to Streeter (2000), one of the biggest management issues banks faced in 2001 is asset quality management. The results of the aforementioned study amply show that bankers often struggle with asset quality management. In a similar way, Gene Miller, the CEO of America Corp., put the quality of assets as the second most important management issue and set up a task group to deal with the problem of rising bad debt.

Non-performing loans (NPL) have an inverse link with bank profitability, claim Achou and Tenguh (2008). Therefore, they advised that it is very important for banks to undertake careful credit risk management, preserve their assets, and look out for the interests of investors. Similar to this, Aboagye and Otieku (2010) argued that in order for banks to remain in business, they needed to generate enough revenue from lending and fiduciary activities or services to pay their operating and financing expenses, as well as reinvest retained earnings to fund future operations. This will improve their growth and profitability as well as their capacity to survive.

From the standpoint of management accounting, there is a favorable correlation between bank operational performance and asset quality, because if a bank has low asset quality, it will have to incur greater bad debt losses and devote more resources to the recovery of non-performing loans (Abata, 2010). Banks will incur additional operating costs from non-value-added activities when they list the loan amount for collection in order to manage and oversee the collection process. Some examples are keeping track of the debtor's finances on a regular basis, keeping an eye on the

value of the collateral, rearranging the amortization schedule, paying the costs of contract negotiations, figuring out how much it will cost to withhold, etc.

Gaining the confidence of management and the public; maintaining the security and completeness of the banks; preventing the banks from receiving a poor rating due to external affairs; decreasing deposits as a result of a loss of customer confidence; incurring additional costs to monitor loan quality; and incurring higher future costs due to the senior management's ignorance of the problems from other operations that are generated when the loan quality issues capture their attention, are other factors to consider (Khalid, 2012). Empirical studies conducted over many years of research have revealed that the micro- and macro-prudential environments are linearly related to commercial banks' asset quality. Higher bank concentration is linked to decreased profitability, according to Beck (2005) who studied the relationship between bank concentration and banking system instability. Lis et al. (2000) observed that non-performing assets were positively impacted by loan expansion, security, net interest margin, equity debt, market dominance, and regulatory framework, whereas non-performing assets were negatively impacted by GDP growth, bank size, and capital. For 96 nations between the years of 1998 and 2005, Babihuga (2007) examines the association between a few macroeconomic indicators and Financial Soundness Indicators (FSI). The technique used by Demirguc Kunt and Huizinga (1999) in modeling the drivers of asset quality was followed in this study, which used a sparse model with a macroeconomic factor-based relationship between the percentages of non-performing loans in total loans. They discovered that the primary channel of macroeconomic distress to the ray of bank's investment is the decline in company reliability of credit and the associated decline in the collateral worth and deposit protection for loans that aren't performing. They discover unrestricted

insurance policies create motivations for moral hazard that entice banks to take unnecessary risks, as well as causing a substantial rise in NPLs.

Resti (2002) investigated the relationship between macroeconomic factors such as the GDP and economic growth rate, the number of outstanding bonds, the quantity of defaults, the return on default bonds, and stock returns, all of which were compared with the corporate bond recovery rate and bond default rate. It was discovered that although the GDP growth rate and shares of firms return had a favorable influence, the rate of breach of repayment, quantity of bonds had a bad outcome. With the aid of a simultaneous equation model, Lis et al. (2000) used a variety of metrics to explain bank loan losses in Spain, including the GDP growth rate, firm debt-to-equity ratios, regulatory framework, growth in loan portfolio, firms branch growth rates, large or small bank, secured loans, net interest return, CAR ratio, and the market clout of failing enterprises, to name just a few of the factors to consider. They found that although increases in loan volume and other factors including regulatory framework had beneficial effects on problem loans, increases in the GDP, large or small bank, and Cost to Asset ratio had the opposite effects. Sergio (1996) discovered evidence in an analysis of bank assets in Italy that a bank's lending strategy contributing to a relatively unselective and deficient evaluation of sectorial prospects is the cause of a rise in NPL ratio. Interestingly, this study disproved the idea that the business cycle might be the main cause of the decline in the bank assets quality held. Indicators such as size of bank asset and growth in credit risk condition including others were used by Das and Ghosh (2003) to establish a link between the bad bank assets of India's public sector banks. In their analysis of Argentinean banks, Bercoff et al. (2002) attempted to quantify non-performing assets using a variety of bank-specific and macroeconomic characteristics. Their analysis included factors related to banks, they included

net worth divided by net assets of the bank, the exposure of banks to loans, and the ownership type of banks. They have proven that elements including operational expenses, exposure to loans in pesos, credit expansion, and international interest rates have a detrimental impact on non-performing assets. Non-performing assets benefit from macroeconomic factors such as reserve sufficiency and the money multiplier.

According to Chen et al.'s (1998) study on the subject, there is a negative association between the risks that the financial organization is exposed to and the shareholdings of the management. This implies that the financial organization will lower its own risky behavior if the managers' ownership proportion rises. According to Berger and De Young (1995), it is challenging for a management team to carry out its supervision of the borrower because of its weak operational skills. Additionally, because of its subpar technology in rating the borrowers, management find it challenging to effectively monitor operating expenses, which will result in a high impact in terms of declining bank asset quality.

Financial sector changes have increased competition among banks and put pressure on their profitability, according to Bodla and Verma (2006). According to Singh (2005), the rapid internationalization of business processes and new technology advancement have increased resource productivity, the number of deposits and credits, profitability, and the reduction of non-performing assets.

Rajaraman and Vasishtha (2002) found a significant bivariate connection of NPA of banks owned by the public and inefficiency issues in their empirical study. Das (1999) discovered a significant negative correlation between the amount of non-performing assets and efficiency factors by

comparing the various efficiency metrics. In an attempt to empirically analyze the non-performing assets of public sector banks in India, Ranjan and Dhal (2003) investigated how non-performing assets responded to credit terms, bank size, and macroeconomic conditions. They discovered that, there is a substantial impact on the NPA of institution vis-à-vis bank size. In research of Nigerian banks from 2004 to 2008, Kargi (2011) discovered a strong correlation between credit risk management and bank performance. He found that loans, advances, and loans that aren't doing well makeup of the NPL.

Hou (2005) employed a statistical model to regress the NPL to examine NPL hurt banks' profitability in a lending behavior that is not linear. However, when the number of non-performing loans is below a certain level, banks' lending growth is less regressive. Non-performing loans, however, have beneficial effects on banks' lending behavior with a statistically significant positive coefficient thus NPL rates are below the criteria level. In order to determine if consolidation increases the prevalence of NPL in a precarious banking atmosphere, Ezeoha (2011) analyzed 25 banks from Nigeria. They conclude that there has been a decline in asset quality, which between 2004 and 2008 was made worse by banks' inability to effectively utilize their enormous asset holdings to raise their profit profiles. This suggests that, ironically, the condition of excessive fluidity and somewhat large base for capital that encouraged irresponsible loans portfolios contributed to a reduction in the amount of nonperforming loans over the course of the study.

2.3.3 Fintech Size and Banking

Because there are many different definitions of Fintech, it is challenging to estimate its scale. For instance, according to the Buchak et al. (2018a) report, Fintech also includes items offered by

banks that are helped by technology (e.g., online lending). Others, do not include banks in their definition of Fintech. It is nearly impossible to determine the precise size of Fintech because of the diversity of definitions for the term. However, venture capital (VC) investment in Fintech startups is a helpful growth indicator to employ. According to information from an International Organization of Securities Commissions (IOSCO) study, as of November 2016, more than 8,800 Fintech businesses had received a total investment of more than \$100 billion. Between 2014 and 2017, worldwide Fintech investments climbed year over year at a consistent rate from \$19.9 billion to \$39.4 billion. The global Fintech industry raised \$41.7 billion in the first half of 2018, exceeding the total for all of 2017.

Additionally, there are a lot of fascinating stylized statistics concerning Fintech. Where a bigger proportion of the population uses banking and where the rents are higher (due to lower interbank competition). This makes sense. In nations where banks are heavily used, banking rents are frequently substantial, which serves as an incentive for Fintech investments to be made in order to receive a portion of the rents.

2.3.4 Fintech and Bank Asset Quality

The banking sector is impacted by disruptive ideas known as "Fintech" (Kjellman et al., 2019; Martino, 2019; Ozili, 2020). They offer intelligent financial services and solutions and boost the effectiveness and risk management of financial service providers (Ozili, 2021b). Several studies examine how Fintech is affecting the banking industry. Fintech loans, according to Balyuk et al. (2020), are dangerous and frequently take the form of loans provided by major banks. This is so that they can handle vast amounts of data more quickly than traditional lenders. In their 2020 study,

Pierri and Timmer examine how non-performing loans (NPLs) behave in banks that used information technology (IT) to evaluate bank loans during the global financial crisis of 2008. They discover that NPLs were lower in banks with strong IT use during the global financial crisis. According to Buchak et al. (2018), Fintech lenders offer convenience to customers rather than cost savings, service more creditworthy borrowers, participate in the refinancing market more often, and demand a premium of roughly 14 to 16 basis points. According to Hau et al. (2019), due to their more affordable distribution methods and informational advantage, Fintech loan providers in China have a competitive edge over traditional banks in the country's credit market. According to Ozili (2021a), banks regulate their reported profitability by reducing irregular income swings in response to competition from Fintech lenders.

2.3.5 Prospects and Issues in Integrating Fintech into Banks

There are many fantastic chances for banks to stay stable and competitive as a result of the growth of Fintech in the banking industry. In order to better serve their customers, Handro (2018) contends that traditional financial institutions should take the adoption of Fintech as a warning and respond by collaborating even more closely with Fintech. Financial institutions must use technology in product design and delivery in order to provide their customers the best automated digital banking experience possible. The current technologies that might alter how financial services are provided today are being developed by tech companies in competition with one another on the worldwide market.

By investing in artificial intelligence (AI), the largest financial institutions have adopted digital development, particularly in sectors of risk management, regulatory compliance, and customer

service. The expanding needs of the customer have always been challenging for the banking sector to meet. Artificial intelligence is revolutionizing customer service and front offices with chatbots and conversational interfaces, sparking the banking sector. The first chatbot of its sort, "Pepper," a cyborg introduced by Softbank Robotics in 2017, offers a novel form of improved online banking experience in the US. Studies show that public relations professionals and bank customers are both interested in these chatbots. The financial industry strives to make use of modern technologies in this manner for its clients.

Large-scale data collection and analysis using computers is known as "big data analytics," which uses more diverse datasets to find directions (Riahi, 2018). In whole, the banks have got a huge number of client datasets at their disposal. These datasets give banks the chance to enhance their operational efficiency by effectively leveraging their database for the creation of new products and the provision of services. Banks may classify their consumers based on their income levels, purchasing habits, and transactional behaviors thanks to big data. According to this client segmentation, reasonably individualized items that address their demands might be created and successfully promoted. The data obtained from mobile devices is also collected and analyzed by fog computing technology. When making individualized product suggestions and providing customer service, these technologies include predictive systems (Nieves et al., 2019). These specialized product and service offerings foster sincere client connections and increase banks' general profitability.

The so-called "trust factor" is always the cornerstone of long-lasting and devoted relationships between bankers and their customers. Fintech offers a variety of tools to help clients develop and maintain their trust in it. A breach in client confidence in their banks is caused by dreaded data

breaches, threats, and hacking attacks. Compliance and IT security are the two main reasons the banking industry is reluctant to utilize cloud computing stated in the Cloud Monitoring 2018 report. Financial Tech companies are creating IT models expressly for banking institutions that give secured protection of data with cutting-edge, ready and needful technology environment in order to do this. Customers and banks would benefit from cloud computing that better conforms to the Banking Supervision and Regulation Act and has a high level of data security.

Blockchain technology-based distributed ledgers can securely and chronologically store and move data that is current (Jani & Shah, 2018). In an effort to promote both green finance and economic development, institutions throughout the world are experimenting with blockchain technology (Cocco et al., 2017). Experts predict that blockchain technology will soon alter current financial payment practices and help reduce mistakes in the global financial network. If the deployment is successful, banks will be able to process payments swiftly and reliably while spending less per transaction; this is a benefit of cost reductions.

Innovation is the one thing that traditional financial institutions, like banks, must have if they want to stay in business as Fintech companies grow. 88 percent of banks, according to the PWC report, are concerned about losing out to Fintech firms in the payments and personal lending markets. By working with Fintech companies that make significant investments in the creation of banking products, this opens up a wealth of potential for sectorial growth in the banking industry. Through these partnerships, financial services and products will be offered that are up-to-date, affordable, and delivered quickly through a single platform.

2.3.6 New Challenges Associated with Integrating Fintech in Banks

Fintech offers benefits and possibilities, yet there's also a chance of hazard relating to this invention. The risks that Fintech companies face may be classified into two categories, the technology and the solutions it offers. The implication means, due to the variety of these hazards, managing them is not an easy task. Banks and Fintech firms must be very careful while minimizing these risks. Security and data privacy are continuous challenges in the finance sector, just as they are with other IT products. Particularly due to cash availability. Dwolla after it was discovered that the company had provided inaccurate cyber-security information plan to improve its data security procedures over the course of five years in addition to paying a \$100,000 punishment (Hayashi, 2016). Another security risk that is becoming more prevalent is credit card theft. People increasingly cautious about using digital banking.

Some old banking practices may not be compatible with modern technology, which is seen as an obstacle to completely digitizing the financial sector. Additionally, there is a chance of technological failure, just like with any IT-based method. Since many of the Fintech solutions, like blockchain, crowdfunding, and crypto currencies are novel, central banks from all over the globe have been providing the required rules to the banking industry in an effort to stay up with these advances; nonetheless, there is a danger in the case that a regulation is delayed or doesn't exist at all. P2P lending is not technically lending, so a Fintech company may not be subject to the loans limits that are capital and liquidity availability driven. Online P2P lending services link borrowers and lenders (Lee & Shin, 2018).

Financial dangers will continue to exist as long as Fintech is used to perform financial transactions. However, the financial transaction will determine the sort of financial risk exposed as a result of a robot advisor's algorithm failing. According to Lee and Shin (2018), there have been recent lawsuits stemming from erroneous derivative product sales brought on by bad investment advice from robot-advisors. The counterparty risk that a Fintech that provides financial services for mortgages or student loans faces is another illustration of financial risk.

Businesses in Kuwait believe that a bank's financial stability, efficiency, and helpfulness of staff assist in times of financial crisis (Edris, 1997). According to Al-Mossawi (2001), Bahraini students choose banks primarily because of their reputation, staff friendliness, and convenience. Nowadays, a lot of bank services are carried out online or by robots thanks to Fintech, which eliminates the human factor and feelings and increases the risk of reputation loss. Customized digital services without higher costs are difficult to offer. In order for Financial Technology businesses succeed, there must be highly responsive services to clientele needs and offer better accessibility, convenience, and customized products.

2.3.7. Banks' Adapting Fintech

The production of value and the delivery of products and services by financial institutions might be radically altered by technological and digital improvements, which could result in the creation of new business opportunities. But keeping up with new technical developments is a problem in and of itself. Access to financial services might be facilitated by Fintech, which would spur competition among new companies. If traditional firms are to survive, they will need to adapt to the increasing pressure from rivals and apply new tactics. It may also be challenging to connect

Fintech apps with current computer networks since the bulk of Fintech is based on developing technology (Lee & Shin, 2018). However, conventional banking procedures may become incompatible with contemporary technology in a variety of situations if an appropriate integration plan and relevant prior expertise are not in place. Global bankers are very concerned about outdated information technology systems due to the possibility that these devices might produce blind spots. If information technology (IT) is unable to fully comprehend what is occurring on the network or how certain apps are using it, the situation is said to have a "blind spot." If you don't make an investment in safe and functional technologies, you risk suffering big losses and being more open to online assaults.

There is a need for solutions to reduce security breaches and cyber theft due to technology adoption. According to Jagtiani and Lemieux (2017), Fintech companies have a tendency of utilizing certain sources of information that are more prone to mistakes, as a result, could potentially pose additional risks to customers. In addition, because trust is such an important component in the process of adopting new technologies, the security of financial technology should be one of its primary concerns. In order to safeguard themselves against fraudsters and their clients, they need to rethink the strategies they've been using in the past. Fintech, for example, may consider the utilization by constantly shifting the sites of attack and depriving hackers of the static targets they are accustomed to breaching, which aids in interrupting the hacks. Traditional passwords and security questions have been shown to be less secure than other types of passwords and security measures. Financial institutions may reduce the danger of a cyber-attack by using a variety of strategies, such as contemporary biometric breakthroughs. In addition, keeping up with

the latest developments, preventing security lapses, and making sure employees have adequate training to handle sensitive data are both helpful ways to protect against cyber-attacks.

The various financial institutions are also faced with a significant obstacle in the form of a stringent regulatory environment as said by Rabbani et al. (2020). This has presented numerous challenges for the regulators in a variety of different ways (Arner et al., 2015). Capital requirements, anti-money laundering, privacy, and security concerns are just some of the regulatory challenges that must be met by traditional financial institutions as well as by startups in the Fintech industry (Lee & Shin, 2018). Banking firms and new Financial Tech are subject to various regulatory restrictions depending on the kind of financial services they provide. A typical financial institution must follow certain guidelines about the kind of lending it may do based on the capital it has, whereas a lending Fintech firm may not be subject to such guidelines. The capital has these regulations. Fintech enterprises need to be aware of any prospective alterations that may have an impact on them and identify strategies to adapt to such shifts since there is a lag between the industry's regulatory changes and its advancements.

The banking industry has been subject to stringent financial regulations ever since the financial crisis that occurred in 2008. As the world grows increasingly dependent on technology, the financial institutions have had no option to abide by the rules to avoid cost of noncompliance. At the moment, the great majority of financial rules are centered on conventional banking. A recent branch of Fintech called "Regulatory Technology" may assist in digitizing the regulatory risk management procedures. Compared to the conventional procedure, this will ensure more accuracy while also saving time, money, and resources (Arner et al., 2017). Numerous mandatory tech

options find themselves through channels into the financial world with the aim of preventing money laundering and detecting fraudulent conduct.

Not only do modern financial companies struggle to acquire new clients and keep the ones they already have, but they also find it difficult to do so successfully with prospective employees. Haddad and Hornuf (2019) emphasize how critical it is for Fintech companies to invest in their human capital. The mentality of an organization needs to shift in order for it to be successful in recruiting and retaining qualified workers. It is no longer sufficient for employers to provide workers with good compensation. Employees increasingly demand that their companies foster a culture that honors their beliefs and way of life. Most financial institutions throughout the globe are actively looking for digital technology that will help them become more creative. However, many lack the IT expertise, data scientists, or developers to construct purposeful product. Companies should increase their expenditure budget for workforce capability development and their digital talent pipeline. One strategy for doing this is to provide employees with access to training that will allow them upgrade their skill set for the information technology time. One excellent illustration of this is the In-Residence program that allowed to collaborate with its staff on the development of technologies that help banks run more quickly, safely, and affordably.

2.3.8 Effectiveness of Ownership Structure on Banks

Hu et al. (2004) investigated the relationship between type of ownership and NPLs. The results showed a rise in government ownership encourages political lobbying. Private shareholding, on the other hand, encourages more NPLs. By deploying the use of panel data for the years 2000 - 2010, Kolapo et al. (2012) discovered the impact and concluded that the influence is not

determined by the management style and type of certain organizations. The impact of credit risk management on banks' profitability levels is reiterated by Hosna et al. (2009). They came to the conclusion that increased capital requirements benefit bank profitability. Muhammed et al. (2012) investigated whether credit risk affected banks' performance in Nigeria from 2004 to 2008 using descriptive, correlational, and regression methodologies. They also discovered that the profitability of Nigerian banks is significantly impacted by credit risk management. Foreign-owned banks, private domestic banks, and government-owned banks each have an impact on the performance of the firm. Sironi et al. (2006), in their study of type of ownership, risk, and performance in the European financial sector, concluded that public sector banks have low asset quality and are likely to run into insolvency as compared to private and foreign-owned banks. This was also corroborated by Iannotta et al. (2006), who studied the European banking industry's ownership structure, risk, and performance and found a significant impact of the type of ownership on asset quality of banks.

2.3.9 Impact of Fintech Resilience on the Bank's Performance

Cho et al. (2021) found the effect of financial technology to Chinese banking industry and discovered a link between Fintech and bank performance. Kriebel and Diebener (2019), with the use of the Fintech lexicon, studied the impact of digitization on the performance of banks in USA. It showed that digitization increases the performance of banks and vice versa. Also, according to studies (Campanella et al., 2017) performed, they found that the impact of retail banking, home banking, and business internet on bank profits cut across the European region. They discovered that all aspects of Fintech investment are related to bank profits. Chhaider et al. (2022) also researched about the impact of Fintech investment and how it affects profitability of banks in

European region. They found that the impact of Fintech investment on bank performance was positive. Chinese commercial banks have benefited from the growth of internet financing, according to Dong et al. (2020). Through enhancing their diversity, profitability, and security. This has fundamentally altered China's and its government's perception of Fintech investment. It is more of a game plan for the government to oversee the development of banks. In Nigeria, Mustapha (2018) found that the impact of electronic payment technologies on the profits of Nigerian banks and that the two are positively correlated.

In Ghana, Boateng et al. (2020) found that even though a positive relationship between bank profitability and check code line clearing, however, the Automated clearing house, the interbank settlement and Gh-Link had a negative relationship between mobile money and Z-Switch.

2.3.10 Diversification and Banking

Diversification is the investment in a variety of assets to ensure that volatility in returns is kept to a bare minimum or to reduce exposure to a single asset or risk. It is the aim of every bank manager to achieve this to guarantee the bank's continuous outturn of good returns. Research on strategic management has focused heavily on the impact of diversification strategies on business performance. According to several studies, connected diversification outperforms unconnected diversification in terms of improving company performance (Palepu, 1985; Park & Jang, 2013a). From a practical standpoint, employing diversification tactics to build a corporation may fully utilize underutilized resources. A company may develop expertise, knowledge, and experience in a particular field, allowing it to continue making investments in similar fields as part of its development plan. The ability to share infrastructure, raw materials, marketing networks,

expertise, and other firm-specific resources throughout all business divisions or products is made possible by relevant diversification.

The case for linked diversification's optimization of company performance is supported by scale and scope economies as well as the hypothesized synergy effect between business divisions (Park & Jang, 2013a). From the standpoint of resource-based theory, for instance, since hotel businesses primarily provide services-related goods, staff members may readily transfer the abilities and information they have acquired from prior instruction about one kind of services-related product to others (Yang et al., 2017). According to Berger and Ofek (1995), diversity has a negative impact on a company's ability to perform better, creating a "diversification discount." Top management teams' agency issues might be the cause of this diversity discount (Tang & Jang, 2010). According to Park and Jang (2013b), agency theory provides a theoretical justification for diversification, which results in a decrease in company value but an increase in managers' personal gains. According to Berger and Ofek (1995), enterprises that overinvest in unrelated industries have a larger diversification discount. Due to its tight ties to overinvestment habits, a diversification discount is more likely to be connected to unrelated diversification (Park & Jang, 2013b). According to O'Brien et al. (2014), unconnected diversification lowers business value due to the associated agency costs.

In their study in China, Wu et al. (2021) discovered that, while there is a positive relationship between profitability and diversification, both income-based diversification and asset-based diversification, the former is greater than the latter. Ky et al. (2019), in their studies in the East African Community, also found that income diversification could be a possible channel for bank performance with Fintech investment.

Diversification has been found to reduce the variability of bank returns. It is the continuous spreading of a firm's resources over a large asset to take advantage of risk. According to Li et al. (2021), diversification's importance cannot be overstated, as it affords banks the ability to limit variation in returns. Chen Kuan-Cheh (2020), in his studies about the implication of Fintech on traditional banks in China, found that banks have improved in their income diversification due to Fintech. It therefore stands to reason that, as banks improve their income by engaging in more diversification, their asset quality is enhanced.

2.4 Empirical Review

This section presents a review of recent empirical studies on the financial technologies, diversification, ownership structure, and asset quality of banks. The review covers issues pertinent to the study's specific objectives. The themes under review include Fintech investment and bank asset quality; diversification, Fintech investment, and bank asset quality; and ownership structure, Fintech investment, and bank asset quality.

2.4.1 Fintech Investment and Bank Asset Quality

Ozili (2022) investigated the actions of non-performing bank loans in the age of Fintech. The findings, which were based on information from 35 industrialized countries between 1998 and 2016, show that during the second wave of Fintech, there has been a decline in non-performing loans. Bank non-performing loans are also closely tied to the state of the economic cycle in the second wave of Fintech. Countries with substantial private sector credit availability had higher non-performing loan rates during the second wave of Fintech. Non-performing loans are less

frequent in the second-wave Fintech period, when credit availability is higher and the economy is flourishing, according to the two-way interaction study.

Researchers currently are looking through studies to determine the drivers and motivation for Fintech investment. As a result, Yin et al. (2022) performed research on how the Fintech age has affected the stability of the Chinese banking industry. The implications of China's digital technology on the outcomes of equilibrium markets for products, labor, and loans were investigated by Lui, Gu, and Lei (2022). The authors showed that fast expansion in e-commerce causes prices for goods to fall, the volume of their transactions to rise, and the number of transactions to rise. Although it is uncertain how the adoption of Fintech will affect loan interest rates, we find that banks' lending operations will be growing as a result of their close relationship with the digital economy. These theoretical conclusions are generally in line with many, well-researched observations concerning China.

In a case of peer-to-peer (P2P) lending, Saiedi et al. (2022) highlighted the role of consumers' distrust in banks. The authors determined: "What has boosted crowdfunding's growth?" The authors provide evidence that banks are distrusted, which is likely to cause people to direct their funding toward crowdfunding rather than bank deposits. They found that a mistrust mentality stimulates comparisons that emphasize disparities, challenging default decisions and taking other options into consideration. According to their research, people in US states with higher levels of bank mistrust invest in P2P loans and vice versa. The connection is particularly obvious if lending money for smaller loans or to borrowers with restricted banking access.

Also, credit transactions require an extra level of security, trust, and privacy (Wang & Liu, 2022). Although the bank's credit transaction system technology has gradually improved, it still has high labor costs, inefficiencies, and security concerns. This study proposes a standardized blockchain application model in Fintech and discovers that blockchain has broad prospects that can be realized through distributed consensus, smart contract execution, cryptographic algorithms, and distributed ledgers, which increase transparency, efficiency, and fairness in the financial industry. This study also deployed an automated machine learning system at the stage where banks qualify borrowers, optimizing the original credit model.

Tseng and Guo (2022) explored incentives for bank credit screening in the face of competition from a Fintech company and conventional banks. Monetary rewards for bank screening grow along with the price of the testing Fintech that the tech company utilize, decline along with the effectiveness of that technology, and climb together with the price of information transfer from business owners to the new financial technology businesses. However, the incentives for the firms to screen the customer is reduced when there is high price to pay for preparing business owners to seek for loans from banks declines with Fintech, and those incentives are strengthened when the cost of bank screening down with Fintech. According to Chen et al. (2022), China's Fintech industry has made significant strides during the last 10 years. The Fintech and other creative approach have shown resilience in markets by challenging existing solutions by existing processes. Financial tech has influence and effect on conventional banks. This also compete with existing banks as loan intermediates. The authors investigated the likely risks that financial tech brings to banks and gathered information from critical banks numbered 19 dating from 2011 – 2020. To study the effect of financial tech advancement on risk of financial bank in order to help attain

continuous finance industry growth. According to this research, the effect of Fintech on banking institutions' financial risks follows an upside-down pattern. The test statistic Z-score and the NPL ratio are the main variables employed in the investigation. Their outcome indicates traditional banks have responded to the expansion of financial technology relatively slowly. Following is a discussion of management suggestions for managing risk in China and other emerging countries for commercial banks and the financial sector.

At this critical juncture in China, the soundness and efficiency of 25 listed Fintech lenders and 40 stock exchange-traded banks was assessed by Katsiampa et al. (2022). Numerous problems plagued traditional banks, such as rising operational costs, shrinking profit margins, and declining credit quality.

After a period of decline, performance of a bank remained stable second half of from 2018 to 2019 in accordance with a process of adaption. Increasing commercial and mandatory expenditures for financial technology providers throughout the research period are another conclusion of the study. During the time, Special Mention Loans for online lenders significantly deteriorated and so did the quality of asset also decline. Smaller companies with less opportunities for expansion and more foreign ownership performed the lowest in terms of prudential standards within the typical bank group. Since their IPOs, the financial and prudential performance of traditional banks has likewise been worse over time. Particularly in terms of asset quality, state-owned lenders outperformed joint-stock commercial, city, and rural banks.

Wang et al. (2022) assert that the growth of financial tech digitization has increased market rivalry in China's banking sector, which had an influence on the conventional business models of small and medium-sized banks. Small and medium-sized banks' willingness to take risks has also been negatively impacted. The authors examined the variability of influence of financial tech on the embracement of risk of various kinds of banks sizes using data from 78 banks with varied sizes in China for the period 2012 to 2020. The influence of Fintech on the risk embracement of banks with varied sizes was examined using intermediate effect model. The authors also demonstrated the market competition impact on the link and the link between Fintech and risk using the moderating effect model. According to the study, both rural and urban commercial banks now take more risks than they did before, with urban commercial banks being more affected by this trend. Fintech has raised the risk of sizeable banks in a direct way, but it raised their risk appetite indirectly through reducing difference of their deposits and loans. As market competition increases, financial technology's potential to enhance the risk for banks will become less effective.

Wu et al. (2022) constructed a model to empirically examine how the financial technology index (Fintech index) affects the interest rate spreads for Fintech loans for their empirical research. A total of 1,201,658 observations from the Lending Club platform between 2007 and 2018 were chosen. The empirical findings indicate that: (1) the degree of financial technology development is more conducive to lowering the loan interest rate of Fintech lending; (2) the longer the loan term, the worse the credit rating is; and higher the unemployment rate, income-to-debt ratio, and federal funds rate are, the greater the loan risk and higher the interest rate spreads are; and (3) the services offered by traditional banks and Fintech lending platforms are comparable. Additionally, Najaf et al. (2022) looked at how the COVID-19 pandemic altered the variables that drive Fintech

P2P financing. P2P lending services have drawn customers with little to no credit history, making the issue crucial for the pandemic-related services provided by traditional banks. During the COVID-19 epidemic, many banks and financial institutions provided online loan application services, but few have created procedures for checking loan applications sent to the firms via online. The findings of this research demonstrate that COVID-19 has significantly altered the primary determinants of P2P lending. According to the findings, P2P lending via Fintech is now the key practical new credit accessible to those who need loans. They will be of interest to policymakers, practitioners, academics, investors, borrowers, and shareholders since it shows the value of P2P lending and how they can supplement or even completely replace the lending activities of traditional banks.

Palladino (2021) also stated that worries regarding exclusion and abusive lending practices for small businesses are raised by banking consolidation. Small company lending by Fintech lenders, who are generally unregulated credit providers and heavily rely on algorithms to decide loan conditions and lending choices, has risen quickly. In addition to a comparative, the author additionally looked at loan-level data on consumer and small-business loans in addition to a sample of loans from licensed banks which give out loans and Fintech lender. Annual mean rates of interest for Fintech business loans are 3 percent up as compared to the commercial loans emanating from the very same firm and 4 to 7 percent up more compared to those for little regulated loan banking companies. The significant premium in excess of the interest rate highlights the importance of educating stakeholders to be clear of regulation and increased oversight to safeguard this important market sector from unscrupulous non-bank lenders.

Okoli (2020) looked at the association between financial technology (Fintech) and banking risk. In using the panel ARDL (1, 1), this study compares bank credit risk across various countries in BRICS countries from 1995 to 2018 based on the ratio (NPL). By employing principal component analysis to create an indicator for Fintech, the research contributed in a unique way to the Fintech data set. The results support earlier research in that credit risk is influenced by both macroeconomic and bank-specific variables. Additionally, we discovered a nonlinear connection between Fintech and credit risk. The U-shaped link between Fintech and NPLs showed that credit risk would continue to rise considerably to a certain point after which Fintech adoption will lessen the influence of Fintech on NPLs in BRICS nations. A same result was also found by the robustness tests of the fixed effect models and GMM. The authors advocated BRICS economies to optimize their Fintech adoption through bank collaboration.

Tran et al. (2022) analyzed from 2001 to 2021 the impact of opacity on bank stability using a huge US bank as the data. The authors noted that declining bank stability is caused by rising opacity. Their findings suggested that the opacity's spillover effects lead to higher price synchronization and, as a consequence, elevated systematic risk. Reduced profitability, deteriorating asset quality, and greater profits volatility are the ways that bank opacity transfers these instability-destroying impacts. In bigger and more financially secure institutions, the detrimental impacts of opacity on bank stability are more obvious. In banks that pay dividends, they are quiet. This study should be of interest to regulators and other bank stakeholders since it corroborated previous research's worries about too-big-to-fail organizations.

In the context of the Tseng and Guo (2022) looked at the incentives behind bank screening in the context of traditional banks and a financial tech firm with the view on credit market competition.

The banking firm drive for screen climb in direct proportion to the cost of the Fintech company's screening technology, decline in direct proportion to how well it works, and rise in direct proportion to the entrepreneurs cost of providing details to the financial tech company. Fintech, while, has ability to both raise and diminish bank screening incentives, with the latter occurring as bank preparation costs for businesses qualifying for loans fall.

Zhao et al. (2022) used patent data and a Fintech development index to assess the effect of financial technology innovation on Chinese banks' performance. To account for possible endogeneity, they used a GMM model. The results demonstrate that Fintech innovation lowers banks' overall asset quality, which is more evident for big state-owned commercial banks, but also raises capital adequacy and management effectiveness, although to a lesser degree for policy banks and state-owned commercial banks. The result is that banks should concentrate more on the growing capabilities of Fintech technology than its challenges and what the competition is doing when dealing with the expansion of Fintech. By actively collaborating with Fintech firms, small banks may, in particular, accomplish business process reengineering and innovation more reliably.

Gaur et al. (2022) analysis of the link between Basel III's recommendations and the credit quality of the Indian banking sector was published in 2022. The authors looked at 37 domestic commercial banks in a sample spanning a 5-year period (2015–2019).

The two-step generalized approach of moments has been used for regression analysis in order to solve the endogeneity problem between capital restrictions and credit quality of non-performing assets (NPA). The authors discovered that the Reserve Bank of India's (RBI) strict capital requirements aid to improve the credit quality of banks by lowering non-performing assets (NPAs).

The outcomes have further shown that the non-risk-based leverage ratio results in more subprime loans and, as a consequence, has a detrimental effect on the bank asset quality. The liquidity coverage ratio, a Basel III-provided indicator of liquidity risk, has no appreciable effect on the NPA of domestic Indian banks. The findings of this research have consequences for both bank management and policymakers. The research might be useful to investors as well. They may accept the conclusions that have been provided, which show that banks should keep greater capital buffers, perhaps protecting the institutions from prospective loan losses but exposing them to a higher credit risk in the future.

Empirical evidence of Bayram and Othman (2022) indicated that similar to other conventional assets like stock, debts instruments, and the dollar indices on US market, gold has a symmetric volatility structure. Contrary to these assets, asymmetric market knowledge has no impact on the price volatility of gold (lack of leverage effect). Gold specific role in managing risk and portfolio analysis in financial markets, especially in hard economic times, since it may operate as a risk adjuster instrument and diversify to minimize risks. It is suggested that "High Quality Liquid Assets" (HQLA) stock contain gold because of this.

According to Zhou (2022), banks and financial organizations are storing considerably more data as a result of the Internet's expansion and financial institutions' merger, which favors the use of intelligent algorithms. Given the shortfalls the BP neural network in the creation of a long prediction delays and weak promotion capacity are two examples of credit risk taking into account. This study brings the SVM approach in area of credit risk of banks evaluation and creates an optimum mechanism to assess risk. SVM can tackle several multi-classification issues. In order to address this kind of issue, this study explores the structural and algorithmic foundations of a fuzzy

integration-based integrated SVM that uses the SVM classification algorithm. The findings demonstrate a successful raising of outcome more accurately by the algorithm, address the issue of rise in computing costs, decrease memory use, increase operating efficiency, cut training time, and give a more solid foundation for an efficient and quick assessment of bank credit risk. The assessment model can quantify credit risk in real time and with high accuracy, which lays the groundwork for updating and improving credit decision-making and increasing the use of artificial intelligence in economic research. On the other hand, the research findings have high theoretical and practical value.

In order to provide financial institutions and Fintech with valuable guidelines, Ruhland and Wiese (2022) aimed to identify the most significant common and particular strategic collaboration rationales. Eight expert interviews that were semi-structured and in-depth were done in order to get insights and evaluate the motivations. The financial return, reputation, and legitimacy were discovered to be the most important cooperation reasons, starting from the Fintech standpoint. Access to extra consumer acquisition channels and a reputation for quality signaling of Fintech goods or services in the market are the main factors driving these motives. On the other side, it was discovered that customer happiness and business model innovation were the most important incumbent reasons. From a corporate standpoint, these goals mostly include the chance to grow, pivot, and challenge the current company model while boosting consumer satisfaction with new, creative goods or services. The financial return, reputation, and legitimacy were discovered to be the most important cooperation reasons, starting from the Fintech standpoint.

The key aspects influencing these incentives are access to additional customer acquisition channels and a reputation for quality signaling of Fintech products or services in the market. The interviewee

sample size is somewhat reasonably low and the applicants are predominantly operating on European markets, which is a thematic restriction. Because of this, the motivations considered are limited to European strategic choices and do not include all views on intercontinental partnership. Furthermore, the financial sector is the only one covered by the strategic collaborative reasoning assessment framework. Therefore, this paradigm cannot be immediately transferred to other economic sectors or even other startup niches. From the standpoints of Fintech and financial incumbents, this research offers a high-level overview and direction of the least and most significant partnership motivations. It aids the two cooperate parties in enhancing possible strategic partnership negotiation results. By collecting interview data from experts in the financial technology, insurance, banking, and asset management, this study offers a wider collaborative understanding inside the financial sector than earlier, mostly bank-focused partnership research methodologies. The developed framework also has real-world uses in the collaborative procedure.

By comparing the conventional data envelopment analysis (DEA) model with the contemporary Seiford et al. (2022) aimed to evaluate the technical efficiency (TE) of Indian banks from 1998/99 to 2016/17 in the presence of non-performing loans (NPLs). Treatment of NPLs using the conventional DEA model misinterprets the TE scores, while a true picture emerges when the NPLs are correctly accounted for as an undesirable output in the banks' loan production process. Efficiency has declined during the crisis years, but it recovered immediately after the crisis years in India. However, a sudden and steep deterioration in efficiency scores has been seen from 2013 until the most recent study period. Public sector banks and old private banks have reported higher average efficiency scores than private owned banks and foreign owned banks. However, FBs are the only commercial banks that maintained their efficiency levels during the crisis years in India.

This study also discovered the persistence and presence of σ -convergence phenomena in TE for Indian banks, indicating their ability to achieve the "catch-up" phenomenon as a result of lower dispersion and persistence of convergence in TE. The actual efficiency score can only be estimated when the NPL is considered an undesirable output rather than a desirable output when designing the loan production process of banks. Although the ownership clusters of all commercial banks in India need to formulate stricter policies to increase the level of asset quality and efficiency, NPBs need to make some more efforts in this direction. This study's outcome has the potential to provide useful information for regulators and policymakers, which suggests which directions or cluster of improvements are needed to raise the level of asset quality and technical efficiency in the coming years.

Wang (2021) empirically tested the effect of financial technology development on risks attitude of bank from 2011 and 2018 using Chinese imbalanced bank-level panel data. The writers evaluated media coverage of Fintech-related news to assess the industry's progress. They discovered solid evidence that the growth of Fintech exacerbates banks' overall risk-taking. The heterogeneity study also shows that banks with bigger sizes, lesser efficiency, more shadow banking activities, and more interest-based revenue are more sensitive to the asset quality degradation impact brought on by successful Fintech. In addition, there is an inverse connection for banks' risk-taking vis-à-vis Fintech, with Fintech first escalating and then subsequently reducing banks' risk-taking. Additionally, the reactions of the banks to the U-shaped impact vary depending on the kind of ownership. State-owned and jointly owned banks' replies are not noteworthy, but city owned banks, foreign owned bank and rural owned bank are more perceptive.

2.4.2 Diversification, Fintech Investment, and Bank Asset Quality

Kaur and Bapat (2021) found that banks have recently been under pressure to find ways to enhance the level of quality in the loan portfolio to enhance performance. Their performance may be enhanced by revenue diversification at a time when interest earnings are under pressure. This study investigated the link between income diversification and risk-adjusted returns for Indian banks while examining changes in diversification from 2000 to 2017. According to the study, banks that diversify into non-interest revenue may expect to earn greater risk-adjusted returns. It is discovered that dividend and treasury income contribute significantly to risk-adjusted return for public sector banks.

According to Bai and Uri (2021), the 2008 financial crises showed several flaws in the investment banking industry and the need to modify some novel and strategic outcomes to the established economic and financial atmosphere. According to some financial professionals, the financial innovation known as securitization is a contributor to the problem. The benefits of the securitization model, with a degree of flexibility and increased process control at all procedural levels, considerably exceed its perceived drawbacks, despite the fact that it is often associated with the onset of the Financial Crisis. The Republic of Srpska's financial system is still characterized by an increase in non-performing loans in bank assets, primarily as a result of increased systemic risk as a result of the ongoing COVID-19 pandemic. The use of the securitization model must be supported by a robust financial system infrastructure in order to considerably increase financial stability in the nation despite diminishing economic activity. The nonperforming loan securitization strategy and its use in the bank restructuring process may be the cornerstone of the financial system's stability. The research's objective is to show how the implementation of the

modified securitization model of bank non-performing assets and its use throughout the banking sector. The outcomes include the introduction of new financing sources for financial institutions, the creation of issues with nonperforming assets, as well as increased liquidity and customer diversity.

Haabazoka et al. (2021) sought to identify the precise internal elements that have an impact on the bank's ability to provide financial services. The focus of this investigation was the Zambia National Commercial Bank (ZANACO). It was hoped that by examining the numerous aspects, the research would help to clarify the effect that certain factors would have on the financial institution's overall ability to offer financial services. The years 2008–2018 were taken into account. The study was carried out using the SPSS software utilizing multiple regressions. The findings indicated that the degree of bank profitability is significantly influenced by capital sufficiency, a crucial bank-specific feature. It is a measure of the amount of capital that banks must have in order to be able to resist risks including operational, market, and credit risks in order to absorb any losses and safeguard the bank's debtors. Therefore, a bank's capital adequacy ratio shows how strong it is internally to absorb losses during times of adversity. Additionally, there is a bad correlation between profitability and liquidity. In order to increase its loan portfolio, Zanaco must adopt a more risk-averse strategy. This is due to the fact that NPL levels affect profitability. According to the data reviewed, this could be because Zanaco is suffering large losses as a result of the increasing rate of NPLs. Overall, banks as a rule do have a large amount of liquidity owing to the large savings deposits that are pooled from individual consumers' savings. However, the large savings base is also characterized by even fewer opportunities for investing these funds. Many businesses that have borrowed from the banks have failed to repay their loans over time, resulting

in a reclassification of their accounts as "bad credit" following the bank's failure to fully recover the outstanding balances.

Ha et al. (2020) introduced broad metrics of banking openness and a generally balanced level of capital flow integration. The obtained empirical results demonstrate that: (i) despite increased degree of financial accessibility, which is determined by total inflows and outflows divided by total banking assets of the specific nation, is still modest and sometimes even slightly declines due to cross-border banking and economic cooperation links among the ASEAN-6; and (ii) the overvaluation of the ASEAN-6 economies from 1996 Q4 to 2016 Q4 is less than anticipated. Additionally, the research examines the important factors that influence financial integration, including bank size, compliance to regulations, and international credit risk. For the financial integration and stability of the ASEAN-6, these findings have important policy implications.

Wang and Luo (2020) looked at the relationship between bank risk and oil prices while taking bank heterogeneity into consideration. Using a sample of 279 banks in the Middle East and North Africa from 2011 to 2017, this study empirically examines the impact of changes in oil prices on bank credit risk. The authors discovered solid evidence that rising oil prices had a detrimental effect on the credit risk of bank loan portfolios. According to the heterogeneity research, traditional banks and smaller, less liquid banks that rely on client deposits for financing are more affected by the improvement in asset quality brought on by increased oil prices. The findings support the introduction of explicit deposit insurance, the enhancement of a nation's financial growth, the diversification of bank funding sources, and macro-prudential measures such countercyclical liquidity buffers to lessen the negative effects of falling oil prices. By examining the diversity of bank characteristics and increasing our understanding of the identified elements of bank riskiness

and susceptibility, the current research contributes to the body of work on the relationship between the oil price and bank risk.

Githaiga (2020) set out to ascertain if income diversity has an impact on the relationship between bank performance and human capital. The research analyzed panel data from 2010 to 2018 from a sample of 53 banks. The research concludes that human capital and income diversity have a considerable impact on bank performance, while the causal relationship is not always clear.

Diversifying income has a negative impact but human capital has a beneficial impact. Furthermore, the interaction term suggests that having a diverse income has a negative and substantial impact on bank profit, which is in opposition to the link between human capital and bank performance. Liquidity and asset quality have an inverse relationship with bank performance for the control variable, but capitalization has a favorable impact. Future research may employ qualitative measurements instead of the quantitative measure of human capital used in this study, known as human capital efficiency (HCE). Additionally, the study concentrated on East African commercial banks; future studies may perhaps take other areas and sectors into account, which might give additional information. The findings of this article provide insightful information. The influence of quality employee on the performance of banks with increasing investments in the development of human capital may be better understood by bank management. The report also warns bank managers that participating in non-lending activities may reduce performance by eroding the economic worth of human capital. The report also urges policymakers to remove barriers to banks' revenue diversification, such as by loosening restrictions on it. By doing so, banks could be able to use associated financial service operations for the best possible use of human resource and

increase bank profitability. This research investigates how income diversification acts as a moderator in link between performance of banks in East Africa and the quality of their employees.

Abdullah et al. (2019) were of the opinion that due to the dual nature of crypto-currencies as both may be some doubts regarding the practicality of using crypto-currencies as a means of exchange (currency) and enhance their liquidity risk management. The paper looked at Bitcoin's attributes in light of Basel III's HQLA regulations and contrasted together with other, its dynamic composition conventional asset classes that are already suggested as HQLAs. The paper examines the standard deviation in the structures of these assets utilizing the GARCH model. The results demonstrate that the Bitcoin currency possesses the same properties as the HQLA; but the legality risk and acceptance is still being considered by legal authorities worldwide. In the future, this danger will be eradicated since, unlike fiat money currency, crypto currencies obtain their legality from their genuine intrinsic worth and multi-economic utility rather than from the law. The U.S. markets return series for the Bitcoin currency and other unconventional asset types continue to exhibit volatility and predictable behavior, as shown by the examination of the symmetric volatility structure. But over time, Bitcoin's stability has steadily increased.

Regarding asymmetrical informational Bitcoin react more negatively to shocks than to positive ones, but this has no statistical significance, indicating that there are no far benefits to take advantage of in the market of Bitcoin, whereas the impact has been statistically continuous the typical asset groups markets. Additionally, there is relatively no link between Bitcoin returns and other conventional asset classes. All of these indicate that Bitcoin is a possible contender for inclusion in the HQLA as a risk mechanism asset alternative. This analysis lends some credence to current theoretical research on the liquidity risk management and return behavior of

cryptographic assets. They may use the data to make informed investing decisions with relation to hedging, diversification, and liquidity risk management by learning more about how bitcoin asset behavior compares to that of other conventional asset classes. The results of this research may help in determining if it is appropriate to include crypto assets in HQLA in order to enhance the liquidity requirement requirements and make sure that banks have enough HQLA, particularly during periods of financial unrest.

Ghosh (2018), using data on 5,176 commercial banks in the USA from January to March of 1999 to the July to September of 2016, research was presented with the goal of studying the underlying causes of loan charge-off rates. The research used the panel data fixed-effects estimating technique. Charge-off rates are decreased by increased regulatory capital, increased diversity, increased earnings, and cost effectiveness. On the other hand, a greater proportion of real estate loans and loans in a bank's asset portfolio have a negative effect on loan performance. Strong macroeconomic fundamentals in the US also lower loan charge-offs. The most vulnerable to changes in the balance sheet are real estate loan charge-offs. The outcomes emphasize how crucial it is for banks to maintain a healthy level of capital in accordance with Basel III rules.

By preventing banks from participating in hazardous lending practices, more Tier-1 capital enhances loan performance. Additionally, it's critical for banks to retain a diverse revenue source and achieve increased profitability. In order to enhance loan performance, management inefficiencies that result in greater non-interest charges must be minimized. Less research has been done on loan performance, despite the fact that a growing body of literature has looked at the underlying variables that influence low-quality loans in the USA and worldwide. Understanding the variables that influence loan charge-offs is essential from the standpoint of banking regulation

and promoting financial stability in order to pinpoint the pathways via which loan performance may either become worse or better. Understanding bad loan performance will enable us to foresee the risk of bankruptcy.

Abuzayed et al. (2018) investigated bank diversification tactics and how they relate to the stability of the financial industry. We examine the diversification characteristics of conventional and Islamic banks deploying public and unregistered banks with dominant areas in the GCC nations from the time spanning from 2001 up to 2014. The major conclusion is that bank stability is not increased by diversifying assets or revenue. Non-interest (non-financing) revenue and stability, however, seem to have a non-linear connection, suggesting that banks may manage risk at greater levels of diversity. On the risk side, conventional banks seem to be more negatively affected than Islamic banks. Additionally, the authors discovered that characteristics including enhanced institutional quality, favorable macroeconomic circumstances, and other aspects unique to banks encourage higher stability.

Koju et al. (2018) employing a sample of Indian commercial banks, researchers looked at how banking management affected credit risk. In order to assess the relationship between banking management characteristics and credit risk, the research used dynamic panel estimates. The empirical findings demonstrate that a rise in the loan component of total assets does not always correspond to a rise in problem loans. The results indicate that although high profitability and robust revenue diversification strategies minimize default risk, high capital requirements and huge bank sizes do not. The overall empirical findings confirmed that profitability, banking supervision, high credit standards, and effective investment strategies are the primary drivers of credit quality in the banking industry. These findings also supported the "operating efficiency," "diversification,"

and "too big to fail" hypotheses. The insights may be used to create efficient lending policies and investment plans by bank management, investors, and bank regulators.

Birchwood et al. (2017) sought to empirically establish the factors that affected bank interest margins in the Caribbean and Central America from 1998 to 2014. A special emphasis is placed on how variations in regulatory environments and market structures between nations affect individual banks' interest margins. The findings imply that although increasing income diversity and GDP growth are linked to reduced loan-deposit spreads, bank market power, operational expenses, credit risk, and liquid asset holdings increase the difference between loan and deposit rates. The authors discovered substantial evidence to support their primary hypothesis—that increased market quality and liberalization have a large impact on interest margins—when they looked at data on banking regulation. Reductions in admission criteria, especially have resulted in significant decreases in interest margins and are linked to increasing financial statement openness, more foreign bank participation, and expanded access to banking.

Chen et al. (2016) sought to determine whether and how control of corruption (CC) influences the asset quality of banks, both directly and indirectly through diversification. A review of banks in three Islamic countries (Indonesia, Malaysia, and Pakistan) from 2006 to 2012 reveals that CC has a positive impact on asset quality of Islamic banks only. In addition, diversification typically has a negative effect on asset quality, but such a negative effect weakens as CC becomes more effective, particularly for Islamic banks. Furthermore, the modifying effect of CC is particularly found in more corrupt countries (Indonesia and Pakistan) as opposed to a less corrupt country (Malaysia).

Badunenko et al. (2022) in order to assess asset quality and banks' capacity to reduce expenses characteristics in a sample of Italian banks during the years 2006–2015, researchers looked into the temporal relationship between them. Through separating of the long-term and short-term aspects of cost effectiveness, the authors provided fresh ideas and mechanisms by which efficiency and effectiveness of banks influences bank asset quality. They demonstrated that both efficiency factors may account for the non-performing loans plaguing Italian banks. Short-term cost efficiency declines before NPLs deteriorates, suggesting that policy makers bear into calculation short-term efficiency into consideration a sign of indication of a rise in NPL. Policymakers should prioritize removing exogenous obstacles that hinder banks from dedicating the best possible amounts of budget allocation to plan the day-to-day decisions about the loan portfolio. Using information from Chinese banks, Liu and Huang (2022) investigated the connection between financial risk management and sustainable financing at Chinese financial institutions. A complete indicator of operational effectiveness, asset quality, and capital sufficiency ratio is financial risk management. The association between two variables is determined using the structural vector auto-regression model. Banks' financial risk management is adversely impacted by the positive shock of sustainable finance. Favorable shocks from banks' financial risk management, on the other hand, have a positive impact on sustainable financing. Further split of the sample demonstrated shows financial risk by large state-owned financial institution is not always adversely impacted by sustainable financing.

Gong and Wei (2022) built a model of a bank's optimal financing structure (including leverage and debt maturity) by incorporating the moral hazard problem and investigating the interactions between the bank's asset quality and financing structure. The authors discovered that, under certain

conditions, the bank prefers a lower-quality asset financed by only short-term debt (no equity or long-term debt), even if a higher-quality asset is available. This is completely opposite to the optimal choice of the social planner, who chooses the asset with higher quality, financed by long-term debt, and a positive level of equity. Implementing liquidity and leverage regulations simultaneously can deal with this problem.

Abusharbeh (2022) studied how macroeconomic and bank-specific variables have changed during the last ten years in Palestine with regard to loan quality. Empirical tests are carried out for this aim utilizing a panel dataset of fixed and random effect estimates for the years 2007–2018. When the financial crisis is taken into account, the findings of the panel data analysis with fixed effects provide more than enough proof that interest, profitability, and credit supply have a major influence on credit default. Therefore, profitability has a statistically significant negative relationship with NPLs, whereas interest and credit supply have a positive relationship with NPLs. Additionally, it revealed that commercial banks in Palestine were able to absorb their NPLs both before and after the financial crisis. The innovative nature of this research offers valuable insight into risk management and credit quality. As a result, it may aid in identifying the root causes of credit risk in this nation and provide commercial banks the tools they need to maintain their competitive environment.

Therefore, monetary authorities may find it quite useful to manage loan defaults and safeguard Palestinian banks from debt problems. Swami et al. (2022) risk factors that have been identified as lowering the quality of NPL of commercial banks during and immediately before to the NPL reevaluation time. The factors of NPLs have been studied using a pooled and panel logit model.

The authors discovered that banks with a less diverse portfolio are more likely to experience declining asset quality.

Menicucci and Paolucci (2022) investigated the correlation between gender diversity and Italian banks' risk profiles between 2015 and 2019. This research investigates if there is any discernible difference in bank risk-taking when female board members or senior executives are present. The researchers used banks with an econometric model to investigate the impact of women on bank risk-taking. To confirm the impact of gender diversity, the scientists took into account five risk characteristics inside a multivariate regression model. The results support an inverse causation for risk and diversity of gender by showing that female board directors and executives are much less overconfident and more risk-averse than their male counterparts. As a consequence of their superior capital adequacy and equity-to-assets ratios, banks led by women are found to be less hazardous. Greater adequacy of capital does not come by as a result of worse loan portfolio. Even though it is correlated with the female directors who are high risk aversion and senior management.

Credit risk in female-led banks is identical to that in male-led ones. The findings emphasize managerial factors that may support the involvement of women in the banking industry while theoretically suggesting senior women in positions creates risk for the banks which have to be addressed. The findings have special relevance because they provide some credence to the idea that gender quotas in bank board management should be encouraged by regulators in order to curb risk-taking behavior. Given that there have been few empirical studies that have looked at the factors that influence risk-taking in this area to date, the research looks deeper analysis of what banks expectation in terms of variable returns and the solution thereon in the sector. Our knowledge of the factors that influence risk-taking behavior in banks is advanced by the results

about the greater risk aversion of female directors, which raises the possibility that implementing gender quotas on bank boards may help to curb this behavior.

Mostak (2017) investigated if the profitability of Indian banks is improved by a move toward non-interest revenue sources. The results demonstrate that, particularly when banks engage in greater trading activities, a larger percentage of non-interest revenue results in better profits and risk-adjusted profits. Furthermore, they also discovered that financial institutions with lower asset quality gain more from diversified incomes than banks with improved NPL. Alternative sample specifications and dynamic panel data estimates had no effect on the results. The findings of this research provide insightful information to policymakers, and it is concluded that promoting diversification operations improves bank profitability, especially for banks with poor asset quality. Taylor (2022) determined whether diversified and less risky banks performed better amid the pandemic. This research shows that amid tightened credit conditions and deteriorating asset quality induced by the pandemic economic hardships, credit risk adversely affected bank performance. However, income diversification is positively related to performance and offers alternative means of enhancing sustainable performance.

Using panel data methodologies and data from the years 1997–2009, Vighneswara (2015) investigated the factors that influence bank asset quality and profitability in India. Contrary to popular belief, the study's results draw some intriguing conclusions. Contrary to popular belief, it has been shown that priority sector lending does not significantly affect non-performing assets. This is also true for rural branches, suggesting that the negative reputation of rural credit is unfounded. Compared to other economic sectors, the performance of the industry has a greater impact on bad debts. Aside from other recognized factors of profitability, capital sufficiency and

investment activity impacts substantially on the profit banks; asset size has no discernible influence on profitability. Jakubik and Kadioglu (2022) investigated the variables influencing the banking sector's loan quality in seventeen emerging and developing economies utilizing a workable generalized least squares approach and a quarterly panel dataset encompassing the years 2010–2019. This research stands out from others due to the empirical analysis that reveals the net open foreign capital position and its lag values. The findings show the intriguing indices and considerable detrimental effect on banks NPL. This conclusion, which is in tandem with 1997 crises in Asian, shows that the moral hazard issue, which raises the number and volume of banks' bad loans in the financial system, increases with the ratio of net open positions in foreign currency to capital.

2.4.3 Ownership Structure, Fintech Investment, and NPL

Research by Gupta and Sharma (2022) identified certain corporate governance factors that influence bank asset quality and provided recommendations for further study in the sector. The outcomes will serve as a roadmap for other developing countries dealing with banks' subpar asset quality. The findings may be used by nations having economic ties with India. A dynamic panel data technique was used by the authors to identify the factors that determine NPL for Indian banks, utilizing new sample raw data of the banks for 2010-2019. Using the standard approach of moments, the authors examined 45 banks in the public and private sectors. The findings show that ownership concentration, board functioning, and board activity intensity are important drivers of asset quality. Additionally, as they have no discernible impact on NPL, the research predictions

on banks board of directors' objectivity and size of the board are refuted. The capital's net opens foreign exchange position and its lag values. The findings show a considerable detrimental effect on banks NPL. This conclusion, which was found in the 1997 Asian crisis, shows that the moral hazard issue, which raises the number of bank assets quality in the banking system, increases with the ratio of net open positions in foreign currency to capital. In contrast to all previous research, the authors' inclusion of macroeconomic and bank-specific characteristics as control variables ensures that their findings are accurate and trustworthy. The writers also acknowledge that asset quality is enduring.

Tarchouna et al. (2022) sought to research how effectively banks' corporate governance can lower the number of non-performing loans. Applying the dynamic panel GMM estimate on 184 US commercial banks from 2000 to 2013 is a good idea. The sample of banks from the US is separated into groups of trios due to the fact that various bank-size groupings have varying risk profiles. The authors separately include five corporate governance factors, together with bank-specific and macroeconomic variables, into each asset-size group of banks. The main conclusion the study is that sizeable banks tend to have poor and unstable management and directional framework, which negatively affects the quality of their loans. This outcome may be attributed to tiny banks' emphasis on interpersonal relationships. We see a good corporate governance framework for medium-sized banks. It is crucial to note that huge banks' corporate governance systems have been neutralized in this context. Large banks are participating in excessive lending practices owing to the high level of liquidity, oblivious to the resulting unjustified losses. This study makes a significant contribution to the financial literature by emphatically demonstrating that the size of the bank affects the corporate governance of the bank's loan quality.

According to Dar et al. (2021), in recent years, growing NPAs have drawn attention and scrutiny in India because they have negative impact on bank offerings, make banks more susceptible to external shocks, provide them less room to maneuver in the case of idiosyncratic shocks, and erode productive capital. Some extremely normative problems inevitably arise under this background. How has India's banking industry's technical efficiency evolved over time, particularly in the wake of the 2016 asset quality review? How are Indian banks' technological efficiencies impacted by unwanted output like NPA? Does the ownership of banks have anything to do with technological efficiency? They use the DEA, Malmquist productivity index, and SFA, three cornerstone techniques in the banking industry for the years 2014 to 2020, to try to address some of these problems via our analysis. The findings of employing DEA and SFA show that there are differences between banks classified as public and banks that are private in India in terms of technical efficiency. The three main outcomes of DEA are as follows.

First, although the SFA ratings demonstrate that public sector ownership fosters efficiency, banks owned by private investors have outstanding outcomes more compared to banks owned by public banks. Second, as seen by the SFA ratings, the technical efficiency of public sector banks continually decreased from 2014 to 2017 before increasing in subsequent years. This tendency is consistent with the myriad of policies the government and RBI have taken, such as the AQR and subsequent bank mergers. Although the findings of the Malmquist productivity decomposition show that bank productivity has been declining from 2014 to 2020, third, the efficiency of the banks is harmed by non-performing assets. Similar to DEA, the SFA data demonstrate the existence of technical inefficiency in the Indian banking industry and a pattern in which technical efficiency ratings decreased from 2014 to 2017 and then increased afterwards.

Skaa (2021) examined how shareholders contributed to the formation of voluntary provision for Loans and how it was used to balance out revenue. Using a sample of more than 200 Central European institutions, we examined how the income smoothness of foreign-owned and state-owned banks differed from that of local private banks. State and foreign banks generate more discretionary LLP than local private banks. These LLPs are used by foreign banks to execute discretionary income smoothing, but state banks often do not. Higher LLPs are seen in foreign banks with poor asset quality but strong profitability. Low-profit foreign banks that work in unstable economy climates don't generate more voluntary LLP than locally owned private banks. The suggestion is that, at least on the credit side, the exposure to variable return is lower than that of locally owned banks. Banks owned by Foreigners and the state banks have both been excess cautious as compared commercial banks in the wake of the financial crisis, and their discretionary LLP is greater. Overall, the author offered proof that LLP policy in banks is impacted by foreign and government ownership. This adds to earlier findings on how international, state, and local private banks vary in terms of overall loan default rate risk.

Geng et al. (2021) studied and found from data from China for 1995 to 2017 order to examine the implications of becoming listed as a bank and its risks, such as insolvency risk, capital risk, liquidity risk, asset quality, credit-risk, and prudential behavior, researchers used propensity score matching and difference in differences techniques. The findings are as follows: First, after becoming public, bank risks are decreased (apart from bankruptcy risk). Second, if a bank is listed on more than one stock market, the implications of becoming public are more significant. Last but not least, state-owned banks have larger single-listing impacts and cross-listing implications of going public on bank risks than non-state-owned banks.

Ben and Kenzari (2020) investigated critical determinants of non-performing loans using the panel VAR, types of GMM particularly the difference GMM. The project aim is to identify elements with contribution worth lots to the instability of bank assets during problem. The research attention was on eighteen banks from Tunisia studied between 2008 and 2018. The goal of the article is to determine how significant macroeconomic, microeconomic, and governance factors affect NPLs. The findings imply that both macroeconomic and bank-specific variables may be used to explain the decline in asset quality. The association between the liquidity risk and the NPLs of Tunisian banks is both positive and strong. Although not statistically significant, there is a positive link between these and the variable "revolution." The results also highlight the robustness of Tunisia's macro-financial feedback loops. Regarding the impact of the revolution's positive shock on bank asset which has enabled researchers to demonstrate how the capital has a beneficial impact on NPLs while the ROA and ownership structure had a negative and substantial impact. It seems that bank-specific variables, notably in the post-revolutionary era, effectively explain the volatility of NPLs.

Arrawatia et al. (2019) revealed that the loan asset quality has declined over time and that the Indian banking system has been struggling with a significant amount of nonperforming loans. Many Indian banks have seen severe capital loss as a result of this. The outcome of the banks in in term of economic development has been hampered by the spike in corporate defaults that has resulted in a tremendous increase in nonperforming loan assets. So, it seems sense to wonder what factors contribute to Indian banks' low asset quality. The authors investigated banks and related macroeconomic-specific drivers of NPL Indian banks with 47 banks during a period of 2000 to 2014 to provide an answer to this topic. When examining the causes of low asset quality in Indian

commercial banks, the empirical research also takes into account the effects of various ownership models and the financial issues. The findings show that variables particular to banks, industries, and macroeconomics are to blame for the deteriorating of bank asset quality of banks. These results indicate that in addition to bank-specific characteristics, forecasting models for asset quality should take macro level factors within the economy and sector-specific factors into account.

Kumar et al. (2018) examined factors influencing non-performing loans (NPLs) for Indian banks. The analysis contributes by including restructured advances in addition to standard measures of asset quality that provide a comprehensive picture of pressure on banks' balance sheets. Moreover, the Bayesian technique with multivariate t-distributed priors is applied for robust estimation. Utilizing a quarterly dataset from 2005 to 2015, the strong persistence of bad assets is clearly evident. Bank-specific characteristics such as growth of advances, profitability, and net interest margin are significant determinants. A high growth rate, among macro-factors, has a negative impact on bad assets. Moreover, the ownership effect is causing differential behavior, with state-owned banks being the most vulnerable.

Goyal and Verma (2018) In order to evaluate bank lending against the aggregate demand channel as a reason for the poor Indian credit growth, the drivers of credit and non-performing assets (NPAs) were calculated using a company and a bank panel with data up to 2015. The findings validate demand as the primary restriction. Only demand factors have an impact on corporate credit for a wide range of businesses. Balance-sheet weakness lowered lending only for a tiny group of indebted enterprises, according to a difference-in-difference study. Sales were still the key factor, however. The asset quality review (AQR), according to the bank panel, had a significant negative impact on advances but not gross NPAs. In addition to raising NPAs, sluggish growth and high

interest rates also affected prior credit. Low demand raised NPAs while also reducing credit. The effectiveness of capital injection is shown by the fact that the capital adequacy ratio (CAR) considerably lowers NPAs. Bank ownership has little effect on NPA ratios when other factors are taken into account, providing more evidence that exogenous shocks are causative. The results imply that for credit growth to continue, structural change to straighten up balance sheets is also necessary, along with a demand recovery.

Us (2018) examined using panel data estimate approaches, identify the factors that influence nonperforming loans (NPLs) in the Turkish banking industry. The study is divided into subperiods encompassing the precrisis and postcrisis eras, and estimates are redone to show the impacts varies across ownership. According to research, macroeconomic and policy-related factors now have a bigger role in determining NPLs than they did before the crisis. As a result, a healthy economy and prudent budgetary management enhance loan quality, whereas a higher policy rate encourages NPLs. Ownership affects the importance of bank-specific factors, though. However, a recurring theme is that asset size should increase in favor of loans, but that this should be supported by effective loan monitoring and capital adequacy requirements that are strict enough to prevent NPLs.

Banerjee and Murali (2017) examined whether after financial deregulation in 1992, the Indian banking sector is resilient enough to absorb unanticipated shocks from both local and international macroeconomic forces. According to Kaminsky and Reinhart (1999) and Demirgüç-Kunt and Detragiache (1998), the banking crisis occurs after financial liberalization. In contrast to the current global financial crisis (GFC), which might endanger bank portfolios, India started its financial deregulation program in 1992. The NPAs of banks, using quarterly data from 1997 to

2014, are used to assess their soundness. The robustness of the VAR model results is examined using the post-VAR estimating approach. The IRF states that it takes more than nine and eight quarters, respectively, for the shock from GDP to NPA of public and private banks to stabilize. Similar macroeconomic issues also have an influence on foreign banks. The results of the stress test show that public banks need recapitalization since they are more exposed. Additionally, local banks were not negatively impacted by the GFC, which may be credited to the central bank's supervisory approach. Unexpectedly, capital market indexes had little impact on banks' NPA; these merits more research. The constraint results from the stock market index for banks just having been introduced in the early 2000s. The findings may not have been significant because of a paucity of data and the few bank shares that were exchanged on the market. The study's conclusions will be helpful to bank management and RBI officials in practical ways. The RBI is interested in looking at the exchange-rate risk borrowers confront that contributes to rising NPAs. Social repercussions: The financial crisis has negative effects on society, including the loss of household savings and a drop in consumer confidence. Only Bhattacharya and Roy investigated this subject in India (2008) and did stress tests under different type of ownership systems.

Cheng et al. (2016) assert that Growing NPAs are a subject of worry and attention in India because they affect bank credit services, make banks more susceptible to external shocks, provide them less room to absorb idiosyncratic shocks, and erode productive capital. In light of this context, several quite normative queries are inescapable. How has the technical efficiency of Indian banks evolved over time, particularly in the wake of the 2016 asset quality review? How are the technical capabilities of Indian banks impacted by unwanted output, such as NPA? What relationship exists between bank ownership and technological efficiency? The DEA, Malmquist productivity index,

and SFA are three cornerstone techniques in the banking industry for the period of 2014-2020 that we use in our research to try to provide answers to some of these problems. The findings of utilizing DEA and SFA both show variation in the technical efficiency of Indian public sector banks and banks owned by the private investors.

Dek et al. (2022) examined the link between issuer bank reputation and the performance of mortgage-backed securities (MBS) in the European market. The authors found that MBS sold by reputable issuer banks are collateralized by higher-quality asset pools with lower delinquency rates and are less likely to be downgraded. However, during boom periods, characterized by declining credit standards, MBS originated by reputable issuer banks tend to be collateralized by lower-quality assets compared to normal periods.

Pramahender (2022) analyzed the growing bank bad loan situation in India, among other aspects that Along with the current status of Indian banks, non-performing assets (NPA) are a contributing factor. According to this study, the main causes of the rising number of NPL in the region of Indian include inadequate recovery procedures, an absent of adequate management procedures and systems at the banks, borrowers' willful breach, an inadequacy of strict regulation, a subpar corporate directing and decision making, and borrowers' misappropriation of funds. Public sector banks (PSB) were determined to be the most harmed by the growing NPA numbers. Bank balance sheets, asset quality, provisioning coverage ratios, and return on assets are all negatively impacted by high NPA rates. Although numerous actions have been taken by various interested parties to address the issue and the establishment of a vehicle for the management of the asset, the establishment of debt recovery firms for the swift retrieval of NPL, and the adoption of the

insolvency and bankruptcy code (IBC), However, still a ton of work to be done and a ton of space for reforms in the banking industry, notably in India's PSB.

2.5 Conceptual Framework and Hypotheses

This section presents the proposed conceptual model and the development of the study's hypotheses in response to its underlying objectives.

2.5.1 Conceptual Framework

This section presents the conceptual model depicting the relationships between the study variables. The variables of interest include Fintech investment, bank asset quality, diversification, and ownership structure. The study developed the conceptual framework presented in Figure 1 based on the theoretical, conceptual, and empirical issues presented above. It predicts the relationship between Fintech investment (independent variable) and bank asset quality (dependent variable) and the moderating role of diversification and ownership structure.

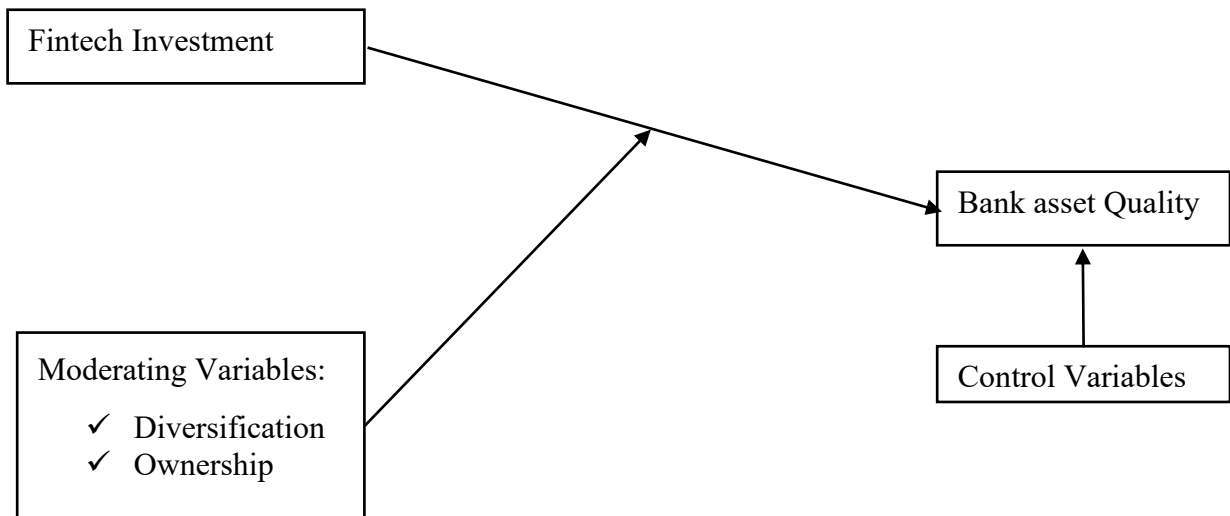


Figure 2: The Conceptual Model

Source: Author's construct (2022)

2.5.2 Hypotheses Development

This section reports the hypotheses assumed in response to the study's specific objectives. It outlines the relationships among the dependents, independents, and the moderator. The following subsections presents the proposed hypotheses depicting the relationships between the study variables:

: There exists a significant statistical relationship between Fintech Investment and Asset Quality.

: Diversification affects the relationship between Fintech Investment and Asset Quality.

: Ownership affects the relationship between Fintech Investment and Asset Quality.

2.6 Chapter Summary

Chapter two presents the literature review in response to the study objectives. The review covers concepts, theories, and empirical studies relating to the subject matter as well as a conceptual framework and associated hypotheses. The research examines the impact of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan African countries. Precisely, the research is about the effect of Fintech investment on bank asset quality; assess how diversification affects the relationship between Fintech investment and bank asset quality; and investigate how the type of ownership of a bank affects the relationship between Fintech investment and bank asset quality.

The chapter presents the theoretical foundation of the study. It provides theories underpinning the associations between the study variables. It covers a review of subjects under Fintech, including bank asset quality, ownership structure, and diversification. The themes are as follows: definition and measurement of Fintech investment; understanding bank asset quality; Fintech size and banking; Fintech and bank asset quality; prospects and issues in integrating Fintech in banks; new challenges associated with integrating Fintech in banks; banks' adaptation of Fintech; the effectiveness of ownership structure on banks' performance; diversification and banking.

Recent empirical studies relate to the study presented in this chapter. It covers studies on Fintech investment and bank asset quality. Studies on diversification, Fintech investment, and bank asset quality are also presented in this chapter. The final part of the empirical review covers ownership structure, Fintech investment, and bank asset quality.

This section presents the proposed conceptual model and the development of the study's hypotheses in response to its underlying objectives. The study developed the conceptual framework presented in Figure 1 based on the theoretical, conceptual, and empirical issues presented above. The hypotheses outline the relationships among the dependents, independents, and the moderator.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This part explains the methods utilized to study the research and the rationale behind specific designs and procedures. Additionally, it defines the environment in which the study was conducted. The chapter also covers sample methods, data collecting tools, data collection procedures, analysis, validity and reliability, research constraints, and ethical considerations.

3.2 Research design

In order to gather information regarding Fintech, diversification, ownership and bank asset quality and how they predominantly affect profitability of Banks asset quality, this study used a quantitative methodology using a panel design. The quantitative method is based on the idea that human phenomena may be objectively analyzed (Parahoo, 2006). Babbie (2005) asserts that quantitative research has a predetermined design that pre-organizes the research questions and a thorough process of data collecting and analysis. Banks with fewer than the number of data required were omitted creating a balance panel data.

3.3 Study population

The target population for the study of Fintech, diversification, ownership and bank asset quality included Banks in Sub-Sahara Africa that are listed on their country stock exchange market for the period 2011 to 2020. The study employed the use of secondary information about the yearly annual audited statements of listed banks from 2011 to 2020. The choice of the interval is to give us the opportunity to examine the effects of Fintech investment on the asset quality for a

more recent period. The region's selection was influenced by the need to explore the impacts of this novel Fintech on banks in SSA.

3.4 Inclusion criteria

The inclusion criteria were Banks listed on the stock market of the country they operate. The sampled banks in the research were also contingent upon availability of data for the period under study.

3.5 Sample size

The sampling size considered for this research is a total sample of seventeen banks listed on their country's stock exchange and operating within the Sub-Saharan African Region for a period of 2011 to 2020. This sample was chosen because the researcher wants financial institutions that are listed and also have annual audited financial statement published.

3.6 Data Source

The study relied on secondary data for the analysis. This data was extracted from various sources such as the Ghana Stock exchange, Nigeria Stock Exchange, Kenya Stock Exchange and all other stock exchange that are within the Sub Sahara African region.

Data about Fintech investment (FinT score) was obtained from the information extracted from the annual audited financial statements. The measure of diversification, non-interest income to Total income (NIITI) would be gotten from the yearly financial reports of each of the banks. At the macroeconomic level, GDP growth rate would be obtained from the World Development Indicators. Details of the variables are discussed next.

3.7 Outliers

An outlier is an observation that lies an abnormal distance from other values in a random sample from a population. Again, outliers are observations that appears to deviate markedly from other members of the sample in which it occurs. During the data analysis, there were insignificant outliers that were detected. This implies that, they do not affect the final result of the data. However, the researcher filters the outliers from the data. There are different ways of treating outliers apart from removing them from the dataset. Therefore, in dealing with outliers, the researcher reduces the weights of outliers (trimming weight); then changed the values of the outliers and using robust estimation of techniques (M-estimation).

3.8 Dependent Variable

For the purposes of this study, the dependent variable was Asset Quality (Ratio of Non-Performing loan) (NPL). It will be calculated as non- performing Loans to total Loans (NPLTL).

3.9 Independent Variables

3.9.1 Fintech investment

We will adopt the methodology used by Kriebel and Debener (2019) and Chhaider et al (2022) to calculate Fintech investment labelled as FinT score. FINT score (FINT) will measure the Fintech investment by counting the frequencies of digitization terms in the audited annual financial reports of banks. The frequent appearance of these lexicons indicates the banks investment in Fintech. For this purpose, the following relevant terms in digitization dictionaries will be selected for the search of its frequent use in the annual audited financial statement. They are ‘digital’, ‘Digitization’, ‘hardware’, ‘software’, ‘MPESA’, ‘mobile’, ‘online’, ‘internet’, ‘Fintech’,

'cyber', 'cybersecurity', "mobile money", "mobile wallet", "information technology", "information system", "computing", "programming", "computer science",

$$\text{FinT score (annual report } i, t) = \ln \left(\sum_{m=1}^M \text{tf}/\text{nt} \right)$$

The tf is the term frequency of m is the keyword in the annual report being investigated, nt is the number of total words in the annual report being investigated and M is the total number of keywords tested in the annual report being investigated (M=18) word appearing in the annual statement.

3.9.2 Income Diversification

Income diversification will be measured by NII divided by total income (NIITI). Bank that is income diversified would generate significant income from non-interest sources such as fees, commissions and trading income.

3.9.3 Ownership

The study would consider how the type of ownership affect the bank asset quality. The type of ownership may be either domestically owned or foreign owned. A domestically owned bank means the owners of the bank is within the African region. Foreign owned mean the bank is owned by foreigners to the African region. We use a dummy variable to represent whether a Domestic owned bank and a foreign owned bank. Dummy variable of 1 if the bank is foreign owned and zero were otherwise.

3.9.4 Cost-to-Income

CIR (the cost-to-income ratio) is a measure of bank efficiency. It is measured as cost divided by total income. The literature indicates that the higher the ratio, the lower bank performance.

LIQ is calculated as the ratio of cash to deposit ratio. Studies in the past have concluded that higher liquidity levels lead to higher performance (Bourke, 1989).

3.9.5 Macroeconomic Variables

GDP growth rate is a macroeconomic factor used a control variable.

Table 1 Variable definition and Notation

	Variables	Description	Notation
Dependent Variable (Bank Asset)	Bank Asset quality	Ratio of NPL to total loans	NPLTL
Independent Variable	Fintech	Investment in Fintech FINT score (annual report-1) = L_n $(\sum_{m=1}^M tf/nt)$	FINT
	Diversification	The Non-interest income divided by total income	NIITI
	Ownership	Dummy variable equal to one for Foreign-owned and zero otherwise	OWN

Control Variable	Cost to Income Ratio	Measure by Cost to Income ratio	CIR
	Liquidity Ratio	Measured as cash to total deposit	LIQ
	Return on Asset	Return on Asset measured as Net Income to Total Asset	ROA
	Leverage	Leverage is measured as total liabilities to total Assets	LEV
	Inflation		Inflation
	GDP growth rate	CPI Growth rate	GDP
		GDP	

3.9.6 The Proposed Model (GMM)

It would be important to provide the proper approach in order to estimate the suggested model. NPLs are a dynamic phenomenon according to the literature on NPLs. According to studies by Radivojevic et al. (2019), the historical value influences their present. Therefore, using dynamic panel data estimators would be apparent. The lags of the endogenous variable to estimate our model will be used.

A dynamic panel model of first-difference GMM estimator was chosen ahead of the pooled mean group, fixed effect, and system GMM models, to remove unobserved country specific effect from the panel. The first-difference GMM estimator was chosen because the coefficient of the lag form of the dependent variable appears greater than that of the fixed effect model, making it superior to even the system GMM estimator. With respect to robustness of the model, the study adopted the Autocorrelation test by Arellano-Bond. The Arellano and Bond (1991) moment criteria are only applicable if the first differenced error terms are uncorrelated.

The dynamic equations have this structure:

$$NPL_{it} = \gamma NPL_{it-1} + \eta X_{it} + \Omega Y_{it} + \mu + h_{it} \dots \dots \dots (1)$$

The factors will be represented by index that will be created and it will be X_{it} . The lagged endogenous variable is $NPL_{i,t-1}$. We also assume that h_{it} is the error term, and the total of the indices y is smaller than that of the unit measured in terms of their actual values. $E(h_{it}^2) = 2$ variations. Additionally, when taken in pairs, these stochastic disturbances do not correlate and are independent of the particular impacts as well as independence of the specific effects (μ_i). However, the conventional estimate approaches on panel data are inadequate due to the inclusion of a lagged variable. This is brought on by the correlation between the residuals from the regression and the endogenous variable. To solve this issue, the first difference model's instrumental variable approach by employing lagged explanatory variables as instruments, endogeneity may be incorporated into the equation.

Insofar as lagged dependent variable accounts itself as one of the explanatory variables in the specified model, the generalized method of moments is the most suitable econometric tool in this situation (GMM). It makes it possible to regulate certain individual and temporal effects in addition to offering remedies for endogeneity biases.

3.9.7 The Empirical Model

$$NPL_{i,t} = NPL_{i,t-1} + h_1 FinT_{i,t} + h_2 NIIT_{i,t} + h_3 FinT_{i,t} * NIIT_{i,t} + h_5 LEV_{i,t} + h_6 ROA_{i,t} + h_8 LIQ_{i,t} + h_7 GDP_t + \mu_{it} \dots \dots \dots (3)$$

$$NPL_{i,t} = NPL_{i,t-1} + h_1 FinT_{i,t} + h_2 OWN_{i,t} + h_3 FinT_{i,t} * OWN_{i,t} + h_4 CIR_{i,t} + h_5 LEV_{i,t} + h_6 ROA_{i,t} + h_8 LIQ_{i,t} + h_7 GDP_t + \mu_{it} \dots \dots \dots (4)$$

In our equations the subscript i , and t will denote bank i in year t .

$NPL_{i,t}$ will represent the Asset quality of bank i at year t in all the three equations.

$NPL_{i,t-1}$ represents the lag of the dependent variable.

$FinT_{i,t}$ will be Fintech investment for bank i at year t in all the equations.

$NIIT_{i,t}$ represents income diversification of bank i in year t .

$CIR_{i,t}$ is a control variable which represent the cost to income. Gross Domestic Product is the yearly rate of growth for time t at country level. e_{it} and $\mu_{i,t}$ represents the idiosyncratic error.

3.10 Data analysis

Data analysis, according to Parahoo (2006, p. 375), is "an intrinsic aspect of the study design" and is a way to interpret data and present it in a comprehensible way. The statistical software program EViews was employed to examine the data. When analyzing the data, correlation and regression analyses were carried out to determine the connections between the variables, and descriptive statistics were employed to summarize the results. Khan (2012) and Opoku (2005). The study used the dynamic panel model of GMM estimator.

3.11 Chapter Summary

Chapter three presents the methods utilized to study the research and the rationale behind specific designs and procedures. Additionally, it defines the environment in which the study was conducted. The chapter also covers sample methods, data collecting tools, data collection procedures, analysis, validity and reliability, research constraints, and ethical considerations.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The chapter provides an interpretation of the findings as well as discussions in response to the research objectives. The research examines the effect of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan African countries. Precisely, the study examines the effect of Fintech investment on bank asset quality, assesses how diversification affects the relationship between Fintech investment and bank asset quality, and investigates how the type of ownership of a bank affects the relationship between Fintech investment and bank asset quality. The chapter covers the following themes: Descriptive Statistics.

4.2 Descriptive Statistics

The descriptive statistics reveal the features of the study variables by using the mean, median, minimum, maximum, standard deviation, skewness, and kurtosis. This further strengthens the case for using the appropriate panel regression techniques on the given data. Table 2 presents the descriptive statistics of SSA countries over the period 2011-2020. The mean, maximum, and minimum values of the dependent variable, NPLTL, are 10%, 97%, and 0%, respectively. The NPLTL recorded skewness and kurtosis of 4.07297 and 26.28823, accordingly. With respect to the independent variable, NIITI, the study found 25%, 98%, and 3% respective mean, maximum, and minimum scores. The NIITI recorded skewness and kurtosis of 3.06304 and 17.03449,

respectively. Both NPLTL and NIITI recorded small standard deviations suggesting decreased volatility.

Table 2: Descriptive Statistics of Sub-Sahara African Countries for 2011-2020

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Obs.
NPLTL	0.10067	0.06650	0.97000	0.00000	0.11689	4.07297	26.28823	168
NIITI	0.25033	0.23718	0.98166	0.03666	0.12701	3.06304	17.03449	168
FINT	-7.07911	-7.03000	-5.30865	-10.13698	0.70480	-1.31682	8.16793	168
LIQ	0.50910	0.41575	2.16700	0.03883	0.35896	1.36145	5.56189	168
LEV	0.92684	0.84893	5.75423	0.01116	0.54376	7.45193	62.26645	168
CIR	0.59834	0.59874	1.27249	0.27977	0.17396	0.35843	3.29550	168
GDP	0.04488	0.04569	0.14047	-0.01794	0.03330	0.57887	4.12790	168
ROA	0.02840	0.02765	0.22401	-0.08833	0.02531	2.12946	26.02321	168
OWN	0.58333	1.00000	1.00000	0.00000	0.49448	-0.33806	1.11429	168

Source: Author (2023)

The mean, maximum, and minimum values of the FINT as a moderator are -7.07911 percent, -5.30865 percent, and -10.13698 percent, respectively. The FINT recorded skewness and kurtosis of -1.31682 and 8.16793, accordingly. Concerning OWN as a moderator, the study found 58%, 1%, and 0%, respective mean, maximum, and minimum. The OWN recorded skewness and kurtosis of -0.33806 and 1.11429, respectively. Both FINT and OWN recorded small standard deviations suggesting decreased volatility.

4.3 Correlation Matrix

The Table 3 displays the correlation matrix for all the studied variables included in the regression equation. If multicollinearity is present in the data, it may be found using the correlation matrix. It is particularly challenging to determine which explanatory variable is affecting the dependent variable when all or some of them are strongly correlated with one another. This is known as multicollinearity. The correlation between explanatory variables in most of the variables is not large to pose multicollianrity problems. Here, the correlation among most explanatory variables is least ($r < 0.50$) to provide confidence that there exist no much multicollianrity relationship between the variables in the model.

Table 3: Correlation Matrix

	NPLTL	NIITI	FINT	LIQ	LEV	CIR	GDP	ROA	OWN
NPLT									
L	1	-0.0877	0.0388	0.3045	-0.0051	-0.0358	-0.0044	-0.0230	-0.1845
NIITI	-0.0877	1	0.1390	-0.1129	-0.0831	-0.1242	0.0774	0.1038	0.0786
FINT	0.0388	0.1390	1	-0.0268	0.0828	-0.1670	-0.1625	0.1129	-0.0650
LIQ	0.3045	-0.1129	-0.0268	1	0.0501	0.1175	0.2246	0.2307	-0.1502
LEV	-0.0051	-0.0831	0.0828	0.0501	1	0.1816	-0.1190	0.4413	-0.0663
CIR	-0.0358	-0.1242	-0.1670	0.1175	0.1816	1	-0.0329	-0.3101	0.1699
GDP	-0.0044	0.0774	-0.1625	0.2246	-0.1189	-0.0329	1	0.0943	-0.1940
ROA	-0.0230	0.1038	0.1129	0.2307	0.4413	-0.3101	0.0943	1	-0.2159
OWN	-0.1845	0.0786	-0.0650	-0.1502	-0.0663	0.1699	-0.1940	-0.2159	1

Source: Author (2023)

4.4 Variance Inflation Factor

The multicollinearity of the variables was again tested for using the variance inflation factor (VIF). Multicollinearity exists when two or more independent variables in the regression model are

correlated. The VIF test results obtained suggest no amount of multicollinearity since all the scores recorded fell below 10 (Appendix A). This implies that the model estimates of the coefficients were stable and the standard errors for the coefficients were not widely inflated.

4.5 Effect of Fintech on Asset Quality

This section presents the outcome of the dynamic panel model of GMM estimator in response to the question, *What is the effect of Fintech investment on Bank asset quality in Sub Saharan Africa?*

The test was conducted under the hypothesis:

: There exists a significant statistical connection between Fintech Investment and Asset Quality.

We examine the first differenced error terms' first and second order autocorrelation. The absence of serial correlation between the error terms is the null hypothesis. The Arellano-Bond test, abbreviated as AR (1), averages auto-covariance in residuals of order 1. The Arellano-Bond test, which averages auto-covariance in residuals of order 2, is often referred to as AR (2). The results are reported in Table 4. The AR (1) term is found to be significant with a p-value of 0.00020 whereas AR (2) term is found to be insignificant with a p-value of 0.17710. This suggests a substantial stability in the model and the presence of a negative first-order autocorrelation, but it does not imply inconsistency in the results. The significant effect of lagged form of NPLTL suggests that Fintech investment is persistent in the sampled banks. The import of this finding is that the banks have embraced Fintech and continue to invest in it towards output maximization. The study support hypothesis, H_1 that *“There exists a significant statistical connection between Fintech Investment and Asset Quality”* ($\beta = -0.04322, p < 0.01$). There exist a significant negative association between FINT and NPLTL such that a unit increase in FINT is capable of leading to a 4 percent decrease in NPLTL. Here, it can be established that increasing Fintech

investment has a positive impact on the bank asset quality i.e., reducing NPLTL. This implies that the higher the levels of Fintech investment of banks, the lower the levels of their NPLTL (High asset quality) will be. On the other hand, the lower the levels of Fintech investments of banks, the higher the levels of NPLTL (Low asset quality) will be. Therefore, banks' engaging in more Fintech investment has the propensity to improve the banks' performance in terms of asset quality in Sub-Saharan Africa, all things considered.

Table 4: Effect of Fintech on Asset Quality

Variables	Coefficient	
NPLTL(-1)	0.44805*** (0.01873)	
FINT	- 0.04322*** (0.00177)	
LIQ	0.16940*** (0.01841)	
LEV	-0.05888*** (0.00205)	
ROA	0.91509*** (0.06146)	
GDP	-1.13159*** (0.06155)	
Instruments rank	17	
AR(1)	z = -3.72902	Pr > z = 0.00020
AR(2)	z = -1.34967	Pr > z = 0.17710
J-statistic	10.43319	
Prob(J-statistic)	0.491893	
Observations	132	
Banks	17	

Note(s): *, ** and *** show 10, 5 and 1% level of significance. Figures in parenthesis are standard errors. Instrument specification: @DYN(NPLTL,-2) FINT(-1) LIQ(-1) LEV(-1) ROA(-1) GDP(-1)

Source: Author (2023)

For the following reasons, it is crucial to comprehend how non-performing bank loans and Fintech investments are related. First of all, less collateral is needed for Fintech-enabled lending than it is for traditional banking methods. This makes it risky for both stakeholders to cooperate or collaborate because Fintech-enabled lending may be exposed. They may not completely recoup the loans they provide to borrowers from the value of the collateral when borrowers fail due to exposure to credit risk from borrowers (Magee, 2011). Second, Fintech lenders frequently lack the legal backing necessary to engage in loan recovery actions against debtors directly. As a result, defaulting borrowers may receive little to no loan recovery action, which can result in an increase in non-performing loans (Usanti et al., 2020), a problem that can be resolved through cooperation and collaboration.

Banks can modernize their typical brick and mortar operations thanks to Fintech business models into technologically advanced ones. Modern techs including data analytics, AI, machine learning, cloud computing. Additionally, blockchain, crowdsourcing, and others are transforming the way banks work today. By altering the way financial institutions create value and provide goods and services, Fintech opens up new business opportunities. Fintech innovations in banks will likely surpass what most people now consider to be technical developments in banks, such as internet banking.

4.6 Moderating Effect of Diversification on the Nexus between Fintech and Asset Quality

This section presents the outcome of the dynamic panel model of GMM estimator in response to the question, *what is the influence of diversification on the relationship between Fintech investment and Bank asset quality in sub-Saharan Africa?* The test was conducted under the following hypothesis:

: *Diversification affect the relationship between Fintech Investment and Asset Quality.*

Table 5 presents the outcome of the moderation analysis on how diversification affect the nexus between Fintech investment and asset quality of the banks. The AR (1) term is found to be insignificant with a p-value of 0.27250 whereas AR (2) term is also found to be insignificant with a p-value of 0.17050, all pointing to absence of autocorrelation. The study failed to reject the hypotheses, that “*Diversification affect the relationship between Fintech Investment and Asset Quality*”. The implication is that diversification do affect the relationship between Fintech investment and bank asset quality in Sub-Saharan Africa. Here, the introduction of diversification into the model as a moderator increased the marginal effect from 4 to 49 percent (at 1% significant level). Therefore, diversification exerts a significant moderate effect on how investing in Fintech helps to reduce NPLTL, thereby raising asset quality of the banks.

According to Jacquemin and Berry (1979), diversity is measured by how closely all product categories are connected to one another. The degree to which companies and products share comparable company resources and abilities, as well as the same clients and technology, is referred to as the relatedness of diversification (Tanriverdi & Venkatraman, 2005). Businesses tend to focus on certain areas for innovation as relatedness rises (Ahuja & Novelli, 2017). According to the degree of relatedness, there are two basic kinds of diversification strategies that may be distinguished from the standpoint of resource sharing: related diversification and unrelated diversification (Palepu, 1985). When a company engages in related diversification, it operates several business units in connected sectors; when it engages in unrelated diversification, it operates in substantially unrelated industries with few shared resources (Bettis, 1981).

Table 5: The Moderating Effect of Diversification on the Nexus between Fintech and Asset Quality

Variables	Coefficient	
NPLTL(-1)	0.40210*** (0.01889)	
FINT	0.07766** (0.03339)	
NIITI	-3.40044 (0.93410)	
FINT*NIITI	-0.48790*** (0.12350)	
LIQ	0.24966*** (0.03497)	
ROA	-0.38980** (0.183519)	
GDP	-0.78212*** (0.13283)	
Instruments rank	17	
AR(1)	z = -1.09724	Pr > z = 0.27250
AR(2)	z = -1.37057	
J-statistic	14.09274	
Prob(J-statistic)	0.168803	Pr > z = 0.17050
Observations	132	
Banks	17	

Note(s): *, ** and *** show 10, 5 and 1% level of significance. Figures in parenthesis are standard errors. Instrument specification: @DYN(NPLTL,-2) FINT(-1) NIITI(-1) LIQ(-1) ROA(-1) GDP(-1)

Source: Author (2023)

4.7 Ownership, a Moderator on the Nexus between Fintech and Asset Quality

This section presents the outcome of the dynamic panel model of GMM estimator in response to the question, *What is the impact of the type of ownership of a bank on the relationship between Fintech Investment and bank asset quality in Sub-Saharan Africa?* The test was conducted under the following hypothesis:

: Ownership affect the relationship between Fintech Investment and Asset Quality.

Table 6 presents the outcome of the moderation analysis on how ownership structure of the banks affects the nexus between Fintech investment and their asset quality. The AR (1) term is found to be insignificant with a p-value of 0.22760 whereas AR (2) term is also found to be insignificant with a p-value of 0.17700, all pointing to absence of autocorrelation. The study supports the hypotheses, that “*Ownership affect the relationship between Fintech Investment and Asset Quality*”. The import of this findings is that banks’ ownership structure has a significant effect on the association between investing in Fintech and their asset quality in Sub-Saharan Africa. Introducing ownership into the model as a moderator increased the marginal effect from 4 to 8 percent (at 1% significant level). Therefore, ownership structure exerts a significant moderate effect on how investing in Fintech helps to reduces NPLTL, thereby marginally raising asset quality of the banks.

Table 6: Ownership, a Moderator on the nexus between Fintech and Asset Quality

Variables	Coefficient	
NPLTL(-1)	0.34604*** (0.01135)	
FINT	0.01393*** (0.00168)	
FINT*OWN	-0.08860*** (0.00635)	
LIQ	0.24062*** (0.01594)	
LEV	-0.03671*** (0.00201)	
Instruments	17	
AR(1)	z = -1.20654	Pr > z = 0.22760
AR(2)	z = -1.35011	Pr > z = 0.17700
J-statistic	14.96295	
Prob(J-statistic)	0.243469	
Observations	132	
Firms	17	

Note(s): *, ** and *** show 10, 5 and 1% level of significance.

Figures in parenthesis are standard errors. Instrument specification:

@DYN(NPLTL,-2) FINT(-1) OWN(-1) LIQ(-1) LEV(-1)

Source: Author (2023)

The significant moderation effect of ownership structure on the nexus between Fintech investment in Sub-Saharan Africa is evidence in the inflow of foreign banks into the continent. According to some academics, international businesses perform better than domestically held banks, with higher profit margins and lower expenses. This is because companies with foreign ownership are seen to have amassed managerial competence over time in other nations. Additionally, international banks often adapt and use the operating systems that they have discovered to be successful in their own nations (Ongore, 2011). Kamau (2009) claimed that foreign banks generally bring with them superior know-how and technical capacity. Foreign banks impose competitive pressure on

domestic banks. They receive liquidity resources from their parent's banks because of their access to international markets. Beck and Fuchs (2004) mentioned and suggested that in emerging nations, foreign-owned banks are more lucrative than their native competitors. Domestic banks less profitable than domestic banks in industrial countries due to benefits derived from tax breaks, technological efficiencies and other preferential treatments. However, domestic banks are likely to gain from information advantage they have about the local market compared to foreign banks.

4.8 Discussions

Globally, the banking industry is now experiencing disruption due to recent advancements in Fintech and digital technologies. Numerous causes, such as financial globalization, technical development, the necessity for new business models, and the rivalry among service providers to meet growing client expectations, were responsible for this transition. The banking industry is moving toward operational innovation as a result of the financial technology industry's fast growth in order to obtain a lasting competitive edge (Zhao et al., 2019). The study seeks to examine the effect of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan African countries. Precisely, the research is about the effect of Fintech investment on bank asset quality; assess how diversification affects the relationship between Fintech investment and bank asset quality; and investigate how the type of ownership of a bank affects the relationship between Fintech investment and bank asset quality.

The study found a significant negative connection in between Fintech investment and bank asset quality. Here, it can be established that increasing Fintech investment has a positive impact on the quality of the banks' assets, i.e., reducing non-performing loans. This implies that the higher the levels of Fintech investment by banks, the lower the levels of their NPL will be. On the other hand,

the lower the levels of Fintech investments by banks, the higher the levels of non-performing loans will be. Therefore, banks' engaging in more Fintech investment has the propensity to improve the banks' performance in terms of asset quality in Sub-Saharan Africa, all things considered. The result is consistent with the Schumpeterian innovation theory's prediction. Fintech innovations provide markets, governments, and society with more efficient goods, processes, services, technology, or business models through creative destruction. According to Schumpeter, the heart and soul of the innovating entrepreneur is creative destruction; he does not consider management of factors or resources or organization of factors or resources to be the heart and soul of an entrepreneur.

Empirically, the finding in this study is consistent with those of several studies (Katsiampa et al., 2022; Lui et al., 2022; Najaf et al., 2022; Okoli, 2020; Ozili, 2022; Saiedi et al., 2022; Tseng & Guo, 2022; Wu et al., 2022; Yin et al., 2022), which found a significant nexus between Fintech and bank asset quality. For instance, when Ozili (2022) investigated the second wave of the Fintech age, there were fewer non-performing bank loans, according to the behavior of bank asset quality in that period. Additionally, Fintech, bank non-performing loans are strongly correlated with the status of the economic cycle. In the second wave of Fintech, countries with strong private sector credit availability saw higher non-performing loan rates. According to the two-way interaction research, non-performing loans are less common in the second-wave Fintech period when credit availability is stronger and the economy is booming.

Given the financial technology sector's quick expansion and development, which has drawn the attention of academics who are now trying to determine how it may affect the banking industry. In response to this, Yin et al. (2022) carried out a comparable investigation on how the Fintech

age has affected the stability of the Chinese banking industry. According to the authors, the second wave of the Fintech period contributed to China's improvement in financial stability and a decrease in NPLs as compared to the first wave. The authors came to the conclusion that the explanatory variable had a favorable effect on NPLs and financial stability during the second wave of the Fintech age. This book aids in understanding how Fintech have evolved in contemporary society and the significance of its upheaval in both developed and developing nations.

Also, Lui et al. (2022) examined the effects of digital technology in China's labor, product, and credit markets on equilibrium outcomes. The authors showed that fast e-commerce growth results in a decrease in product prices and an increase in the volume of product transactions, and that digital development is excellent for both job growth and wage increases. Although it is uncertain how the adoption of Fintech will affect loan interest rates, we find that banks' lending operations will grow as a result of their close relationship with the digital economy. These theoretical conclusions are often in agreement with reliable observations of China.

In addition, Katsiampa et al. (2022) examined the financial performance listed financial technology banks which were 25 lenders and 40 exchange-traded banks in China at this pivotal time. Traditional banks faced a variety of challenges, including rising operating expenses, narrowing profit margins, and deteriorating credit quality. The bank performance balanced in second half of the research time from 2018 to 2019, after a time of deterioration, in accordance with a process of adaptation. Increasing commercial expenditures for financial technology providers throughout the research period are another conclusion of the study. During this time, there was a noticeable decline in the Special Mention and Non-Performing Loan ranks of online lenders. Smaller companies with fewer opportunities for expansion and more foreign ownership

performed the lowest in terms of prudential standards within the typical bank group. Since their initial public offering (IPO), traditional banks have performed worse financially and prudentially. State-owned lenders performed more resolutely than joint-stock commercial, city, and rural banks, particularly in terms of asset quality.

The study found a significant moderating impact of diversification on the association between Fintech investment and bank asset quality. The implication is that diversification does affect the relationship between Fintech investment and bank asset quality in Sub-Saharan Africa. Here, the introduction of diversification into the model as a moderator increased the marginal effect. Therefore, diversification exerts a moderate but significant effect on how investing in Fintech helps reduce non-performing loans, thereby raising the asset quality of the banks. As predicted by the Schumpeterian innovation theory, diversification can result in banks cooperating or collaborating with Fintech firms to build competitive credit products aimed at improving asset quality. Findings and recommendations from several other empirical studies (Abdullah et al., 2019; Bai & Uri, 2021; Chen et al., 2016; Demid, 2021; Ghosh, 2018; Githaiga, 2020; Haabazoka et al., 2021; Jakubik & Kadioglu, 2022; Kaur & Bapat, 2021; Mostak, 2017; Taylor, 2022) point to the importance of diversification in improving bank soundness indicators such as asset quality. For instance, Taylor (2022) determined whether diversified and less risky banks performed better amid the pandemic. This research shows that amid tightened credit conditions and deteriorating asset quality induced by the pandemic economic hardships, credit risk adversely affected bank performance. However, income diversification is positively related to performance and offers alternative means of enhancing sustainable performance.

According to Kaur and Bapat (2021), banks are now under pressure to improve both their performance and asset quality. Their performance may be enhanced by revenue diversification at a time when interest earnings are under pressure. According to the study, banks that diversify into non-interest revenue may expect to earn greater risk-adjusted returns. It is discovered that dividend and treasury income contribute significantly to risk-adjusted return for public sector banks.

According to Bai and Uri (2021), the 2008 financial crisis exposed several flaws in the investment banking industry as well as the need to modify some novel approaches to the newly developed economic and financial environment. One of the factors contributing to the Great Financial Crisis, according to some financial professionals, is the financial innovation known as securitization. Although the securitization model is sometimes linked to the beginning of the financial industry crisis, its advantages, together with some flexibility and greater process control at all procedural levels, far outweigh any perceived disadvantages.

By examining the following issues, Demid (2021) examined the connection between the banks' credit risk and macroeconomic circumstances: (i) How do macroeconomic shocks affect lending risk based on the characteristics of the bank? (ii) Do loan portfolios in different economic sectors experience macroeconomic shocks in different ways? Contrary to popular belief in the literature, the empirical approach takes into account the variety and diversity of the banks' borrowers. The findings imply that there is significant variation in the magnitudes and timing of credit quality declines in different business sectors and bank characteristics, which is influenced by both macroeconomic and bank-specific variables. The authors discovered substantial evidence of the cyclical sensitivity of loan quality in particular, and they discovered that around one-fourth of banks' NPLs rise faster in reaction to shocks to GDP, the exchange rate, interest rates, and

profitability. The more successful banks have a tendency to take fewer unnecessary risks, which leads to reduced NPLs; however, for the sample, there is no correlation between asset size and NPLs. The fluctuation of NPLs in the commerce and mining industries is mostly explained by a growth shock. Similar to this, the manufacturing sector's NPLs are mostly caused by the exchange rate shock, whereas the NPLs in the construction sector are primarily caused by the loan supply shock. The two variables that have the greatest impact on NPLs for consumer loans are the interest rate shock and the exchange rate shock. Last but not least, the feedback impact of NPLs demonstrates how declining credit quality hinders economic development.

Examining whether income diversity modifies the link between human capital and bank performance was the goal of Githaiga (2020). The research concludes that human capital and income diversity have a considerable impact on bank performance, although the causal relationship is not always clear. Diversifying income has a negative impact, but human capital has a beneficial impact. Furthermore, the interaction term implies that diversifying has inverse and substantial impact on performance of a bank, which is in opposition to the link between Performance of banks and human capital. Asset quality and liquidity were deployed as the control variables. It has a detrimental effect on performance of banks. Future research may employ qualitative evaluations since human capital was quantified as human capital efficiency, a quantitative measure of human capital. The study concentrated on East African banks, but future researchers may take other areas and sectors into account, to provide greater information. The findings of this article provide insightful information. The influence of quality workforce on the outcome of banks performance and for increasing investment in the development of human capital may be better understood by bank management. The report also warns bank managers that participating in non-lending

activities may reduce performance by eroding the economic worth of human capital. The report also urges authorities to address the barriers to banks' revenue diversification, such as loosening restrictions on it. By doing so, banks may be able to leverage associated financial service operations for the best possible use of human resources and increase profitability. The current study examined both the direct impacts of workforce and income variation on bank performance as well as the moderator effects of diversification of income on the relationship between human capital and the effectiveness of East African banks.

Ghosh (2018) investigated the factors that contribute to loan charge-off rates. The approach used in the research is panel data fixed-effects estimation. Charge-off rates are decreased by increased regulatory capital, increased diversity, increased earnings, and cost effectiveness. A higher proportion of real estate loans and loans in a bank's asset portfolio, on the other hand, has a negative impact on loan performance. Strong macroeconomic fundamentals in the US also lower loan charge-offs. The most vulnerable to changes in the balance sheet are real estate loan charge-offs. According to Basel III regulations, the data highlight how crucial it is for banks to have enough capital. Greater tier-1 capital prevents banks from engaging in riskier lending activities, which enhances the performance of their loans. Additionally, it's critical for banks to retain a diverse revenue source and achieve increased profitability. In order to enhance loan performance, management inefficiencies that result in increased non-interest expenditure must be addressed. Fewer studies have focused on loan performance, despite a growing body of research that has looked at the underlying variables that influence subpar loans in the USA and worldwide. Understanding the variables that influence loan charge-offs is essential from the standpoint of banking regulation and promoting financial stability in order to pinpoint the pathways via which

loan performance may either get worse or better. Understanding subpar loan performance will help us foresee the risk of bankruptcy.

The study found a significant effect of ownership structure as a moderator on the association of Fintech investment and bank asset quality in Sub-Saharan Africa. Introducing ownership into the model as a moderator increased the marginal effect. Therefore, ownership structure exerts a moderate but significant effect on how investing in Fintech helps reduce non-performing loans, thereby marginally raising the asset quality of the banks. This finding is consistent with the assertion in the agency theory that corporate governance dimensions such as ownership structure affect banks' soundness indicators such as asset quality as well as overall performance. Several other empirical studies (Arrawatia et al., 2019; Ben & Kenzari, 2020; Cheng et al., 2016; Dar, Mathur, & Mishra, 2021; Dong et al., 2017; Gupta & Sharma, 2022; Skaa, 2021; Tarchouna et al., 2022) point to this prediction.

For instance, Skaa (2021) analyzed shareholders' impact on the formulation of loan portfolio which are voluntary vis a vis the applicants average income. State and foreign banks generate more voluntary loans as compared to local owned banks by private investors. While state banks often do not do discretionary income smoothing, foreign banks utilize LLP to do so. Banks owned by foreign owners are more prevalent with highly profitable banks and poor asset quality. Foreign low-profit banks that operate in shaky economic environments don't produce more voluntary LLP as compared to banks owned by private investors locally. It indicates comparable risk to that of locally owned banks, at least in terms of credit. Following the financial crisis, banks owned by foreigners and government owned banks have both exercised excess caution compared to banks, and their voluntary LLP is higher. The author offered proof that LLP policy in banks is impacted

by foreign and government ownership. This adds to earlier findings about the variations in loan persistent risk exposure across foreign, state, and local private banks.

Additionally, Tarchouna et al. (2022) investigated how well banks' corporate governance may help them cut down on non-performing loans. The main conclusion of this study is that tiny banks have a poor and unstable corporate governance framework, which negatively affects the quality of their loans. This outcome may be attributed to Tiny Banks' emphasis on interpersonal relationships. According to our observations, medium-sized banks have a strong corporate governance framework. It is important to note that company supervision and direction mechanisms of major banks have been neutralized. Large banks are engaging in excessive lending practices owing to the high level of liquidity, oblivious to the resulting unjustified losses. This research makes a significant contribution to the financial literature by experimentally demonstrating that bank size affects the corporate governance of banks' loan quality.

Ben and Kenzari (2020) looked at the key causes of non-performing loans and discovered that macroeconomic and bank-specific variables may both be held responsible for the decline in asset quality. The association between the liquidity risk and the nonperforming loans of banks from Tunisian is positive. These variables "revolution" have a positive but insignificant association. The results also highlight the robustness of Tunisia's macro financial feedback loops. Regarding the impact of the revolution's positive shock about the asset quality level, it is large and adverse. The data was divided sub data: pre- and post-revolutionary, allowing it to be shown that capital has a favorable impact on NPLs while ROA and ownership structure have a negative and substantial impact. It seems that bank-specific variables, particularly in the post-revolutionary era, adequately

explain the volatility of NPLs. Last but not least, we have shown via descriptive research COVID-19 problem give details about the variations in nonperforming loans held by the banks in Tunisia.

4.9 Chapter Summary

Chapter four presents an interpretation of the findings and discussions in response to the study's objectives. It covers the descriptive statistics of the study variables. The chapter also covers correlational matrices and VIF. The analysis in response to the study-specific objectives is presented in the Chapter. The chapter also contains a discussion of the findings.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Chapter Five presents a summary of the study including the methodology and the findings generated from the study. The conclusion is drawn from the summary, and then recommendations are made for policy and future research. The study seeks to examine the effect of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan African countries. Precisely, the research studied the effect of Fintech investment on bank asset quality; assess how diversification affects the relationship between Fintech investment and bank asset quality; and investigate how the type of ownership of a bank affects the relationship between Fintech investment and bank asset quality.

5.2 Summary

The study seeks to examine the effect of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan Africa countries using the dynamic panel model of the GMM estimator. The target population for the study of Fintech, diversification, ownership, and bank asset quality included banks in Sub-Saharan Africa that are listed on their country's stock exchange market. The study adopted the use of secondary information obtained from yearly financial reports of listed banks (using the purposive sampling technique) with a sample interval of a ten-year period from 2011 to 2020.

The study found a significant negative relationship between Fintech investment and non-performing Loan (bank asset quality). Here, it can be established that increasing Fintech investment has a huge impact on reducing non-performing loans of banks. This implies that the higher the levels of Fintech investment by banks, the lower the levels of their NPLs will be. On the other hand, the lower the levels of Fintech investments by banks, the higher the levels of non-performing loans will be. Therefore, banks' engaging in more Fintech investment has the propensity to improve the banks' performance in terms of asset quality in Sub-Saharan Africa, all things considered.

The study found a significant impact of diversification as a moderator on the association between Fintech investment and bank asset quality. The implication is that diversification does affect the relationship between Fintech investment and bank asset quality in Sub-Saharan Africa. Here, the introduction of diversification into the model as a moderator increased the marginal effect. Therefore, diversification exerts a moderate but significant effect on how investing in Fintech helps reduce non-performing loans, thereby raising the asset quality of the banks. Diversification can result in banks cooperating or collaborating with Fintech firms to build competitive credit products that improve asset quality.

The study found a significant impact of ownership structure as a moderator on the association between Fintech investment and bank asset quality in Sub-Saharan Africa. Introducing ownership into the model as a moderator increased the marginal effect. Therefore, ownership structure exerts a moderate but significant effect on how investing in Fintech helps reduce non-performing loans, thereby marginally raising the asset quality of the banks.

5.3 Conclusions

The study sought to investigate how banks' investments in Fintech contribute to great asset quality as well as the intervening effects of diversification and ownership structure. Globally, recent developments in Fintech and digital technology are putting the banking sector under potential threat. This transformation is the result of a number of indicators, including financial integration, technological advancement, the need for new business models, and rivalry among service providers to fulfill growing customer demands. The banking industry is moving toward operational innovation as a result of the financial technology industry's rapid growth in order to obtain a lasting competitive edge (Zhao et al., 2019).

The finding points to a strong negative relationship between Fintech investment and non performing Loan (bank asset quality). The study also found a significant effect of the lagged form of non-performing loans as a percentage of total loans, which suggests that Fintech investment is persistent in the sampled banks. Overall, banks in Sub-Saharan African countries can invest heavily in Fintech innovations, which have the potential to improve their soundness performance in terms of asset quality.

The study also concludes that there exists a significant moderating effect of diversification on the association between Fintech investment and bank asset quality. The implication is that diversification does affect the relationship between Fintech investment and bank asset quality in Sub-Saharan Africa. Diversification can result in banks cooperating or collaborating with Fintech firms to build competitive credit products that improve asset quality. As a result, diversification

has a moderate but significant impact on how investing in Fintech helps reduce non-performing loans, thereby improving the asset quality of banks in Sub-Saharan Africa.

The study found a significant moderating effect of ownership structure on the association between Fintech investment and bank asset quality in Sub-Saharan Africa. Introducing ownership into the model as a moderator increased the marginal effect. Therefore, ownership structure exerts a moderate but significant effect on how investing in Fintech helps reduce non-performing loans, thereby marginally raising the asset quality of the banks in Sub-Saharan Africa countries.

5.4 Recommendations

The study seeks to examine the effect of Fintech, diversification, and ownership from a cross-country perspective on bank asset quality with evidence from Sub-Saharan African countries. The findings in response to the underlying issues can become the bedrock for policy, practice, and research purposes.

The discovery of this significant relationship between Fintech investment and bank asset quality, suggests that policymakers should implement policies that encourage banks to increase their investment in financial technology such as internet banking, mobile money, MPESA, information system, cybersecurity among others. This would ensure that their assets' quality is high and enhanced.

Furthermore, based on the findings of the significant relationship between Fintech and asset quality, banks and bank managers should make decisions to ensure that banks invest in financial innovations and technology in order to reap the associated benefits on bank assets.

With the intervening effect of diversification, policymakers should implement policies that will enhance and promote the growth of the Fintech industry through investment in internet banking, information systems, cybersecurity among others to provide an opportunity for the banks to take advantage and enjoy the benefits.

When considering Fintech investment, banks and bank managers should consider the intervening effect of diversification and corporate governance practices and dimensions. An effective consideration and implementation of discussion in that regard will ensure that the banks enjoy the benefits of quality bank assets, which lead to growth.

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APPENDICES

Appendix A 1: Variance Inflation Factor

Variable	VIF	1/VIF
CIR	8.91	0.112209
LEV	6.22	0.160796
NIIT	4.33	0.230781
LIQ	3.66	0.273324
ROA	3.63	0.275789
log_FINT SCORE	3.54	0.282497
GPD	2.94	0.340364
Mean VIF	4.75	