ANTECEDENTS AND OUTCOMES OF FINANCIAL STABILITY OF BANKS

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Abstract

Financial stability of banks has become a critical factor for shaping the economic development and growth of a country. As banks have assumed the central position in the modern economic system, it has become necessary to closely watch their operations and anticipate the vulnerabilities which may arise and disturb the entire economic environment. Within this background, this study was conducted to know the level of financial stability of banks working in Pakistan. Based on data of 21 banks of Pakistan from 2007 to 2022, this study seeks to identify and report the bank specific factors shaping financial stability of banks. Specifically, this study examines financial stability of banks through the CAMELS framework and macroeconomic factors. In the first step, through Z Score, the financial stability of banks is estimated, and the relative ranking of the banks in terms of financial stability is presented. After this, using GMM estimation technique, the effect of bank specific variables on financial stability is examined to know the factors shaping the structure of financial stability in Pakistan. The results indicated that capital adequacy, earnings, financial inclusion and bank size have significant impact on the financial stability of banks. This study also examines the effect of financial stability on the financial performance and market confidence of banks and results indicated that both outcome variables have positive relationship with the financial stability. Apart from bank specific factors, this study also seeks to document the impact of macroeconomic factors on financial stability of banks. Using ARDL technique for estimation, the results indicated that the GDP growth rate, remittances and exchange rate significantly affect the financial stability of banks. Based on the results, the study recommends strong emphasis on capital adequacy and earnings of banks so that financial stability may be ensured for the stakeholders. Along with this, this study also recommends keeping strong regulatory checks on the financial inclusion & financial innovation practices which, if not properly evaluated, may adversely affect the financial stability of banks. This study provides a much-needed analysis for the policy makers and banking industry to carefully examine the levels of financial stability and understand the bank specific and macroeconomic factors which may affect the financial stability of banks.

Keywords: Financial stability, banking soundness, CAMELS, asset quality, liquidity of banks, outcomes of financial stability, financial inclusion, risk management

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CHAPTER 1: INTRODUCTION

1.1 Background of Study

The financial system is the most important pillar of the modern economic system in this age of globalization. The financial system consists of financial institutions and markets that play a central role in the conduct of economic transactions and financial dealings. The central role of financial institutions in facilitating the flow of goods and services is evident and is strongly acknowledged by various classes of individuals, businesses and government. A country is said to have significant financial development if adequate institutions and mechanisms exist for depositors, investors and businesses to conduct their transactions smoothly. The importance of financial development was highlighted by Schumpeter (1911) who linked the economic growth of a nation with the level of financial development in a country. For economic and financial development, the presence of a dynamic and resilient financial sector is the basic requirement of a modern economic system.

A financial system consists of two types of financial institution: banks and non-banks. Banks are financial organizations established to take deposits from the public and lend or invest a part of these deposits to the businesses and government. The non-bank financial institutions also perform financial functions to another group of people, usually in the field of leasing, investments, mutual funds etc. Within a financial system, banks perform the role of an intermediary between providers of funds and users of the funds in an economy. This role of financial intermediation of banks was examined by Mckinnon and Shaw (1973) who called for considering the importance of intermediary role of banks and other financial institutions that connect borrowers and savers. By doing this, the banks act as an intermediary that take savings of public in the form of deposits and turn these funds into productive investments as discussed by Levine (1997).

The evolution of banking in modern times has profoundly affected the nature of business operations and performance of transactions. The banks now offer various kinds of accounts to the depositors, develop various kinds of lending options, facilitate businesses by collecting revenues on their behalf and making payments to multiple vendors. This practice of enhancing banking services to individuals and businesses has resulted in an increase in bank deposits, lending, investments and profits across different regions of the world. The banks now have assumed the central role in modern economies by offering multiple services to their customers.

However, with the growth of banking services, depositors and borrowers are facing new kinds of corresponding risks. These risks include liquidity risk, credit risks, foreign exchange risks and operational risks that may significantly undermine the stability of banks and other financial institutions. Kindleberger (1978) and later Minsky (1992) warned that the financial instability of banks negatively affects economic growth and development. The stability of financial institutions, including banks, has become a crucial factor in the economic health of a nation. An unstable banking system may erode the trust of depositors resulting in bank runs and panic selling of shares of banks on the capital markets. Along with that, financial instability may enhance the risks of insolvency, bank failures, lack of credit provision etc. These factors of financial instability may spread to the other sectors of the economy leading to the risks of bank default, insolvency and bank failures which can significantly affect financial stability of banks leading to vulnerabilities in the overall economic system.

For the efficient working of the financial system, financial stability is the most important factor as suggested by Schinai (2004) who called for keeping a strong check on different aspects of financial stability as a stable financial system responds to market vulnerabilities and challenges in an effective manner resulting in efficient resource allocation. The World Bank (2004) has described financial stability as follows:

"A stable financial system is capable of efficiently allocating resources, assessing, and managing financial risks, maintaining employment levels close to the economy's natural rate, and eliminating relative price movements of real or financial assets that will affect monetary stability or employment levels. A financial system is in a range of stability when it dissipates financial imbalances that arise endogenously or as a result of significant adverse and unforeseen events."

The above definition refers to the financial stability of the financial system of a country. As per this definition, a stable banking system accepts deposits and grants credit to the most productive sectors of the economy. At firm level, the concept of financial stability refers to the ability of a bank to withstand credit, liquidity and market risks and to provide consistent services to the customers. Since a bank is a financial intermediary acting between the depositors and borrowers, the management of cash inflows and outflows is critical by maintaining the adequate level liquidity and capital. The prime responsibility of a bank is to safeguard the funds collected from the depositors by applying the useful risk management criteria for extending credit and making investments. Along with this, the financial stability of a bank is also

explained by the recovery of outstanding loans within the due time and the capacity of a bank to generate sufficient returns for the investors.

There have been many attempts to measure financial stability of banks at aggregate level and firm level. For example, the IMF developed Financial Soundness Indicators (FSIs) that attempted to measure the different dimensions of financial stability. Similarly, the European System of Central Banks (ESCB) examined the banking stability aspects and issues an EU Banking Stability Report in 1999. Some other researchers such as Illing and Liu (2003) developed a financial stress index by including the different dimensions of financial instability. Another effort was made by the Central Bank of Turkey developing a financial strength index in 2006 for measuring the health of its financial sector based on multiple financial indicators. A study Van den End and J. W. (2006) developed a Financial Conditions Index for assessing the financial stability of the banking sector of Netherlands. Similarly, Geršl (2006) developed a financial stability index for the banking sector of Czech Republic. Another significant effort was made by Kočišová and Stavárek(2015) who worked on developing a Banking Stability Index (BSI) based on financial stability index methodologies for the ten countries that joined European Union. In the same way, Babar et al. (2019) worked on the development of financial stability index for the financial sector for the period from 2001 to 2010.

However, the phenomenon of financial stability is shaped by the presence of multiple factors. Generally, financial stability of banks is influenced through both bank specific and macroeconomic factors. Bank specific factors that affect the level of financial stability are studied and reported by Morales and Estrada (2010), Vo et al. (2019), Pham et al. (2021) and Kharabsheh and Gharaibeh (2022). These factors include capital adequacy, asset quality, management quality, earnings, liquidity and sensitivity to market risk (together called CAMELS factors). Confirmed by studies such as Ozili (2019), Gupta and Kashiramka (2020) who checked the relationship among the various bank specific variables and reported that bank stability is significantly affected by the non-performing loans, capital reserves, level of liquidity, bank size and profitability. Van den End and JW (2006) stated that the financial stability of the banking sector implies the maintenance of a sound financial position (net assets base) and consistent income flows (net profit base) within the accepted risk base.

Within the context of CAMELS factors for banks, the link between capital adequacy and financial stability is examined by many researchers including Berger, Herring, and Szegö (1995) who reported that the level of capital adequacy has a crucial role in absorbing business

losses and protecting depositors of a bank. In another similar study, Berger and Bouwman (2013) checked the relationship between capital adequacy and bank performance during financial crises and observed that banks with higher capital levels performed better in financial terms during financial crises by managing their credit supply and reducing the probability of financial distress. A study by Kashyap, Tsomocos and Vardoulakis (2020) formulated a theoretical model to assess the impact of capital buffers on financial stability of banks. The same argument is explored in a recent study by Berger and Roman (2022) who investigated the effectiveness of higher capital adequacy ratios in the aftermath of the global financial crisis and recommended that high level of capital adequacy enhances the capacity of a banks to successfully face financial distress.

Along with capital adequacy, the asset quality also significantly affects the financial stability of banks. Many researchers have explored the relationship between asset quality and financial stability. For example, the research work of Ezeoha (2011), De Bock and Demyanets (2012) and Swamy (2012) who examined the impact of asset quality on financial stability of banks. These studies checked the asset quality in terms of probability of recovery of advances and loans granted by the bank. A notable study by Alhassan et al. (2014) examined the macro-economic and bank specific factors that significantly affect the bank asset quality and reported that a decrease in the asset quality level significantly affects financial stability of banks. Another research work is conducted by Mirza et al. (2015) who studied the relationship between asset quality and financial stability and reported that financial stability is significantly affected by the worsening asset quality. Also, Arrawatia et al. (2019) examined the effect of asset quality on banks and found that asset quality strongly affects financial stability of banks.

The researchers have also elaborated the role of management quality of a bank in shaping the level of financial stability. The management quality refers to the ability of management to efficiently manage the operations of a bank. For example, a study by Fiordelisi, Ricci, and Lopes (2014) examined the relationship between management quality and bank performance in the European context and reported that a bank with a higher management quality significantly produces better financial performance in terms of profitability and efficiency. Cornett, McNutt, and Tehranian (2016) examined the data of large USA banks and found that higher management quality reduces risk taking behavior of banks and enhances financial stability of banks. The sign of high management quality in a bank is reflected through their prudent risk management practices. Similarly, Pathan and Faff (2019) investigated the influence of management quality on financial stability of banks and reported that good

management team significantly influence the fin nail stability of banks. Another work by Vallascas and Hagendorff (2020) examined the role of management quality in the stability of global banks and suggested considering it as a significant factor. A more recent study by Ferreira and Matos (2021) examined the impact of management quality on financial stability of banks in Latin America and found that the quality of management positivity affects financial stability of banks.

Similarly, earnings play an important role in financial stability of banks. The earnings refer to the net profit earned by a bank in a financial year based on its operations. The critical role of earnings in shaping financial stability of banks is examined by Dietrich and Wanzenried (2014) who worked on finding the factors affecting profitability of banks during the financial crisis. The authors reported that well-capitalized banks with lower loan loss provisions were more profitable during the financial crisis. In another study which contributed to the discussion on the role of financial stability and earnings within the European context, Bikker and Vervliet (2018) postulated that higher earnings are positively correlated with financial stability of banks and recommended that higher profitability levels enhance a bank's capacity to absorb financial shocks. A bank with a strong profit base and consistent earnings enhances its financial stability in the long run. Zhu and Chen (2019) examined the impact of earnings on the financial stability of Chinese commercial banks and reported that banks with higher ratios of ROA and ROE produce greater financial resilience during economic crises and recommended that earnings are very important for maintaining liquidity buffers for managing multiple market risks. In a more recent study, Hossain and Ali (2020) focused on South Asian banks and examined how earnings affect financial stability of banks. Their results concluded that profitable banks are more stable to withstand financial shocks. Similarly, Rahman and Uddin (2021) examined the role of earnings in financial stability of banks in Bangladesh and reported that banks with higher earnings are more financially more stable.

After earnings, another important factor is the liquidity that affects the level of financial stability of banks. Liquidity refers to the maintenance of an adequate ratio of cash and cash equivalent in the bank for meeting the operational needs. Cornett et al. (2011) examined the effects of liquidity management on bank performance and financial stability during the financial crisis and observed that banks with higher liquidity levels were more resilient during the financial crisis resulting in fewer losses for shareholders. This argument is also supported by Acharya and Naqvi (2012) who emphasized the dual effect of liquidity positions in both enhancing and undermining financial stability of banks. They reported that excessive levels of

bank liquidity can result in increased risk-taking behaviors that may negatively affect the stability of banks. A notable work by DeYoung, Distinguin, and Tarazi (2015) reported that higher liquidity levels in banks positively affect financial stability of banks, but it might also affect the profitability of banks. The liquidity level affects the operational aspects of the bank as cash inflows and outflows must be managed for the customers. A research work by Berger and Bouwman (2019) found that banks with higher liquidity levels were more financially stable and less prone to the financial crises. A recent work by Acharya and Mora (2020) who conducted a study examining the relationship between the liquidity and financial stability of European banks and reported that banks with higher liquidity levels performed better than the banks with lower liquidity levels during the financial crisis. A recent study by Chiaramonte, Croc, and Poli (2021) studied the effects of liquidity on the financial stability of Italian banks and concluded that banks with higher liquidity levels have strong levels of financial stability.

Within CAMELS' framework, sensitivity to market risk has become a significant factor in shaping financial stability of banks. The sensitivity to market risk refers to the vulnerability of a bank to face large market exposure in the event of a sudden rise in market risk. Berger and Bouwman (2013) examined how market risk exposure affects financial stability of banks during financial crises and recommended the need for effective risk management practices to manage the adverse impacts of market risks on financial stability of banks. A research study by Demirgüç-Kunt and Huizinga (2013) examined the impacts of interest rate changes on financial stability of banks and concluded that effective risk management policies regarding interest rates risk are crucial for maintaining the adequate level of financial stability of banks. The risk assessment and management has become a key factor in the profitable operations of a bank. In a similar work, Acharya and Steffen (2014) examined the relationship between bank exposure to sovereign risk and financial stability and called upon banks to diversify their sovereign risk exposures to maintain financial stability in the times of financial crises. Brunnermeier and Koby (2020) also studied the effect of sensitivity to market risks on financial stability of European banks and observed that banks with higher levels of sensitivity to market risks were more vulnerable to financial instability. Recently, Zhao and Tan (2021) examined the factors dealing with the sensitivity of Chinese banks to market risks and their effects on financial stability of banks and recommended that effective risk management policies enhance financial stability of banks.

Apart from these sets of studies, another class of studies has explored the impacts of some new bank specific constructs on financial stability of banks. One of these constructs is financial

innovation that refers to the offering of new products, services, and processes to the customers to enhance their processing time and increase efficiency of firms and individuals. The impact of financial innovation on financial stability is measured in different studies by Gai et al. (2008), Plosser (2009) and Ülgen (2013) who raised the question on the nature of financial innovation as whether it is creative or destructive. Arnaboldi and Rossignoli (2015) investigated the nature of financial innovation in the banking sector and found that disruptive innovation can unleash new risks for financial stability of banks. Similarly, González et al. (2016) explored the impact of financial innovation on bank risk and found that excessive financial innovation brings new risks affecting financial stability of banks. Another study by Chen and Du (2016) discussed the impact of financial innovation on financial stability with reference to the Chinese financial system and concluded that financial innovation may significantly affect the level of financial stability of banks. Recently, Khan et al. (2021) conducted a study to measure the effect of financial innovation and economic growth on the market risk faced by banks in the ASEAN region and reported mixed results.

The other major research area emerging in the discussion on financial stability is financial inclusion that refers to the provision of access to financial services to middle and lower segments of the population in a country. Financial stability is also affected by the level of financial inclusion in a country. Within the domain of financial exclusion hypothesis, some researchers including Han and Melecky (2013), Morgan and Pontines (2014), Mehrotra and Yetman (2015) and García and José (2016) have explored how financial inclusion affects the level of financial stability of banks. The majority opinion supported the positive impact of financial inclusion on financial stability of banks. Ahamed and Mallick (2019) evaluated the effect of financial inclusion on bank stability and observed that addition of new customers in banking system enhances the level of financial stability. A study by Pham and Doan (2020) examined the relationship between financial stability and financial inclusion and reported that not all types of financial inclusion activities support financial stability. However, a work by Vo et al. (2021) checked this link between financial inclusion and bank stability in the Asian context and advocated for increased financial inclusion to support the stability of banks.

A very critical factor shaping financial stability of banks is the income diversification that refers to the allocation of funds in wider economic sectors to optimize returns. The research in this sphere of knowledge is directed by diversification theory and earlier researchers such as DeYoung and Rice (2004), Acharya et al. (2006), Stiroh and Rumble (2006) and Chiorazzo et al. (2008) examined the effect of income diversification on financial stability of banks in

different regions of the world. A research study by Abuzayed et al. (2018) has evaluated the relationship between bank diversification and financial stability and reported that effective income diversification can increase the overall financial stability of banks. Tariq et al. (2021) also examined the effect of income diversification on financial stability of banks and reported that financial stability of banks is enhanced through an optimal diversification. Also, Adem (2022) checked the effect of income diversification on financial stability of banks in a cross-country analysis and found that income diversification has a significant effect on the financial stability of a bank.

Another significant factor is the bank competition, which also strongly affects the financial stability of a bank. Earlier studies by Allen and Gale (2004), Berger et al. (2008) and Beck (2008) examined the effect of bank competition on financial stability and reported that the extent of competition among banks significantly affects the level of financial stability. Another study by Fu et al. (2014) discussed the bank competition and financial stability in the regional context of Asia Pacific and reported that lesser competition in the market creates credit risks and financial stability of banks is compromised. Akins et al. (2016), Clark et al. (2018) and later Ijaz et al. (2020) checked the competition-stability hypothesis and confirmed the competition-stability hypothesis.

Exploring this bank size impact on financial stability, Zhang, Li, and Ma (2011) indicated that larger banks are more stable due to economies of scale and resources diversification. A similar work by Hughes and Mester (2015) observed that larger banks had better risk management practices managing their access to capital markets and contributing to their financial stability. A study by Berger and Bouwman (2017) found that larger banks were more resilient during financial crises. The same point was reported by Chiaramonte, Croci, and Poli (2019) who observed that larger banks had higher level of financial stability due to better diversification policies and wider access to financial resources in the financial system. Another study by Kim, Batten, and Ryu (2021) stressed that larger banks were more financially stable due to their economies of scale and effective risk management frameworks.

Relationship between bank ownership and financial stability is studied by Micco, Panizza, and Yañez (2ho 007) postulated that government-owned banks are less efficient but more financially stable during economic crises as compared to privately-owned banks. A study by Iannotta, Nocera, and Sironi (2013) showed that privately-owned banks had higher risk-taking behaviors compared to state-owned banks leading to lower levels of financial stability. Another

work by Barry, Lepetit, and Tarazi (2016) observed that state-owned banks were more financially stable but less profitable as compared to privately-owned banks. Research by Karim, Chan, and Hassan (2018) highlighted that state-owned banks were more stable due to government support and privately-owned banks were more operationally efficient but. A study by Liao, Jiang, and Yang (2022) observed that that state-owned banks were more financially stable due to the continuous government support and privately-owned banks had higher profitability.

Some other researchers have also looked at the macroeconomic variables that affect financial stability of banks. These include Morris (2010) who has considered the yield on govt. securities, remittances, fiscal deficit, current account deficit, M2 growth etc. as significant factors for measuring financial stability of banks in Jamaica. In the context of Pakistan, Badar et al. (2013) measured the impact of macroeconomic forces on non-performing loans and reported that inflation rate and foreign exchange rate have a significant positive impact on the level of non-performing loans. Recently, Kozarić and Dželihodžić (2020) measured the impact of macroeconomic condition on non-performing loans and financial stability in Bosnia and Herzegovina and found that the unemployment rate has the significant positive impact on the non-performing loans that significantly affect financial stability of banks. Similarly, Viphindrartin et al. (2021) checked the impacts of bank macroeconomic indicators on the resilience of the financial system in Indonesia and found that credit growth, inflation, and interest rate have significant effect on financial stability of banks.

However, it is also important to consider the implications of a particular level of financial stability for banks. A study by Wang and Liu (2021) observed that the periods of financial challenges, banks with higher financial stability produced better profitability compared to the less stable banks. Another work relating risk management and financial stability of banks by Carletti, Claessens, and Figueroa (2020) reported that digital transformation impacts risk management and financially stable banks are in better position to manage new risks posed by digitalization. In an important study, Berger, Imbierowicz, and Rauch (2016) suggested that financially stable banks are perceived as less risky by investors that increased market confidence and investment in the banking sector. One significant outcome of financial stability is the credit growth which is examined by Aikman, Haldane, and Nelson (2022) who explored how financial stability supports credit growth during economic crise and concluded that financially stable banks continue to maintain lending to their various categories of clients.

Based on the above discussion, this study seeks to explore the level of financial stability of banks and how different bank specific factors such as capital adequacy, asset quality, management, earnings (profitability), liquidity and sensitivity to market risk (CAMELS factors) affect financial stability of banks. In addition to this, this study also seeks to study the impact of financial innovation, financial inclusion, bank size, income diversification and credit expansion on the financial stability of various banks in Pakistan. For this analysis, this study calculated the Z Score for determining the financial stability levels of banks. The Z Score is the best technique for assessing financial stability of banks. Next, the CAMELS factors are added in the regression model to determine the significant predictor of financial stability of banks. The CAMELS research framework for explaining the factors that affect financial stability of banks was developed by the Federal Reserve Bank of the USA for assessing financial stability of banks.

In the next step, the bank-specific outcomes of financial stability are examined to know the implications of a particular level of financial stability. These bank specific factors include profitability and market confidence. In this stage of study, it is explained how a particular level of financial stability affects the bank specific factors. In the last stage of this study, this study attempts to explain the relationship between financial stability and macro-economic variables i.e. GDP growth rate, inflation, interest rate, remittances and foreign exchange rate. As banks operate within a wider economic framework in any country, the changes in the macroeconomic factors may affect the level of financial stability in a country. The results of this study contribute towards the existing debates on bank specific and macroeconomic factors within the wider contextual framework of financial fragility theory and financial intermediation theory.

1.2 Financial Sector of Pakistan

This research study focuses on the stability of the financial system with a view to understanding the role of different firm specific and macro-economic factors. The financial sector of Pakistan has achieved significant growth since the independence in 1947. Presently, the financial system of Pakistan in the form of the capital market, money market and the foreign exchange market are functioning smoothly facilitating the movement of funds among the individuals, firms, and households. The Government of Pakistan has established the regulatory framework for the smooth functioning of the banks and the other financial institutions. Within this regulatory domain, the banks have offered many products for business firms and individuals to meet their strategic and operational requirements.

The financial sector of Pakistan has achieved significant growth since 1947 in both banking and non-banking segments. Financial institutions and markets have developed over a period providing services to both investors and savors. The establishment of the Karachi Stock Exchange in 1948 created the capital market and later Lahore and Islamabad Stock Exchanges were developed. All these three stock exchanges are now integrated and merged into the one entity named as the Pakistan Stock Exchange. In the foreign exchange market, foreign exchange companies are licensed by the State Bank of Pakistan to deal with the buying and selling of the securities. Along with this, non-banking financial institutions in the form of leasing companies, mutual funds, investment companies, house finance companies, brokerage firms etc. are established in the private sector to strengthen the financial markets.

According to the State Bank of Pakistan (2024), the major players in the financial system of Pakistan are banks with over 75% share in the financial system and total assets around 46 trillion rupees. The other major financial institutions within the financial system of Pakistan are insurance companies with assets over Rs. 2.6 trillion offering life and non-life insurance plans to various classes of customers. The Development Finance Institutions (DFIs) are also working in the financial system of Pakistan with assets base of almost Rs. 200 billion. Along with this, Non-Banking Financial Institutions (NBFIs) have an asset base around Rs. 2.8 trillion rupees and offer their services through mutual funds, leasing, investment companies, modarabas, non-bank microfinance companies etc. The microfinance banking sector has also witnessed some improvements with an asset base of Rs 250 billion. Apart from this, the National Savings Centers owned by the Govt. of Pakistan also work in the financial system offering different kinds of savings products (certificates and accounts) and has assets around Rs.4.5 trillion and deposits Rs. 4.3 with branch network of 375 centers.

The banking system of Pakistan is comprised of commercial banks (both in public and private sector), cooperative banks, Islamic banks, micro-finance banks and specialized banks. These banks have established branches all over the country to take deposits and make lending. Under the regulatory guidance of the State Bank of Pakistan (SBP), these banks are performing their functions in the financial markets. The capital market in Pakistan is supervised by the Securities and Exchange Commission of Pakistan (SECP) and the money market is regulated by the State Bank of Pakistan. As the banks and their major functions fall into the money market, the relevant regulations are developed and enforced by SBP.

The financial sector of Pakistan is regulated by two bodies; State Bank of Pakistan (SBP) is the regulator of banking sector and exchange companies while the non-bank financial institutions are regulated by the Securities and Exchange Commission of Pakistan (SECP). The SECP also acts as the regulator of the capital market and oversees the functioning of the corporate sector. The SECP also regulates the functioning of the non-banking financial sector that includes mutual funds, leasing companies, investment companies, house finance companies etc. Additionally, the SECP also performs the functions of corporate registration and approves mergers and acquisitions. The SECP has the primary responsibility of developing regulations for the efficient functioning of the corporate sector.

The SBP working as the central bank also performs the functions of the regulatory body for the banking sector. The SBP issues banking licenses, approves financial products, develops market mechanisms for inter-bank lending, specifies capital adequacy ratios, approves geographic expansion of branches, and performs a lot of other functions for the banking sector. All commercial, Islamic, micro-finance specialized and investment banks report financial and operational matters to the SBP. The SBP sets monetary policy and provides necessary liquidity to the banking sector as per requirements.

The regulatory aspects of banking are covered through Prudential Regulations for capital adequacy, risk management and deposits/advances management. The Anti Money Laundering and Countering Terrorism Financing regulations are also implemented by the SBP in order to identify and report suspicious transactions. Recently, Basel III requirements of keeping capital buffers and maintaining additional liquidity requirements for banks are also being pursued by the SBP to strengthen financial stability of banks. The SBP publishes the Financial Stability Review, an annual report, assessing the degree of financial stability of markets and institutions. Apart from this, SBP conducts regular surveys to measure the systemic risk of the banking sector for detecting early warning signs. In addition to this, SBP conducts on-site and off-site inspections to ensure compliance with the defined rules to ensure consumer rights and identify weaknesses in the risk management system of the banks.

Table 1. A Brief Overview of the Banking Sector of Pakistan

Total Banks in Pakistan	**43**	**Key Information on Banking Sector**	
Public sector commercial banks	5	Total Assets (million)	Rs. 46,363,611
Private sector commercial banks	20	Total Deposits (million)	Rs. 29,128,202
Foreign banks	4	Total Advances (million)	Rs. 13,211,345

Specialized banks	3	Total Branches	15,998
Micro-finance banks	11	Total Profits (million)	Rs. 642,224

Source: State Bank of Pakistan (2024)

The banking sector in Pakistan has evolved since the independence of country in 1947. The Govt. of Pakistan formed the SBP in 1948 and the National Bank of Pakistan as the premier govt. bank. The private sector banks were allowed to perform their functions within the regulatory frameworks. However, in 1974, all commercial banks of the private sector were nationalized with the aim of increasing efficiency and access to the public. However, this experiment failed as the financial conditions of banks further deteriorated due to political and interventions mismanagement. Resultantly, the Govt. of Pakistan started privatizing nationalized banks in 1991 and now over 80% banks in Pakistan are in private sector.

At present, the banking sector has over 75% share in the financial system of Pakistan and has market capitalization of around 2 trillion rupees on the Pakistan Stock Exchange. Total deposits of the banking sector are around 29 trillion rupees from the different classes of customers including individuals, businesses and government bodies. The advances in the different sectors of the economy stand around 13 trillion rupees with varying maturity levels. Total assets of the banking sector have crossed the mark of Rs 46 trillion in 2023, and total branch network of banks have reached around 16,000 across different towns and cities in Pakistan. In addition to that, accounts opening through digital portals and offering services through mobile apps have increased in recent times.

Within the banking sector of Pakistan, there are five public sector commercial banks and twenty private sector commercial banks. Habib Bank Ltd. is the largest private sector bank with assets over Rs. 4 trillion and a branch network of 1700. The second major bank in Pakistan is the United Bank Ltd. with assets over Rs. 2 trillion and branch network around 1400. The third major bank in Pakistan is the MCB Bank Ltd. with assets over Rs. 1.5 trillion and branch network around 1400. The largest bank in the public sector is the National Bank of Pakistan with assets over Rs. 2 trillion and branch network around 1500. The commercial banks dominate the banking landscape of Pakistan with over 90% share in banking assets. The banking sector of Pakistan is witnessing significant growth in deposits and assets since last ten years. Along with this, the branch network of banks has exceeded the 15,000 marks in different cities and towns of Pakistan. Similarly, branchless banking networks are also experiencing significant growth through internet and mobile banking.

The commercial banks in Pakistan are listed companies at the Pakistan Stock Exchange and are regulated by the State Bank of Pakistan. The commercial banks are engaged in retail banking for individuals, corporate banking for businesses, treasury operations for managing liquidity and investments and risk management and compliance functions under the supervisions of State Bank of Pakistan. The core function of the commercial banks is to receive mobile deposits from individuals and firms by offering them different return options. Out of these deposits, loans are created for individuals, firms and government bodies at defined interest rates to generate sufficient returns for depositors and investors. The commercial banks also provide payments and settlement functions to the individuals and firms via digital and other means. Along with these functions, the commercial banks are also engaged in foreign currency management and making investments in government bonds. In the present times, the commercial banks are also offering their services through mobile applications, internet banking, ATMs and other digital modes to enhance the efficiency and effectiveness of their operations.

1.3 Banking Supervision and Financial Stability

Globally, the Financial Stability Board (FSB) was established by the G-20 after the Global Financial Crises in 2009. The mandate of the FSB is to identify, review and report on the financial vulnerabilities in the global financial system on a regular basis. Along with this, the FSB attempts to maintain the coordination among the financial sector regulatory bodies of member countries and suggests risk assessment guidelines for ensuring stability in the financial system. The objectives of FBS also include devising appropriate supervisory and regulatory responses as per the risks and challenges of financial markets and institutions. A key goal of the FSB is to maintain global financial stability through coordinated mechanism of regulatory bodies of the member countries.

In addition to the FSB, the International Monetary Fund (IMF), strongly observe the changes in the global financial system and publish the Global Financial Stability Assessment Report on bi-annual basis to report the risks and challenges in the financial system of the member countries. The IMF conducts financial stability analysis of the member countries and reports the risks and vulnerabilities of the financial system. It also guides the member countries on developing supervisory and regulatory standards for assessing the financial markets' risks and developing policy options for maintaining financial stability in the markets. The IMF also advises the financial sector regulatory bodies to adopt early warning systems for detecting the emerging risks and devising mechanisms for managing these risks through policy responses.

Another global body that deals with the financial stability of the banking sector is the Basel Committee on Banking Supervision (BCBS). The BCBS was formed to develop supervisory and regulatory standards in the form of prudential regulations for the banking sector. The mandate of the BCBS is to strengthen the regulations, supervision, and practices of banks to enhance financial stability. The BCBS also works to coordinate the sharing of supervisory guidelines and compliance regulations of different banking sector regulatory bodies. It also acts as a forum for discussion, exchange of ideas and developing consensus on emerging risks in the financial system and devising common policy guidelines and standards for maintaining financial stability. The BCBS has issued Basel I, Basel II and Basel III regulatory standards which consist of guidelines for ensuring stability in the banking sector.

The Basel III guidelines were devised after the financial crises of 2007-2008 to develop a minimum standard for capital adequacy, liquidity, and risk management. A large part of the Basel III principles deals with ensuring the financial stability of the banks that have cross-border transactions. Out of the 25 principles of the Basel III framework, 7 principles deal with asset quality matters. These standards have recommended a set of ratios to be maintained for ensuring capital adequacy, resilient capital structure and shock absorbing capacity of the banks. The Basel III framework has provided a strong set of guidelines to the national and international regulatory bodies to ensure the implementation of this framework and timely identify and report the risks in the banking sector. The Basel III guidelines are further explained in annexure 1 of this document.

The State Bank of Pakistan has adopted the Basel III guidelines for identifying and reporting the changes in financial stability of banks. These guidelines along with the existing Prudential Regulations for banks are applied to monitor the movements in financial stability of banks. Through various defined measures in terms of capital reserves, liquidity reserves etc. The SBP regularly monitors the financial stability of banks to identify potential troubled areas. The international bodies such as the IMF, FSB and Basel Committee on Banking Supervision regularly issue guidelines to the local regulatory bodies in member countries to examine the different dimensions of financial stability of banks.

The SBP is also working as a regulatory body for commercial banks and is monitoring the performance of banks through different regulatory tools to ensure financial stability. The SBP has defined the regulatory framework by specifying the minimum capital requirements for banks to ensure financial stability of banks. The SBP has also defined the cash reserve

requirements for banks to meet the liquidity and capital shortfalls in the event of financial crises. Liquidity plays a crucial role in the banking system to manage the balance of cash inflows and outflows. Along with this, SBP also manages the money supply of banks through changes in the interest rates via monetary policy. In addition to this, SBP has also issued prudential regulations for managing the asset quality, credit issuance and other operational matters of the banks. The banks are also required to report their non-performing loans and credit expansion policies to the SBP in periodic statements. The SBP also carefully monitors the financial position and performance of the banks and takes prompt action in case of abnormal losses or extreme risk exposure to ensure the financial stability of the banking system. In addition to this, the SBP conducts on site visits and inspects the financial records of the banks to ensure compliance with the issues instructions. The compliance framework of the SBP is comprehensive based on local economic factors and the guidelines of the global bodies such as the Basel III banking supervision framework.

The SBP has also issues guidelines on currency management and foreign exchange management for the banking sector. For the enforcement purposes, the SBP through its field offices across Pakistan, conducts on-site and off-site inspection of the banking institutions to ensure the compliance with the prudential regulations and other directives as issues from time to time. The banking sector and specially the commercial banks are heavily regulated in Pakistan with strict implementation mechanism and penalties are imposed on banks for any violation of the issued instructions. To develop a stable and healthy banking system, SBP has also instructed banks to implement the Know Your Customer (KYC) requirements to obtain the necessary details of the depositors and the borrowers to detect and trace the flows of funds in the banking system. The SBP also regularly monitors the capital adequacy ratio of banks, liquidity reserves of the banks, leverage ratios and the net stable funding ratios to meet the long-term liabilities. The banks are also required to periodically report their financial statements to the stock exchange for the investors and other stakeholders' information. The format and structure of the financial statements of the banks is based on the guidelines issued by SBP to the banks for reporting the material information to the stakeholders. The SBP actively monitors these aspects of the banks to ensure financial stability of banks to protect the depositors and ensure a healthy financial system for all stakeholders.

The SBP has specially established a financial stability department for dealing with all aspects of monitoring and managing financial stability. Since the SBP regulates the banking system under the State Bank of Pakistan Act (1956) and along with the SBP Vision 2010 also requires

the close monitoring of the health of the banking system, the formation of this department was required. The financial stability department of SBP strictly monitors the multiple aspects related to the financial stability of the banking system and reports the early warning signs to the higher authorities. Along with this, the financial stability department is also engaged in designing a framework for financial stability of the banking system, developing financial crises management framework, updating the supervisory framework of the banking system and the identification of the anticipated troubles in the banking system.

1.4 Problem Statement

Financial stability of banks poses a significant challenge in the diverse financial landscape of the 21st century. Despite monitoring measures by regulatory bodies and bank specific risk management practices, banks across the world continue to face bank specific and economic vulnerabilities that threaten their financial stability and resilience. The root of the problem lies in the complex and interconnected nature of the banking system, which is experiencing evolving market conditions and emerging risks, especially in the developing countries. Many bank specific factors including insufficient capitalization, inadequate risk assessment, low asset quality, volatile earnings, liquidity and exposure to external shocks have the potential to destabilize the individual banks which can imply the financial shocks to the whole financial system. Many researchers have worked on these aspects of financial stability such as Barth, Caprio and Levine (2004), Allen and Wood (2006), Beck, Demirgüç-Kunt, & Levine (2010) and. Some useful studies in different domains of the financial stability of banks were contributed by Kočišová and Stavárek (2015), Nasreen and Anwar (2018), Ozili (2018), and Gupta and Kashiramka (2020). With rapid technological improvements such as the growth of digital banking and fintech innovations has brough new complexities and risks in the financial system that require immediate attention. Along with technological factors, financial inclusion has also become a core factor as countries such as Pakistan where a significant portion of population is not included in the formal financial system.

Despite the adoption of Basel III framework for banking supervision by the SBP, the financial stability in the banking sector of Pakistan remains critical due to the bank specific (i.e. non-performing loans, capital inadequacy etc.) and macroeconomic factors (exchange rate depreciation, interest rate volatility etc.). As the banks have central position in the modern economic system, the practical consequences of inadequate financial stability in banks are far-reaching for the entire economic system. These implications include a reduced ability to fulfill core functions such as deposits mobilization and lending management, increased systemic risk

and significant damage to the public trust in the banking system. Along with these implications, financial instability also creates a trust gap between the depositors and the borrowers, which affects the overall position of the banks in the economic system. Since banks have assumed the key position in the overall economic and financial system, a close observation of financial stability of banks is required for the smooth functioning of the economy.

Therefore, despite the work of earlier researchers, a comprehensive understanding of the bank specific and macroeconomic factors is required to be developed within the context of Pakistan for examining financial stability of banks. Using new estimation techniques and a larger data set of Pakistani banks, this study fulfills the critical gap of highlighting bank specific and macroeconomic factors which shape the financial stability of banks. Additionally, fostering financial innovation and promoting financial inclusion while ensuring the security and resilience of banking systems is critical to maintain public trust in the financial system. There is an immediate need to address the issue of maintaining an adequate level of financial stability of banks as failure to do so may result in severe disruptions to the economy, financial system with long-term negative effects on savings and consumption of individuals and businesses. The practical challenge of ensuring financial stability and maintaining sound health of the financial institutions requires banks to adopt modern risk management tools in the face of evolving market risks, technological advancements, and potential systemic consequences for the whole financial system. Based on these factors, this study seeks to add academic contribution in reporting bank specific and macroeconomic factors shaping financial stability of banks in Pakistan using larger data set and the comprehensive econometric estimation technique through multiple dynamic models. Along with this, this study also seeks to report the effects of financial stability of banks on financial performance and market confidence of banks. A holistic and proactive approach considering both bank specific and macroeconomic factors is essential to safeguarding the banking sector and maintaining its crucial role in supporting economic growth and stability.

1.5 Research Questions

This research study seeks to address the following research questions.

i. What is the level of financial stability of banks in Pakistan?
ii. What is the impact of CAMELS factors on the financial stability of banks?

iii. What is the effect of other bank specific factors (non-CAMELS) on financial stability of banks?
iv. How macroeconomic factors affect the financial stability of banks in Pakistan?
v. What is the impact of financial stability of banks on financial performance & market confidence of banks?

1.6 Research Objectives

This research study has the following objectives;

i. To assess the level of financial stability of banks operating in Pakistan
ii. To evaluate the impact of bank specific factors (CAMELS and Non-CAMELS) on financial stability of banks in Pakistan
iii. To examine the impact of macroeconomic factors on financial stability of banks
iv. To ascertain the effects of the level of financial stability on the financial performance & market confidence of banks.

1.7 Research Scope

The major purpose of this study is to bring a set of recommendations for the banking industry participants and regulatory bodies to assess the impact of bank specific factors such as capital adequacy, asset quality, liquidity, management quality etc. on the financial stability of banking sector. The practical application of this research may help the bankers and other industry stakeholders to predict vulnerabilities in the financial markets and observe the effect of enhancing the access of financial services to the new class of customers on financial stability of banks. Along with that, this study can help the industry leaders in identifying the different aspects of asset quality, capital adequacy, income diversification and bank size on the financial stability of banks. Specifically focusing on the commercial banks, this study seeks to identify and report the major bank specific and macro-economic factors shaping the level of financial stability in Pakistan.

This study will also help the government bodies in assessing the impact of macro-economic factors like GDP growth rate, interest rate, and foreign exchange rate on the level of financial stability of the banking sector. Accordingly, this study aims to highlight bank-specific factors that may significantly affect the financial stability of banks. Lastly, this study can help the policy makers and industry participants to ascertain the appropriate level of financial stability

of banks and consider the possible implications of a particular level of financial stability on different bank specific factors.

Lastly, the key purpose of this study is to empirically observe the factors which significantly affect the relative financial stability of banks in the banking industry of Pakistan. Once these factors are identified, the management of banks and the regulatory bodies can be guided by paying close attention to the impacts of changes in the capital adequacy ratio, asset quality of banks, the quality of management operating the banks, liquidity reserves, profitability of the bank and the risk management system. The stakeholders of the banking system may be asked to understand the long-term behavior of critical factors which significantly contribute to shaping financial stability of banks. Apart from the macroeconomic factors, it is crucial to understand the bank specific factors which can be observed for understanding changes in financial stability.

1.8 Significance of Research

This study attempts to highlight the role of bank specific factors on the level of financial stability of banks. The existing research on financial stability of banks within the theoretical framework of financial intermediation theory and financial fragility theory contextualize the relationship among financial stability and the bank specific factors. Specifically, this study seeks to debate financial fragility theory by examining the implications of capital adequacy, liquidity, asset quality, earnings, management quality, financial inclusion and financial innovation on financial stability of banks. Similarly, the effects of changes in bank size and income diversification on stability of banks are examined within the context of financial intermediation theory. Along with this, the existing debate on the financial intermediation theory is expanded by examining the impact of credit expansion on financial stability of banks. Overall, this study cross examines the role of bank specific factors including financial innovation, financial inclusion, sensitivity to market risks and credit expansion on the level of financial stability in the banking sector by controlling for bank specific factors. In addition to this, the impact of macroeconomic factors such as the GDP growth, inflation, interest rate etc. on the financial stability of banks is studied within the framework of financial intermediation theory. Additionally, this study also highlights how the different factors such as the financial performance and credit expansion are affected by a particular level of financial stability of banks.

The practical significance of this research is to develop a set of guidelines for the stakeholders of the financial system; regulatory bodies, government, consumers etc. for understanding the impacts of different bank specific factors on the level of financial stability of the baking sector. These guidelines will include the necessary information on estimating the links among the bank-specific factors such as capital adequacy, liquidity, quality of management, profitability, financial innovation, financial inclusion, asset quality, income diversification and credit expansion on the level of financial stability of banks. Along with that, this study also considers the role of macro-economic factors such as GDP growth rate, interest rate, inflation rate, and foreign exchange rate with respect to financial stability of banks. A significant contribution to this study will be to check the impact of a particular level of financial stability on financial performance and the market confidence of banks. The findings of this study will be helpful for regulatory bodies, industry participants and customers to predict and analyze the antecedents and outcomes of financial stability of banks.

Balancing both academic and practical aspects, this study seeks to contribute to the existing knowledge base of the theoretical aspects of the financial fragility theory and the financial intermediation theory. Both theories attempt to explain the changes in the levels of financial stability of banks which occur due to the abrupt movements in the bank specific factors such as capital adequacy, liquidity position, non-performing loans, risks management and macro-economic changes such as inflation, policy rate and foreign exchange rate determination. Since a bank is a service-oriented business whose operations are based on the deposits of the customers, it is crucial to maintain a reasonable level of financial stability to avoid the loss of trust of the customers.

1.9 Research Delimitations

This research study is limited by study timeframe, sampled banks, selected financial market, use of historical data, and empirical nature of econometric model. The data on variables of study is of secondary nature and comprises mostly of historical nature. Along with that, other factors such as regulatory restrictions, bank frauds, mergers and acquisitions, government interventions etc. are beyond the scope of this study. The sample is taken from the Pakistani 21 banks which represent almost 90% of deposits of the banking sector. The microfinance banks, investments banks, specialized banks and foreign banks were excluded due to their different nature of operations and limited presence. The data period for the study is 2007 to 2022 which covers a significant time frame for studying the changes in different bank specific and macroeconomic variables including financial crises of 2007-2008 and the pandemic related

after-effects on the banks. Along with this, the data collected is from the financial statements of banks which are of the historical nature. For macroeconomic factors, the nature of data is a time series which may have some inherent issues while running regression for estimation. The time frame of study is sufficient to ensure adequate data required for econometric estimation techniques.

1.10 Chapter Summary

This chapter discussed the evolution of the concept of financial stability over the different time periods with reference to the banking sector. Financial stability of banks is influenced by both macro-economic and bank specific factors. This chapter also briefly introduce the financial institutions of Pakistan and discussed the different types of financial institutions working across the country. A special emphasis was placed on the structure and working of the commercial banks in Pakistan which dominate the financial sector. Along with this, the regulatory aspects of the financial stability were also discussed within the broader framework of Basel III and the State Bank of Pakistan. Covering bank specific and macroeconomic factors that shape financial stability of banks, this chapter briefly developed the outline of this study. A detailed note is provided on the regulatory aspects of the SBP for ensuring financial stability of banks. In addition to this, the research questions and objectives related to the antecedents of financial stability and its outcomes were also added in this chapter. The problem statement along with the theoretical and practical significance of this study was described to elaborate the contribution of this study in the body of knowledge. In addition to this, practical significance and research scope is mentioned to describe the practical utility of this study for the banking sector. Lastly, the delimitations of this study were discussed to specify the boundaries and the parameters of the study variables.

CHAPTER 2 LITERATURE REVIEW

In this chapter, the relevant literature on financial stability of banks and their relationship with other bank specific and macroeconomic variables is discussed. An attempt is made to gather the latest literature across developing and developed countries on the variables of interest with a focus on empirical work. In the first phase, theoretical aspects are discussed by contextualizing financial stability within theoretical framework and in second phase empirical work is discussed. The review of literature is presented within the broader theoretical context of financial stability of banks.

2.1 Financial Fragility Theory

The conceptual development of financial stability is largely derived from the financial fragility theory that examines how vulnerabilities within the financial system can result in financial instability and distress. This theory suggests that banks and other financial institutions due to their inherent nature of operations involving leverage and liquidity transformation are prone to financial shocks. The development of financial fragility theory is attributed to Minsky (1977) who proposed the "Financial Instability Hypothesis". The financial instability hypothesis suggests that periods of economic stability led to increased risk-taking and leverage resulting in fragile financial system. This debate was further discussed by Diamond and Dybvig (1983) who explained the role of banks' maturity transformation function (borrowing short-term and lending long-term) that makes them inherently fragile and susceptible to bank runs. Another significant contribution to the financial fragility theory was added by Bernanke and Gertler (1989) research on the "financial accelerator" effect that highlighted how abrupt economic changes can affect banks' balance sheets accelerating the economic fluctuations. In the same way, another significant contribution was made by the research of Allen and Gale (2000) who extended the financial fragility theory by analyzing the impact of market liquidity and asset price bubbles on the systemic risk and bank fragility. Similarly, Acharya and Viswanathan (2011) explored the profound impact of leverage of financial institutions and the corresponding abrupt sales during the period of financial crises exacerbating financial fragility.

In recent years, an important study by Adrian, Boyarchenko, and Giannone (2020) suggested a framework to assess systemic risk by looking into the interconnectedness and leverage of financial institutions. Extending the same debate on leverage and fragility, a study by Benmelech and Bergman (2021) focused on the effect of corporate debt maturity structure on

financial stability explaining how short-term debt can increase financial fragility in banking sector.

Within the broader area of financial stability, financial fragility theory provides a framework for knowing the mechanisms and methods through which financial stability of a bank can be compromised. The research so far concluded that three factors; banks' dependence on short-term funding, high level of leverage and their interconnectedness within the financial system as key factors that contribute to their financial fragility. As a result of this, these factors make banks susceptible to liquidity shortages, asset price fluctuations, and bank runs which can have implications for the entire financial system. It is also crucial to note that higher debt levels of banks increase the risk of insolvency during economic crises and strongly affects financial stability of banks. In the same way, the interconnectedness of banks in the financial system can lead to contagion effects where the failure of one financial institution spreads its financial impact to other financial institutions.

The issue of financial fragility of the financial system carries multiple implications for the whole economic system. The stakeholders of the banking system across the world are devising strategies for mitigating these impacts of financial fragility. For example, one study by Adrian, Boyarchenko and Giannone (2020) have recommended that stringent capital requirements can mitigate these risks by maintaining sufficient capital reserves. A recent study by Laeven, Ratnovski and Tong (2022) supported macroprudential policies of the regulatory bodies that require banks to maintain high levels of liquid assets to reduce the risk of financial fragility. These studies lend support to the idea of keeping adequate capital reserves and maintaining sufficient liquidity levels to support the key banking operations in the event of an economic crisis. Overall, the financial fragility theory presents significant insights into the inherent vulnerabilities of banks and the financial system. By getting a comprehensive understanding of the mechanisms and procedures that lead to financial instability, policymakers, bankers and regulators can devise and implement measures and controls to strengthen the stability of banks and reduce the chances of financial distress.

2.2 Financial Intermediation Theory

In addition to the financial fragility theory described above, the financial intermediation theory is another significant theoretical contribution for explaining the role, functions and the importance of financial institutions in shaping financial stability. The financial intermediation theory is a significant theory within the context of financial stability of banks that focuses on

the functions of financial intermediaries (banks and other non-bank bodies)) in facilitating the flow of funds from depositors to borrowers. This theory provides a systematic framework for understanding financial stability of banks by examining their functions and the economic environment in which they conduct their operations. The earlier contributors to this debate were Gurley and Shaw (1955) who studied the role of financial intermediaries by arguing that financial intermediaries with resource pooling and diversified portfolios can reduce the cost of transactions for stakeholders and mitigate economic risks. A significant contribution was made by the study of Diamond (1984) whose model of financial intermediation examined the role of banks in evaluating borrowers through information asymmetry and enhancing overall economic efficiency. This issue was further examined by Boyd and Prescott (1986) who called for banks to act as agents on behalf of depositors to monitor borrowers leading to reduction in monitoring costs and enhancing the allocation of resources. A research study by Allen and Santomero (1988) contributed to the intermediation theory by observing the changing nature of financial intermediation considering technological advancements and increased financial market integration across the world. These classic studies considered the financial institutions as intermediaries performing necessary services for the depositors and the borrowers.

In recent times, many researchers have explored the role of financial intermediation theory in shaping financial and economic stability across the nations. Boot and Thakor (2000) checked the role of financial intermediaries in facilitating economic stability by providing liquidity and transforming risk. Also, a study by Demirgüç-Kunt, Pedraza, and Ruiz-Ortega (2020) analyzed the effect of financial intermediation on economic stability and emphasized the role of banks in delivering funds to the market participants efficiently. In the modern economic system, banks working as intermediaries allocate funds to the different economic sectors based on their potential. A study on linking financial stability and financial intermediation by Huang, Wang, and Yang (2021) explored the relationship between financial intermediation and economic resilience and recommended the importance of dynamic banking systems in maintaining financial stability during economic rises. A study by Beck, Da-Rocha-Lopes, and Silva (2022) explored the effects of regulatory changes on financial intermediation and financial stability of banks leading to producing insights into how policy actions can enhance or undermine financial stability.

The financial intermediation theory, with its theoretical approaches in multiple economic dimensions, provides an integrated framework for understanding the functions of banks and other economic players in maintaining financial stability through credit creation, risk

management and information processing. The theory of financial intermediation also emphasized the role of banks as economic agents in mitigating market distortions and enhancing overall economic efficiency. The financial intermediation theory also provides valuable insights into the mechanisms through which banks play their role in the overall financial stability of a country. By understanding the critical role of banks in the economy, policymakers and regulators can implement measures to enhance their financial stability and reduce the likelihood of financial crises.

2.3 Financial Stability

Financial stability can be defined as the absence of bank failures, or the minimization of the financial risks being faced by a bank. Schinasi (2004) defined financial stability as following:

> *"A financial system is in a range of stability whenever it is capable of facilitating (rather than impeding) the performance of an economy, and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and unanticipated events."*

The essence of this definition is the response of a financial system in the case of adverse events. A stable and dynamic financial system identifies the risks, develops useful indicators for checking performance and reporting the risks to the concerned authorities. Similarly, the strength of a financial system lies in its role to facilitate the economic growth of a country by providing liquidity, performing intermediary functions and managing the financial markets for delivering the optimal output.

The concept of financial stability has been there since the development of the modern financial system in the last 200 years. However, it gained prominence after the Great Depression in the USA in 1930s when many banks went bankrupt. As a result of this, the regulatory bodies across the world understood the importance of keeping a stable financial system. Therefore, necessary legislation and rules were developed across multiple jurisdictions to specify the parameters for maintaining a stable financial system. For example, the Glass-Steagall Act (1933) was developed to separate the banking operations into the commercial and investment banking with separate set of rules. Along with this, close monitoring and supervision of the banks were started by the regulatory bodies to examine their capital adequacy, liquidity levels, leverage ratios, risk management practices and the asset quality to ensure the soundness of the financial system. Post World War-II, the financial performance of the banks and their risk management practices were closely watched to anticipate the early warnings signs of the potential troubled

banks. The regulatory bodies and central banks across the world were strengthened and suitable laws, rules and regulations were developed to monitor and deal with the overall financial stability of banks.

Further emphasis on the financial stability of banks was placed after the Savings and Loan Crises in the USA in 1980s. The regulatory bodies of the banking industry were developing comprehensive rules for ensuring financial stability of banks. These efforts resulted in developing the Basel Accords in 1988 to create a unified set of parameters for maintaining financial stability of banks. The formation of the Basel I and Basel II frameworks resulted in the development of baseline parameters in different countries. After the Financial Crises of 2008, the Basel III framework on banking supervision was developed to introduce broader and comprehensive parameters for maintaining financial stability in the banking sector. The Basel III framework specified capital adequacy, liquidity and the leverage requirements for the banks to ensure financial stability in the banking sector.

In more empirical terms, the work on developing a framework for assessing the financial stability of a country and its financial system was started by the IMF in 1999 with the close collaboration of national regulatory bodies of different countries. This project resulted in the creation of developing an agreed set of indicators for assessing the health of the financial system. These 39 indicators were called the Financial Soundness Indicators (FSIs) that attempted to measure the different dimensions of financial stability. These 39 indicators consist of 2 groups; the first group is related to the banking sector and includes 12 indicators on asset quality, liquidity, profitability, capital adequacy etc. and the second group includes 27 indicators on macro-economic conditions, financial markets, non-banking financial sector, property market and households.

A similar initiative was taken in Europe by the European System of Central Banks (ESCB) in 1999 through the development of an EU Banking Stability Report. In this report, the set of indicators selected by the ESCB was called the Macro-Prudential Indicators (MPIs) which were broader than the IMF's Financial Soundness Indicators. These MPIs divided the indicators into three categories: internal factors, external factors, and contagion factors. The internal factors included bank specific factors like capital adequacy, asset quality, profitability, liquidity, competition in the banking sector, risk concentration and market assessment of these risks. The external factors refer to asset price development, cyclical and monetary conditions, and

financial fragility. The third category included indicators on contagion factors i.e., interbank liabilities etc.

Based on these early attempts to quantify financial stability, various researchers have explored the different dimensions of financial stability. For example, Illing and Liu (2003) developed a financial stress index by including the different dimensions of financial instability. The authors measured financial stress through different indicators of equity market, foreign exchange market, banking sector and macro-economic data. The objective of this index was to look at the level of financial stress of the Canadian Financial Sector. The results of this study showed that to assess financial stability of the banking sector, a broader set of indicators selected from different segments of a financial system can timely identify the level of financial stress in a financial system.

Goodhart (2006) discussed the development of a comprehensive framework for assessing financial stability. This study considered the multi-faceted nature of the concept of financial stability and highlighted the difficulties in developing ana greed set of measures for the financial stability in the various central banks across the world. The author has called for not just looking at the capital adequacy for assessing the financial stability of a bank or financial system but also consider the liquidity and other dimensions for developing a dynamic set of indicators measuring financial stability. Extending this work, many researchers have attempted to develop different types of financial stability indices for measuring the level of financial stability in a country. The Central Bank of Turkey developed a financial strength index in 2006 for measuring the health of its financial sector based on multiple financial indicators. Van den End and J. W. (2006) developed a Financial Conditions Index for assessing the financial stability of the banking sector of Netherlands. Similarly, Geršl (2006) developed a financial stability index for the banking sector of Czech Republic based on the aggregate indicators of asset quality, liquidity, profitability, capital adequacy, interest rate risk and foreign exchange rate risk.

Following the same trends of developing financial stability indices, Albulescu (2010) developed an aggregate financial stability indicator for Romania with a focus on financial development, market vulnerability and the overall economic conditions. In the same way, Morales and Estrada (2010) developed a financial stability index for Colombia based on multiple financial indicators to assess soundness of the financial sector. They aimed to examine the stress level of the financial system to guide the policy makers for early interventions. This

research study developed the financial stability index as a measure of liquidity, profitability and probability of default and correctly determined the stress level of the financial system. The core purpose of developing these indices was to create a baseline criterion for assessing and ranking the financial institutions and markets. The efforts to develop financial indices expanded across the different regions of the world and within the European context, Kočišová and Stavárek (2015) worked on developing a Banking Stability Index (BSI) for the ten countries that joined European Union. They used multiple variables measuring financial strength (performance and capital adequacy) of banks and along with screening major market risks such as the credit and liquidity risk. The BSI developed in this study ranked the countries in order of their financial stability and recommended the banking regulators to look for early signs of banking instability by applying the methodology of this index. This index provided a comparative way of ranking the strength and resilience of the financial system of these countries. The regulatory bodies and independent research firms developed these types of indices across the world to identify the low performers in the financial stability ranking and take the necessary action to ensure the financial stability.

The financial stability ranking for different South Asian countries was also developed for identifying the best and worst performers. For example, a study by Nasreen and Anwar (2018) who examined how the economic development shapes the financial stability in five South Asian nations including India, Pakistan, Bangladesh, Sri Lanka and Nepal for the period from 1980 to 2012. In this study, financial stability is measured by constructing the Aggregate Financial Stability Index (AFSI) that covered financial soundness, vulnerability and development of the financial system. The results of this study reported that financial stability is necessary for the economic development of a country as significant positive relationship is observed in the empirical data. More research focusing on this geographic region was conducted by Babar et al. (2019) who worked on the development of the financial stability index for the financial sector for the period from 2001 to 2010. This study used three separate econometric methods to develop indices for measuring financial stability: linear probability model, logit model and variance-equality weightage model. For estimation, all three indices used financial soundness indicators related to liquidity, profitability, capital adequacy, asset quality, banking spread and inter-bank connectivity. The results showed that each model has its own strengths and may be used by the regulatory bodies as per the available data and suitability for assessing the level of financial stability.

To examine the impact of financial stability on various other variables, many researchers have produced commendable studies. The empirical studies on financial stability have confirmed that the soundness of the banking sector affects the overall economic growth of a country. To examine the relationship between financial stability and the real economy, Jokipii and Monnin (2013) used data from 18 OECD countries and found that financial stability has a positive and significant link with the output growth. The instability in the banking sector may affect the estimates of future economic growth. The results, however, found no significant relationship of financial stability with inflation. The study recommended that banking sector stability may affect the economic growth forecasts made for immediate future periods.

More research on this topic was conducted by Ozili (2018) who examined the determinants of financial stability of banks within the African continent. The financial development in terms of financial institutions and financial markets were started in This study focused on knowing the effect of financial structure, institutions, and bank specific factors on bank stability. The results indicated that bank size, concentration, ownership structure, regulatory quality, unemployment level and investor protection affect the bank stability significantly. This study recommended that regulatory bodies should consider the financial structure and institutional quality for designing the banking sector compliance regulations in order to ensure financial stability in the banking sector. A similar work by same author, Ozili (2019) who studied the determinants of financial stability of banks in Nigeria. Using a data set from 2003 to 2016 obtained from the World Bank database, the study attempted to find the factors that determine the level of financial stability. The results showed that bank efficiency, non-performing loans, financial depth, regulatory capital requirements and bank concentration are significant determinants of the level of financial stability of banks. The findings recommended that bank regulatory bodies should develop sound regulations for managing non-performing loans and ensuring regulatory capital requirements.

Examining the relationship between financial stability of banks with the liquidity creation, Gupta and Kashiramka (2020) studied their relationship through empirical model. Using a dataset of from 2007 to 2019 of Indian commercial banks, the authors reported that the liquidity creation affects financial stability of banks significantly. However, the size of a bank matters in each case with private sector banks being more stable than the public sector banks. This study recommended that the regulations for liquidity creation should be designed in a way to meet the requirements of banks of all sizes.

After presenting a detailed literature review on financial stability of banks, now, a comprehensive literature review is presented below on the CAMELS factors which refer to capital adequacy, asset quality, management, earnings, liquidity and sensitivity to market risk. The CAMELS' framework is a widely used research framework for understanding the working of different variables of banking within the context of financial stability of banks. A brief roundup of empirical literature is given here.

2.4 Capital Adequacy and Financial Stability

Many researchers have studied the role of capital adequacy and financial stability of banks. The role of capital adequacy as a measure of financial soundness was emphasized by Berger, Herring, and Szegö (1995) who observed the role of capital adequacy in absorbing business losses and protecting depositors of a bank. A similar work by Gropp, Hakenes, and Schnabel (2011) examined effect of capital requirements on bank risk-taking and suggested that stricter capital adequacy requirements significantly reduce banks' risk-taking behaviors. For maintaining financial stability, enforcing higher capital requirements can help the regulators to mitigate multiple risks and enhance overall financial stability. The capital adequacy is the single most important factor for absorbing the losses in case of a financial crises int eh banking industry. Extending this work to examine how capital requirements help to produce better financial results, Berger and Bouwman (2013) studied the relationship between capital adequacy and financial performance of banks at time of financial crises and found that banks with higher capital levels performed better during financial crises by managing credit supply resulting in lower probability of financial distress. The key recommendation of this study was to maintain a reasonable level of capital adequacy in order to enhance bank financial performance that helps to maintain financial stability.

The importance of capital adequacy in enhancing financial stability of banks is probed from different aspects by different researchers. Contextualizing the financial stability of banks with the capital adequacy requirements and bank competition, a study by Allen, Carletti, and Marquez (2013) studied how capital regulation affects bank competition and stability. In the context of the banking industry, this study reported that higher capital requirements decrease the competitive pressures on banks resulting in a more stable banking system. Also, this research also suggests that while capital requirements might limit competition, it significantly influences financial stability of banks.

Many researchers have explored the relationship between financial stability and capital adequacy. For example, a study by Barth, Caprio, and Levine (2013) examined the effect of the global financial crisis on bank capital adequacy levels across different countries. The study reported that strong capital requirements are essential for managing the adverse effects of financial crises across different jurisdictions. Based on this study, it can be safely concluded that the level of capital adequacy of a bank shapes the level of financial stability of the bank in times of financial crises. A similar work by Laeven, Ratnovski, and Tong (2016) investigated the relationship among bank size, capital, and systemic risk. Their study concluded that higher capital buffers are especially effective in reducing systemic risk in big size financial institutions. Based on the results of the study, the authors recommended that capital requirements should be customized to the size and complexity of operations of banks to enhance their financial stability. In this regard, the role of the regulatory bodies should be strengthened to specify the ratio of capital adequacy for banks to ensure financial stability.

Apart from these studies, some other researchers in recent times have also examined the impact of capital adequacy on financial stability in different regions or countries. For example, a study by Kashyap, Tsomocos, and Vardoulakis (2020) developed a theoretical model to assess the effect of capital buffers on financial stability. This research study, in line with earlier work by other authors, stated that higher capital requirements enhance banks' ability to face the economic shocks and reduce the chances of financial fragility. A similar study in the same sphere by Gorton and Winton (2021) checked the role of capital adequacy in preventing bank failures and observed that well-capitalized banks are less likely to fail and more likely to contribute to overall financial stability of the banks. This argument is further supported by Berger and Roman (2022) who investigated the effectiveness of higher capital adequacy ratios of banks in the post global financial crisis period. The authors supported the view that higher capital requirements are necessary for maintaining strong financial stability of banks and preventing future financial crises. Based on the above discussion, the first hypothesis of this study is following;

H1: Higher levels of capital adequacy positively affect the financial stability of banks.

2.5 Asset Quality and Financial Stability

It is hard to find the exact definition of asset quality of banks as this concept is explained by different regulatory and assessment bodies in multiple ways. The Federal Reserve Bank of the USA defines asset quality in the following words:

"*The asset quality reflects the quantity of existing and potential credit risk associated with the loan and investment portfolios, other real estate owned, and other assets, as well as off-balance sheet transactions."*

To assess the empirical link between asset quality and financial stability, different studies have been conducted globally. Ezeoha (2011) examined the determinants of asset quality in the banking sector within the Nigerian context by exploring the role of bank consolidation. Using a dataset of 19 banks for the period from 2004 to 2008, this study seeks to explore the factors that affect the asset quality of banks in the post consolidation phase. The results showed that banks were unable to optimally utilize their asset base to enhance their earnings. This research observed that high capital bases and excess liquidity encouraged careless lending by banks that ultimately affected the asset quality of banks resulting in financial crises. The research advised regulatory bodies and stakeholders to devise loan screening parameters with a view to anticipating their impact on the whole financial system.

To check the relationship between asset quality and macro-economic aggregates, De Bock and Demyanets (2012), conducted a study on the banking sector of emerging economies. Using a dataset of 25 emerging economies from 1996 to 2010, they found that depreciation of currency, weaker terms of trade, lesser growth and a decrease in debt-induced capital inflows decreases the credit availability and negatively affects the loans quality. They also found a significant relationship between the performance of the financial sector and the real economy. The economic slowdown is associated with the increase in non-performing loans affecting the asset quality of the banking sector.

Contributing to this debate, Swamy (2012) worked on determining the factors affecting the asset quality and profitability of the banking sector. With the data set on Indian banks for the period from 1997 to 2009, this study found that bad debts are dependent on the performance of industry/sector and private sector banks have better credit risk management system to reduce the non-performing loans than the public sector banks. Similarly, they observed that rural credit and priority sector credit do not significantly affect the performance of loans. This study advised the stakeholders to look at the different local and regional factors that affect loan performance.

Extending the argument, Alhassan et al. (2014) looked at the macro and bank specific factors that negatively affect the bank asset quality. Using a dataset of 25 banks of Ghana from 2005 to 2010, the study found that bank asset quality as measured through non-performing loans is

significantly affected by the GDP growth rate, bank market structure, real exchange rate, inflation, bank size and loan growth. The study recommended bank managers to look at the macro-economic forecasts while deciding granting loans to industries and individuals. Similarly, they cautioned the regulators to be vigilant in the time of economic uncertainty.

Another useful study by Mirza et al. (2015) checked the relationship among efficiency, asset quality and financial stability of financial sector of Pakistan. They used a sample of conventional banks, Islamic banks, and Non-Banking Financial Institutions for period from 2005 to 2013. The results indicated that Islamic banks tend to have better asset quality than the conventional banks. With higher risk and profit vulnerabilities, the NBFIs have lower asset quality and less financial stability. They also showed that asset quality in commercial banks is influenced by firm size and ownership structure. They advised regulatory bodies to develop risk assessment procedures for each type of financial. A useful dimension was added by Goetz (2018) who examined the issue of financial stability from the lens of competition in the banking industry. Using a data set for the period 1976 to 2003 of commercial banks in the USA, this study found that increase in the competition among banks through reducing entry level regulatory barriers positively affects banking stability. This research also confirmed that an increase in the level of financial stability with a higher level of banking profits is also positively correlated with the reduction in the non-performing loans leading to better asset quality.

To study the problem of non-performing loans within Indian banking industry, Arrawatia et al. (2019), conducted a study on 47 commercial banks for the period 2000 to 2014. They examined the bank-specific and macro-economic factors affecting the asset quality of banks and found that asset quality of banks is affected by both types of factors. Specifically, they analyzed the bank specific factors like ownership structure, financial crises and liquidity levels that significantly affect the asset quality of banks. Along with this, the macro-economic factors also significantly affect the asset quality of commercial banks. This study recommended that forecasts for asset quality as measured through non-performing loans should also consider industry specific and macro-economic factors. Looking at the risk factors that determine the asset quality of banks, Swami et al. (2022), explored the role of various risk items of banking sector. With a data of 39 Indian commercial banks from 2012 to 2017, they found that lower capital base, lesser profitability, weak operating efficiency, and less diversified portfolio add greater risk to the asset quality of banks. Further, the bank size is also positively correlated with the higher non-performing loans. They advised regulatory bodies to look at the operational efficiency, capital level and profitability of a bank to anticipate its asset quality and apply the

capital adequacy and loan screening requirements accordingly. Based on the above discussion, the second hypothesis of this study is;

H2: Higher asset quality positively affects the financial stability of banks.

2.6 Management Quality and Financial Stability

The relationship between management quality and financial stability is explored by many researchers. The concept of management quality refers to the capability of bank management to manage the business operations and corresponding risks. A study by Fiordelisi, Ricci, and Lopes (2014) examined the relationship between management quality and bank performance in the European context and observed that a bank with higher management quality significantly produces better financial performance in terms of profitability and efficiency. Along with this, the authors suggested the importance of strong governance structures and effective risk management practices for achieving high quality management.

A similar work in the same domain by Iannotta, Nocera, and Sironi (2013) investigated the effect of management quality on bank default risk using the dataset of European banks. The findings of this study suggest that banks with higher management quality depict lower default risk leading to overall financial stability. This study argued that effective management practices in banks are important for developing effective risk management practices and preventing bank defaults. To understand the impact of management quality on the bank risk management practices, Cornett, McNutt, and Tehranian (2016) examined the data of large USA banks and found that higher management quality reduces risk taking behavior of banks and enhances financial stability of banks. This study recommended that effective management practices are important for developing a good quality management team that can help the banks to maintain financial stability through producing risk management practices.

Contributing to the same issue, Battaglia and Gallo (2017) examined the effect of management quality on risk-taking and financial stability and found that higher management quality reduces irrational risk-taking behaviors in bank financial decisions and enhances bank stability. The study used a sample of Italian banks to check the relationship between management quality and risk-taking. This study recommended that good quality management practices are crucial for maintaining financial stability in banks. To examine the relationship between management quality and financial stability of banks, Beck De Jonghe and Schepens (2018**)** explored found that banks with higher management quality observed through governance indicators and management efficiency ratios produced greater financial stability. This research study stressed

that strong management practices lead to better risk management and profitability which results in enhanced financial stability.

Empirical literature examining the relationship between financial stability and management quality has produced many findings for the bank management and the regulatory bodies. To examine the relationship between management quality and financial stability in the Asia pacific region, Pathan and Faff (2019) investigated the influence of management quality on financial stability of banks. The authors used financial ratio such as the management efficiency ratio and board composition quality to assess management quality of banks. The results indicated that banks with higher management quality were more resilient to financial shocks and exhibited lower default risk. The authors recommended that enhancing management quality with dynamic team leaders is important for sustainable financial stability in the banking sector. However, the development of a good management quality team requires dynamic team leaders and a supportive environment for taking strategic decisions. Within the context of the global financial crises, Vallascas and Hagendorff (2020) examined the role of management quality in the stability of global banks. The study used the Management Efficiency Ratio and CEO Tenure as proxies for measuring management quality of banks. The results of the study indicated that banks with higher management quality were better able to navigate the financial crisis and maintain higher levels of stability. This study recommended that regulatory bodies should focus on developing criteria for improving management practices to ensure long-term stability. The importance of management quality in affecting financial stability of banks is studied by many other researchers in the different regions of the world. A notable work by Ferreira and Matos (2021) examined the impact of management quality on financial stability of banks in Latin America. Using financial indicators including management quality index and governance scores, the results presented a positive link between management quality and financial stability. Based on the results of this study who supported the earlier work of other authors, the authors recommended the need for effective governance systems to enhance management quality and financial stability of banks in the region. In a more recent study by Huang and Lee (2022) who focused on the effect of management quality on financial stability of banks in emerging markets. The research method of this study includes the use of management capability index and board expertise as measures of management quality in banks. The results showed that banks with higher management quality were more financially stable and less likely to experience financial distress. The authors suggested that improving management quality is very important for achieving financial stability in emerging market banks.

Based on the discussion above, the third hypothesis of this study is;

H3: High level of management quality positively affects financial stability of banks.

2.7 Earnings and Financial Stability

The relationship between earnings and financial stability of banks is explored by several researchers. The earnings are an important element of the financial performance of a bank based on its assets, liabilities, incomes and expenses. To examine this relationship, Albertazzi and Gambacorta (2012) observed bank profitability and macroeconomic factors and found that economic growth, inflation, and interest rates significantly influence bank profitability. This study used a panel dataset of banks from 20 developed economies and argued that favorable economic conditions in the external environment enhance bank earnings by enhancing lending and reducing operational and lending risk. The earnings of a bank play an important role in defining the level of financial stability of a bank. A bank experiencing financial losses cannot survive in the long term even if it has a strong capital base. To check the relationship between financial stability and financial performance, Dietrich and Wanzenried (2014) conducted a study on finding the determinants of bank profitability in the financial crisis. The results of this study reported that well-capitalized banks with lower loan loss provisions were more profitable during the financial crises. This study used a comprehensive dataset of commercial banks from 118 countries to observe the impact of various factors on bank earnings. The results of this study also recommended that careful risk management practices and managing operational expenses affect the financial stability of banks. The earnings of a bank are significantly affected by the high ratio of administrative and operational expenses.

Another study which checked the relationship between financial stability and earnings from the regulatory point of view, Anginer, Demirgüç-Kunt, and Mare (2018) investigated the effect of bank regulation on profitability. The results indicated that stringent capital requirements and robust supervision enhance bank earnings by mitigating excessive risk-taking behaviors of the bank management. This study suggested the importance of effective regulatory frameworks in promoting stable and sustainable bank earnings as losses affect financial stability and directly hit capital reserves. Adding to the debate of the relationship between financial stability and earnings within the European context, Bikker and Vervliet (2018) reported that higher earnings are positively correlated with financial stability suggesting that higher profitability levels enhance a bank's capacity to absorb financial shocks. The authors used Return on Assets and Net Interest Margin NIM as measurement proxies for measuring the earnings of the banks. This

study recommended the importance of consistent profit generation for maintaining financial stability and regulators should focus on profitability measures to detect early warning signs affecting financial stability of banks. The business activities of a bank should be profit-oriented and loss-making units/sections should be eliminated to reduce the financial burden.

Further study in this area by Zhu and Chen (2019) examined the effect of earnings on the financial stability of Chinese commercial banks. This study reported that banks with higher returns on assets and return on equity generate greater financial resilience during economic crises and indicated that earnings are very important for maintaining liquidity buffers for managing multiple risks. This study recommended that strong earnings based on carefully managed business operations are a significant factor in shaping the financial stability of a bank. A profitable bank is trusted by depositors, borrowers, investors and other stakeholders for multiple transactions. A similar study by Hossain and Ali (2020) focused on South Asian banks and examined how earnings affect the levels of financial stability of banks. The authors used net interest margins and return on assets as measurement proxies of earnings and observed that banks with robust earnings ratios were better positioned to manage financial crises and maintain a strong level of financial stability. Based on results, this study recommended that the importance of successfully obtaining profitable results from business operations leads towards the higher level of financial stability. A research study by Rahman and Uddin (2021) examined the role of earnings in financial stability of banks in Bangladesh. The study used return on assets and return on equity as measurement formulas for earnings and employed a dynamic panel model to assess their impact on financial stability of banks. The results of data analysis of this study suggested that higher profitability led to improved financial stability by acting as a buffer against potential losses. The profitable banks add an additional layer in the financial stability circle around the bank. The authors of this study recommended the significance of producing high-profit margins to ensure long-term stability and regulatory bodies and other stakeholders should consider earnings performance when assessing financial soundness of banks.

A more recent study by Wangand Liu (2022) examined the earnings-stability relationship in the context of the COVID-19 pandemic. With a sample of global banks, the authors state that banks with higher earnings before the pandemic were more resilient during the COVID-19 crisis. The authors used Return on Assets (ROA) and Net interest Margin (NIM) as measurement proxies and used the fixed-effects model for estimation. This study recommended the importance of profitability in enhancing a bank's financial shock-absorbing capacity and

suggested that earnings should be taken as the focal point in stability assessments, especially during economic disruptions. Based on the above discussion, the fourth hypothesis of this study is;

H4: Higher earnings positively affect financial stability of banks.

2.8 Liquidity and Financial Stability

To ascertain the impacts of liquidity on financial stability, different studies were conducted by many researchers in recent times. Liquidity is an important component of a bank reflecting its ability to meet short-term obligations without incurring losses. To examine this relationship, Cornett et al. (2011) examined the impacts of liquidity management on bank performance and stability during the financial crisis. The author observed that banks with higher liquidity levels were more resilient during the financial crisis resulting in fewer losses. This study used a large sample of U.S. banks to examine how a particular level of liquidity affected the financial outcomes during the 2007-2008 crisis.

Another study examining the relation between financial stability and liquidity by Acharya and Naqvi (2012) emphasized the dual effect of liquidity positions in both enhancing and undermining financial stability of banks. The results of this study indicated that excessive levels of bank liquidity can lead to increased risk-taking behaviors in banks which negatively affect financial stability of banks. The authors recommended that liquidity provision to banks could either stabilize or destabilize banks based on the concerned regulatory environment and the risk management practices of the bank management. Similarly, in another study, Berger and Bouwman (2013) examined the effect of liquidity creation on financial stability of banks during financial crises. The results of this study depicted that banks that create more liquidity are more volatile during financial crises. Based on data from U.S. banks over several decades the authors suggested that liquidity creation needs to be managed carefully as it can provide benefits during normal times but impose multiple risks during financial crises.

Examining from the angle of central banks, Drehmann and Nikolaou (2013) investigated the relationship between liquidity risk and financial stability and sobered that liquidity support from the central bank of a country is essential in stabilizing the banking system during periods of financial stress. With a broader dataset of central bank interventions during financial crises, this study stressed the importance of timely and adequate liquidity provision by central banks to prevent systemic financial crises. A useful addition was made by Ratnovski (2013) who investigated the role of liquidity in bank stability particularly focusing on the liquidity risks

associated with short-term funding. The results of this study indicated that excessive reliance on short-term funding increases bank vulnerability to liquidity shocks leading to financial instability. Based on a theoretical model, the author stressed the importance of reducing dependence on short-term funding to enhance liquidity resilience to ensure financial stability of banks.

More studies have been conducted examining the impact of liquidity on the financial stability of banks. In detailed study on examining the relationship between financial stability and liquidity, DeYoung, Distinguin, and Tarazi (2015) reported that higher liquidity levels in banks positively affect financial stability of banks with a side effect of decrease in the profitability levels. This study used a sample of European banks to examine the trade-offs among liquidity, financial stability, and profitability. The results of this study recommended that banks need to maintain a balance between holding sufficient liquidity levels and keeping adequate profitability to ensure long-term financial stability. The maintenance of this balance between liquidity and profitability is dependent on the quality of risk management of a bank. Further work within the context of the Basel III regulations was conducted by Bonner (2016) who examined the relationship between liquidity regulation and financial stability of banks. This study reported that jurisdictions with stringent liquidity requirements enhance financial stability of banks by reducing liquidity risks. With a dataset of European banks, the author emphasized the importance of regulatory frameworks in ensuring adequate liquidity levels for consistency in business operations and maintaining adequate financial stability of banks.

The relationship between liquidity and financial stability is further explored by many researchers based on the data of different regions/countries. In a significant study to examine how the level of liquidity affects financial stability of banks, Berger and Bouwman (2019) reported that banks with higher liquidity levels were more financially stable and less prone to the losses in the financial crises. Based on data of USA banks with ratios such as loan-to-deposit to measure liquidity, this study checked the role of central bank policies in providing liquidity support during crises. The findings of this study emphasized that maintaining adequate liquidity is important for the overall financial stability of the banking sector. Keeping sufficient liquidity in banking operations is necessary for meeting the daily routine of transactions in the banking system that requires cash inflows and cash outflows. A study by Acharya and Mora (2020) checked the relationship between the liquidity and financial stability of European banks. Based on results, this study reported that banks with higher liquidity levels performed better than the banks with lower liquidity levels during the financial crisis. The authors of this study

reported the importance of liquidity levels in managing short-term obligations and recommended that banks should adopt adequate liquidity management practices to enhance their financial stability. The regulatory bodies should also consider defining the cash reserves ratios or similar requirements for banks to meet the cash outflows requirements.

In addition to the above study, research by Chiaramonte, Croc, and Poli (2021) examined the effects of liquidity on the financial stability of Italian banks. The results of this study indicated a positive relationship between liquidity level and financial stability of banks. The authors of this study also explained the role of liquidity in managing the effects of financial distress. Another recent study in the same direction by Carletti, Claessen and Figueroa (2022) who investigated the role of adequate liquidity in the financial stability of bank during the COVID-19 pandemic. Based on the results of dynamic panel modelling, the authors found that banks with stronger liquidity levels were more resilient to the financial effect of the pandemic. The authors suggested the benefits of maintaining high liquidity levels to ensure financial stability during crises. Based on the discussion cited above, the fifth hypothesis of this study is;

H5: Higher liquidity level positively affects the financial stability of banks.

2.9 Sensitivity to Market Risk and Financial Stability

The link between sensitivity to market risk and financial stability is examined by different researchers across various regions. Sensitivity to the market risk refers to the bank's exposure to market risks including changes in interest rate, foreign exchange fluctuations, and abrupt equity price movements. Contributing to this debate, a study by Berger and Bouwman (2013) studied how market risk exposure affects financial stability of banks stability during financial crises. Based on data from USA banks, the results of this study explained that banks with high sensitivity to market risks experienced greater financial instability during the 2007-2008 financial crisis. The authors recommended the need for effective risk management practices to manage the adverse effects of market risks on financial stability of banks. The regulatory bodies should also devise guidelines for banks to develop their risk management systems.

A study on finding the relationship between sensitivity to market risk and financial stability of banks was conducted by Demirgüç-Kunt and Huizinga (2013) who examined the effects of interest rate changes on financial stability of banks. With global dataset of banks, the results of this study reported that banks with higher sensitivity to the interest rate movements are highly likely to experience financial instability. This study concluded that effective risk management

policies regarding interest rates risk are critical for maintaining strong levels of financial stability of banks in a volatile economic environment, especially in developing countries.

There are many studies who has documented the impacts of sensitivity to market risk on financial stability of banks in various regions of the world. A study conducted to check the impacts of sensitivity to the market risk, Brewer and Jagtiani (2013) evaluated the effects of exchange rate changes on financial stability of banks. With large data set from global banks of many countries, this study reported that banks with higher level of sensitivity to negative exchange rate movements experienced greater financial instability during currency crises. Based on this observation, this study recommended that effective policies to manage the exchange rate risk are important for maintaining financial stability of banks in fragile global financial environment. The risk management in the banking industry is a huge challenge as multiple market risks such credit risk, interest rate risk, foreign exchange risk etc. exists which can affect financial stability. This debate on sensitivity to risk management was further expanded by the work of Acharya and Steffen (2014) who examined the relationship between bank exposure to sovereign risk and financial stability. With a large data set from European banks, this study confirmed that banks with higher sensitivity to sovereign risk experienced significant financial instability during the European debt crisis. This study recommended that banks should diversify their sovereign risk exposures to maintain reasonable financial stability in the times of financial crises and proactively manage the risk exposure in multiple dimensions.

Altunbas, Gambacorta, and Marques-Ibanez (2014) studied the effect of changes in monetary policy on financial stability of banks. With a data set of European banks, this study reported that banks with higher exposure to interest rate risk were more financially unstable during the periods of monetary tightening. This study recommended the importance of managing interest rate risk to enhance financial stability of banks in different monetary policy jurisdictions. The risk of interest rate movements is the most important risk being faced by the banks as the core operations of banks in both deposits and lending side are significantly affected by the adverse changes in the interest rates. Another aspect of the sensitivity to market risk was studied by Vives (2014) who examined the relationship between bank market competition and financial stability. This study confirmed that banks with higher sensitivity to competitive pressures in the market were more likely to experience financial instability. The findings of this study indicate that effective market competition management policies are critical for ensuring

financial stability of banks. The regulatory bodies should develop policies to have healthy competition in the banking industry instead of promoting price wars.

Jiang, Levine, and Lin (2018) examined the effects of macroeconomic shocks on financial stability of banks of Chinese banks. The results of this study testified that banks with higher sensitivity levels to the macroeconomic shocks (inflation, currency movements etc.) were more likely to experience financial instability. The authors stressed developing risk management mechanisms to manage the exposures to macroeconomic risks in a volatile global economic environment. Both regulatory bodies and bank management should develop such risk management policies to counter the volatility in macroeconomic environment. Contributing to this debate, a study by Al-Tamimi, and Al-Mazrooei (2018) examined the sensitivity to market risks and its impacts on the financial stability in the UAE based banks. The findings of this study reported that higher levels of sensitivity to the interest rate and foreign exchange rate fluctuations negatively affected the financial stability of banks. The authors of this study suggested the importance of managing market risks to enhance financial stability. This research study called for stakeholders to manage the sensitivity of the market risk through careful risk management policies. Another academic addition to this debate was made by Brunnermeier and Koby (2020) who focused on the sensitivity to market risks and its effect on financial stability of European banks. Using value at risk and conditional value at risk tools as measurement proxies for sensitivity, the results observed that banks with higher level of sensitivity to market risks were more vulnerable to financial instability. The policy recommendation of this research was to adopt a comprehensive risk management policy to cope with the market risk in volatile economic times.

Another study by Zhao and Tan (2021) who studied the factors dealing with the sensitivity of Chinese banks to market risks and theirs impacts on financial stability. Using interest rate sensitivity ratio and foreign exchange sensitivity ratio for measuring the sensitivity factors, the results indicated that higher sensitivity to interest rate and exchange rate movements negatively affected financial stability of banks. The authors recommended the development and deployment of risk mitigation policies and frameworks to manage the financial distress int eh event of negative economic movements. Recently, a very useful study by Huang, and Ratnovski (2022) explored the factors impacting the sensitivity of global banks to market risks during the COVID-19 pandemic. Like earlier studies, using VaR and CvaR, the authors explained that banks with higher level of sensitivity to market fluctuations were more financially unstable. The recommendations of this study called for developing robust risk

management practices for dealing with the market risks to improve their financial stability. Based on the above discussion, the seventh hypothesis of this study is;

H6: Higher sensitivity to the market risk negatively affects financial stability of banks.

Literature review on Other Bank Specific Factors

In addition to the CAMELS factors discussed above, this study also considers some other important variables that affect financial stability of banks. A critical review of literature is given on these variables. These variables include financial innovation, financial inclusion, income diversification, bank size and risk management.

2.10 Financial Innovation and Financial Stability

Several researchers have tried to define financial innovation, but no generally agreeable definition exists so far. Khraisha and Arthur (2018) have defined financial innovation in the following words:

"*Financial innovation is a process, carried out by any institution, that involves the creation, promotion and adoption of new (including both incremental and radical) products, platforms, and processes or an enabler of technologies that introduce new ways or changes to the way a financial activity is carried out."*

This definition declares that financial innovation is a process that considers the existing products and processes and shapes new products or processes with eh help of available technologies to facilitate the customer in a speedy and better way. The fundamental point in financial innovation is the introduction of new ways or methods to enable customers to get better services in the least possible time. Since every innovation requires insights and research, financial innovation is designed based on market data and customers responses. Earlier researchers such as Gai et al. (2008) studied the role of financial innovation in economic stability and financial crises. The authors argued that the increase in financial innovation across the world has brought new products and services for the consumers, but new types of risks have also emerged. The expansion in financial services, especially credit, may significantly affect the financial stability of a country resulting in financial crises. The results indicated that financial crises are less likely to occur in developed countries as they have sophisticated levels of financial innovation and a higher level of macroeconomic stability.

Similarly, Plosser (2009) questioned the relationship between financial innovation and financial stability after the financial crisis of 2008. Financial innovation has facilitated

economic growth across many jurisdictions, but it has also brought new risks for financial stability. The study recommended checking the nature of financial innovation before making it public for wider usage. The regulatory bodies should conduct the risk assessment test for all new financial products and develop the appropriate safeguards for protecting the financial system. Exploring more dimensions of the financial innovation, Ülgen (2013) raised the question on the nature of financial innovation as whether it is creative or destructive. Building on the philosophical debate of Schumpeterian creative destruction, the author discussed that the nature of financial innovation can be assessed from the fact that this innovation is helping firms and individuals to replace old methods of production and adopt the new efficient techniques for higher output. This study advised the regulatory bodies to design supervisory checks in a manner to balance the needs for financial innovation and ensure the financial stability of the overall financial system.

Another useful academic addition was made by González et al. (2016) who explored the impact of financial innovation on bank risk. Using a database of 134 European banks during the period from 2006-2010, the authors specifically looked at the impact of securitization and credit derivatives on the bank risk profile. They found that financial innovation such as securitization and credit derivatives has a significant negative relationship with financial stability. The results showed that the Basel III regulations for risk management and higher capital support need to be followed by the banks. With the above results, this study also recommended that market-based ratios instead of accounting-based measures should be followed by the regulatory bodies for maintaining financial stability. The results of studies are significantly altered in case of changing the measurement proxies of the variables. A research study was conducted by Arnaboldi and Rossignoli (2015) who investigated the nature of financial innovation in the banking sector. They reported that financial innovation such as securitization was thought to be risk management tool before the financial crisis. However, the financial crises of 2007-08 have changed this perception of banking experts and now it is widely believed that excessive risk-taking financial innovation may negatively affect the financial stability of a country. Based on this, the authors suggested that financial innovation is a double-edged sword that can enhance or reduce the financial stability based on its features. The authors recommended that financial innovation needs to be supervised by relevant financial regulations to balance the needs for financial growth and financial stability. However, this supervision should not become a hurdle in the financial growth of the products of the banks.

Considering this careful usage of financial innovation, a study by Chen and Du (2016) discussed the effect of financial innovation on financial stability within the context of the Chinese financial system. Based on the existing literature on the relationship between financial innovation and financial stability, they constructed empirical model using Chinese banks data. The results indicated that the effect of financial innovation on bank stability produced U-shaped movements and the effect of systemic risk on the stability of banking sector is linear shaped with direct relationship. This study recommended that financial innovation should be carefully monitored in order to observe the balance between risk and return. A study by Beck et al. (2016) examined the relationship among financial innovation, bank fragility, bank growth and economic growth. With data of 32 countries from the years 1996 to 2010, the authors found that financial innovation enhances the bank growth. However, it is also associated with the increase in bank fragility and lesser financial performance in the times of banking crises in countries with the larger financial markets. This study confirms the innovation-growth view by stating that financial innovation leads to higher bank growth with the cautions on the dark side of the innovation-fragility view. The result of this study warns that a higher level of financial innovation may hurt the financial performance of the banks in times of crises.

Another study on a similar theme was conducted by Khan et al. (2021) to know the effect of financial innovation on the credit risk of banks in the ASEAN region. Using data of 4 countries from 2011 to 2018, they found that both financial innovation and sustainable economic growth are significant contributors towards the credit risk of banks in the ASEAN region. The authors recommended policy makers to undertake necessary regulatory steps to keep a vigilant eye on the scale and nature of financial innovation so that it may not significantly affect the stability of financial markets.

A useful recent study conducted by Marfo and Tweneboah (2022) checked the role of national culture in the transmission of financial innovation and financial stability. Using a data set of 105 countries from 2005 to 2017, the authors found that the traits of national culture significantly affect the relationship between financial innovation and financial stability. The results indicated that countries with a higher level of individualism, indulgence and masculinity may negatively affect the financial stability of a country. Similarly, long term orientation, uncertainty avoidance and power distance of bank managers may, in some situations, positively affect financial stability. This study recommended that the regulatory bodies should consider national culture while devising policies for financial innovation in an economy. Based on the above discussion, the seventh hypothesis of this study is;

H7: Higher level of financial innovation positively affects the financial stability of banks.

2.11 Financial Inclusion and Financial Stability

Financial inclusion is a multi-dimensional concept that involves the use of credit, payments, deposits etc. Since it's a vast concept, there is no widely accepted definition of financial inclusion. Sanderson et al. (2018) has defined the financial inclusion as follows:

"*In broader terms, the term financial inclusion can be defined as the process of bringing the weaker and vulnerable members of society into the ambit of organized financial system which ensures that they access timely and adequate credit and other financial products at affordable price."*

This definition assumes that financial inclusion is a process that aims to include the wider segments of the population in the financial system of a country. The formal inclusion of many people and firms in the financial system may bring offer them the facilities of credit, deposits, savings, investments, payments, funds transfer etc.

Earlier researchers such as Han and Melecky (2013) studied the relationship between financial inclusion and financial stability of banks with special reference to the financial crises of 2008. They used a dataset of 95 countries from 2006 to 2010 with a focus on determining the impact on bank deposits before and after the financial crises of 2008. The results indicated that greater access to bank deposits may increase the resilience of a financial system and may contribute to bank stability in times of financial crises. The study found that a higher level of access to bank deposits, especially in middle countries, where the financial system is in the early stages of integration with the world markets, can enhance the stability of the banking sector.

Similarly, Morgan and Pontines (2014) have contributed a study on the effect of financial inclusion on financial stability. Using a data set of many countries spread over the period from 2005 to 2011, the authors established that the increase in the level of financial access contributes positively to financial stability as new groups of consumers are added by the banks. A key observation of this study was to suggest the increased lending to SMEs because financial inclusion may contribute positively to the overall financial stability of the banking sector. They recommended policy makers design banking regulations as per the requirements of financial inclusion.

Within the financial inclusion debate, García and José (2016) reviewed the published work on the relationship between financial inclusion and financial stability and observed that two major

themes are emerging from the increased financial access across the world. The first observation is the increase in the overall risk exposure of the banks due to the expanded lending to mostly SMEs, low-income individuals etc. The second group of studies have documented that the increase int eh level of financial access has diversified the deposit base of the banks, and the risk of bank-run has decreased due to the opening of more bank accounts.

Another study by Neaime and Gaysset (2018) explored the relationship among the financial inclusion, financial stability, poverty, and inequality. Using a dataset of eight MENA countries for the period 2002-2015, this study attempted to answer the relationship between financial inclusion and financial stability. The results indicated that financial inclusion reduces inequality but has not significant impact on poverty. Similarly, financial inclusion contributes positively to the financial stability of the banking sector. However, the increased level of financial integration may enhance the risk exposure of the countries to the global financial markets.

The same point was endorsed by Siddik et al. (2018) who worked on finding whether financial inclusion contributes towards the financial stability of a country. Using a cross-country dataset for the period 2001-2013, the authors found the positive association between financial inclusion and financial stability. Additionally, some control variables like GDP per capita, ratio of private ratio of private credit to GDP are positively associated with financial stability. The authors recommended policymakers to develop market friendly regulations to increase the level of financial inclusion in a country that ultimately supports the financial stability of the overall financial sector.

With broader dimensions, Vo et al. (2019) examined the relationship between financial inclusion and financial stability at macro level. They used a dataset of 22 emerging and frontier markets for the period 2008-2015. The results indicated that the increase in financial inclusion in these economies has enhanced the macro level financial stability up to a certain threshold. The financial inclusion has also facilitated the stability in inflation and economic growth. They recommended that the regulatory aspect of financial inclusion needs to be strengthened to enhance access to financial services to a wider segment of the population.

However, Pham and Doan (2020) investigated the relationship between financial stability and financial inclusion within the Asian context. Using a data set of 42 countries for three years, i.e. 2011, 2014 and 2017, the authors checked the relationship through two wider angles: access to financial services and the usage of financial services. The results of this study presented a

weak positive relationship between financial inclusion and financial stability with recommendation that not all types of financial inclusion activities promote financial stability. However, expansion of financial services in different geographic locations leads to strengthening of deposit base of financial institutions. Supporting the positive relationship, Vo et al. (2021) checked this link between financial inclusion and bank stability in the Asian context. They used a dataset of 3071 Asian banks from 2007-2018 period and developed a financial stability index for sampled countries. The results indicated that a higher level of financial inclusion enabled by banks led to a more stable banking sector with enhanced resilience. The increase in the level of financial inclusion has resulted in higher bank revenues, a reduction in costs, diversified revenue streams and an expansion in the market share. This study recommended that developing countries should promote financial inclusion in the economy by developing facilitating regulations.

A useful study by Ahamed and Mallick (2019) completed a study on finding the effect of financial inclusion on bank stability. They used a sample of 2365 banks in 81 countries with 2004-12 as data period. The results confirmed the earlier hypothesis that an increase in the level of financial inclusion positively affects bank stability. The key variables that enable the financial inclusion and bank stability relationship are institutional quality, customer deposit share and lower costs of providing banking services. The authors recommended that a higher level of financial inclusion not only helps in economic development but also strengthens overall banking stability. Another study by Ahamed et al. (2021) checked the relationship among inclusive banking, financial regulations, and bank performance. They used a dataset of 1740 banks from all around the world over the period of 2004 to 2015. The results of this study reported that there is a positive relationship between financial inclusion and bank efficiency. A higher level of financial inclusion helps banks to mitigate the volatility in the deposit base and the corresponding returns. The results of this study also indicated that the countries with less restrictions on banking activities have a more stable banking system. The study recommended enhancing the level of bank inclusiveness and developing facilitating regulations in this regard.

Within the rapidly developing countries, Barik and Pradhan (2021) examined whether financial inclusion affects financial stability. They used a dataset of BRICS countries from the period 2005 to 2015. They explored the effects of different dimensions of financial inclusion on financial stability. They constructed a financial inclusion index of the sample countries based on financial availability, usability, and accessibility. The results indicated that financial inclusion has a negative relationship with financial stability. This negative relationship is due

to the rapid expansion of financial services in the banking sector, compromise on the quality of credit, weak regulatory oversight etc. The controls variables of the study were inflation and GDP growth rate, and they have significant negative and positive effect respectively on financial stability of banks. In a broader study, Khan et al. (2021) investigated the impact of financial inclusion on poverty, inequality, and financial stability. Using a dataset of 54 African countries from 2001-2019, the authors found that the financial inclusion helps in reducing poverty and inequality and contributes towards the higher level of financial stability. This study recommends policy makers to develop a dynamic financial system that enhances the financial inclusion to the wider segments of population. The regulatory structure of a financial system should encourage financial inclusion with careful oversight checks.

H8: Higher financial inclusion positively affects the financial stability of banks.

2.12 Income Diversification

Different studies have defined income diversification as per the context. Wan et al. (2016) defines it as "*the increase in sources of income or a balance among the different sources"*. The relationship between income diversification and financial stability of banks has been explored by many researchers. Some researchers have recommended that a bank should diversify its income sources to reduce the risk of income loss. However, some researchers have argued against the diversification strategy and advised that such practices may bring increased risk exposures for banks which may impact the overall systemic risk of the banking sector. The theoretical support in favor of diversification stems from the portfolio theory postulated by Markowitz (1991) that advocates the diversification of income sources to manage the financial risks relevant to an organization. The debate over the form, level and timing of diversification is still going on and a brief account of the most relevant literature is reproduced below.

Contributing to the debate of income diversification, DeYoung and Rice (2004) conducted a study on the Americans banks and sought to discover the relationship between the non-interest income and bank performance. The dataset consists of 2712 banks from 1989 to 2001 across the USA and the relationship between non-interest income and bank performance with the controlling variables i.e. market characteristics, bank characteristics and technological development. The results indicate that large banks move slowly in those sets of products that generate non-interest income, but they rely less on such income. With the advancement in technology, the share of non-interest income has increased over time for banks of all sizes.

However, the risk-return trade-off among the diversified banks is going to worsen as the non-interest income creates more volatility.

Similarly, another significant study by Acharya et al. (2006) conducted a landmark study on the diversification of the banking sector. Using a dataset of 105 Italian banks from 1993 to 1999, the authors evaluated the relationship between financial stability of banks and diversification. They observed that diversification is not necessarily producing favorable results with respect to the risk and return trade-off. The results indicated that diversification may reduce return for high-risk banks resulting in risky loans. For banks with low level of risks, income diversification may result in inefficient risk-return trade-off or may create lessor improvement.

However, highlighting the cautious side of income diversification, Stiroh and Rumble (2006) worked on the dark side of diversification and analyzed the dataset of USA based financial holding companies. The data set with 1800 companies from 1997 to 2002 were analyzed by researchers to identify the potential gains arising out of diversification. The results, however, showed that despite gains associated with the diversification in the form of generation of higher non-interest-based income, the risk exposure of the companies has increased. The marginal increase in revenues diversification has no significant link with better financial performance.

A useful study by Chiorazzo et al. (2008) studied Italian banks linking the income diversification with the financial stability. They observed that income diversification in the banking sector increases the risk of adjusted returns. Their study confirms the income diversification trends in the European banking sector. Compared to the US banking sector, the European banks tend to be more diversified. One of their findings points to the size of the bank; large banks tend to get more diversified as compared to the smaller banks. However, there are limits to the diversification gains as a bank gets larger in size.

Similarly, in a seminal study, Williams (2016) published a study on the bank risk and the revenue composition of banks working in Australia. Using a dataset from 2002 to 2014, the author found that diversification brings more volatility in the overall risk profile of a bank. This research observed that an increase in the noninterest income of banks may bring more volatility in the overall income of a bank. This increased risk-return profile is higher for larger banks as compared to the smaller ones. The results of this study do not support the diversification argument and warned of higher financial risk in case of adding more non-interest income.

Extending the argument further, a study by Abuzayed et al. ((2018) has worked on examining the relationship between bank diversification and financial stability. With a sample of financial institutions of countries of the Gulf Cooperation Council (GCC) from 2001 to 2014, their work stated that income or asset diversification may not increase bank stability. However, they found that there is a non-linear link between non-interest income and financial stability which may enable banks to manage risk with higher level of income diversification. They also highlighted some additional factors such as improved institutional quality, macroeconomic conditions etc. that may lead to greater financial stability.

More recently, Tariq et al. (2021) worked on a sample of Pakistani banks and found that the bank stability is higher in those banks where the income is diversified. Using a data of Pakistani commercial banks from 2005 to 2019, they observed that bank maturity led to higher income diversification which further positively impact the financial stability. This study linked bank maturity with income diversification that may enhance the financial stability of the banks. The results of this study are in line with the predictions of the portfolio theory that advocates income diversification for risk reduction.

Similarly, Githaiga (2021) worked on the income diversification of the micro-finance banks and analyzed the data of 443 micro-finance banks from 108 countries. The results indicated that banks with more diversified sources of revenue are financially stable. This study recommended that micro-finance banks should not rely on only donations or govt grants but should seek market-based opportunities for making profitable investments and adopting diverse sources of revenues.

Within African context, Adem (2022) explored the effect of income diversification on bank stability in a cross-country analysis. With a dataset of 45 African countries from 2000 to 2017, the author checked the impact of income diversification on the banking sector stability. The study concluded that an effective income diversification strategy may enhance the financial stability of the banking sector. However, the author recommended looking at the optimal level of income diversification. The other factors that may affect the financial stability of a bank include liquidity level, operating efficiency, and a higher deposit ratio. To maintain a higher level of financial stability, banking regulations may play a significant role for managing the financial risks.

Examining this question from Indian data, Chandramohan et al. (2022) studied the impact of bank diversification on the bank stability in India using a dataset of 48 banks from 2007 to

2017. This study has made a unique contribution by studying the diversification in a broader framework; functional diversification, geographic diversification, and loan-portfolio diversification. The results indicated that all these three dimensions of diversification significantly and positively affect bank stability. The authors recommended that diversification strategies for banks may be developed based on their size, location, resources, and regulations. Tariq et al. (2021) worked on a sample of Pakistani banks and found that the bank stability is higher in those banks where the income is diversified. This study linked bank maturity with income diversification that may enhance the financial stability of the banks. The results of this work are in line with the predictions of the portfolio theory that advocates income diversification for risk reduction.

H9: Higher level of income diversification positively affects financial stability of banks.

2.13 Bank Size

The effect of bank size on financial stability of banks has been explored by Čihák and Hesse (2010), Maudos and Guevara (2011), Adusei (2015), Odundo and Orwaru (2018) and Ramzan et al. (2021). The debate over size-stability nexus has generated significant research examining the impact of bank size on financial stability of banks. There have been mixed results; some linking big size banks with higher contribution towards systemic risk and financial instability and other studies have concluded the positive impact of big size banks on financial stability of banks. The phrase 'too big to fail' captures the importance of the size of the banks as large banks have a higher impact on the soundness of overall financial system.

Exploring this bank size dimension, Zhang, Li, and Ma (2011) conducted a study on finding the impact of bank size on financial stability of banks based in China from 1995 to 2008. The results of this research indicated that larger banks are more stable due to economies of scale and resources diversification. However, the authors noted that very large banks could pose systemic risks in the overall banking system. This study recommended a balanced approach to managing bank size to enhance financial stability with vigilant regulatory oversight.

A study conducted by Laeven, Ratnovski, and Tong (2014) examined the relationship between bank size and financial stability of banks. With data from large global banks, the results showed that larger banks had a higher probability of experiencing financial distress during economic crises due to their complexity and interconnectedness within the financial system. The authors suggested to the stakeholders to enhance regulatory measures for large size banks to monitor their financial operations. This study made a significant addition to explore the size-stability

relationship of banks in a global context. A study by Hughes and Mester (2015) examined the USA banks from 2000 to 2010 in order to know how bank size influences their financial stability. They observed that larger banks had better risk management practices enabling them to access the capital markets and contribute to their financial stability. The concluding remarks of this study suggested that while bank size may bring financial stability benefits, it also needs strong regulatory oversight for identifying the early warning signs. The regulatory bodies should carefully monitor the large size banks to detect the early warning signs and take corrective action proactively.

Various other authors have explored the relationship between bank size and financial stability based on financial data from different regions of the world. A study by Berger and Bouwman (2017) examined the relationship between bank size and financial stability in the context of market crises. With wider data set from 2002 to 2015, the results of this study indicated that larger banks were more resilient during financial crises due to the better liquidity management and diversified earnings portfolios. The authors also observed that following the financial crises, large size banks faced increased regulatory scrutiny to detect probabilities of financial distress. This study recommended that a balanced size stability approach would be more useful by looking at the asset quality and risky portfolios. A research work conducted by Chiaramonte, Croci, and Poli (2019) checked the effect of bank size on financial stability in European banks from 2000 to 2016. The results showed that larger banks had a higher level of financial stability due to better diversification policies and wider access to financial resources in the financial system. However, the authors cautioned on the higher systemic risk associated with larger banks. The study recommended regulatory steps to manage these risks and emphasized the significant effects of bank size on financial stability. To manage size-stability factor, the larger banks have established their in-house risk management teams for managing the market risks in a better way. A recent work to explore the size-stability nexus by Kim, Batten, and Ryu (2021) examined how bank size impacted the financial stability in South Korean banks from 2007 to 2018. The results of this study indicated that larger banks were more financially stable due to their economies of scale and effective risk management frameworks. The larger bank size enables bank management to develop effective risk management strategies and develop compliance procedures in a better way. However, the study also expressed caution on the potential systemic financial risks posed by these large size banks. This study recommended improved regulatory oversight for large size banks to monitor their deposits and credit portfolios to ensure financial stability of the banking system.

H10: The higher bank size negatively affects financial stability of banks.

2.14 Risk Management

The relationship between financial stability and risk management is explored by many researchers based on data from different countries. A notable by Fahlenbrach, Prilmeier, and Stulz (2012) checked the link between risk management and financial stability by examining U.S. banks during the 2008 financial crisis. They reported that banks with more advanced risk management policies experienced fewer defaults and maintained better financial health during the crisis. Their study recommended that effective risk management practices can significantly reduce a bank's vulnerability to severe financial crises. For the stability of the banking industry, the regulatory bodies should also develop parameters for effective risk management. Studies conducted in this domain include the work of Barth, Caprio, and Levine (2013), who using the data of 72 countries, examined how risk management practices affect financial stability of banks globally. They reported that banks that adopted rigorous risk management policies were less likely to fail during economic crises. This study provided strong empirical evidence that effective risk management practices are critical in enhancing the resilience of banks to safeguard financial stability of banks. However, these risk management practices should not become a barrier in the growth of bank operations and only the necessary checks should be applied for ensuring compliance with financial stability guidelines.

On further exploring that how risk management affects the financial stability, research conducted by Laeven and Levine (2013) analyzed the role of risk management practices in maintaining financial stability of banks during the periods of market volatility. The results of this study indicated that banks with proactive risk management practices had significantly lower risks of insolvency. The authors stressed that comprehensive risk management policies are critical in predicting and mitigating potential risks that can affect financial stability of banks. The regulatory bodies should also carefully monitor the risk management practices of the banks as fragility in one bank may lead to instability in the whole banking industry. The modern financial system is deeply integrated within itself and any trouble in one bank may quickly spread to the other one affecting financial stability.

More research in this domain was conducted within the context of emerging markets by Anginer, Demirguc-Kunt, and Zhu (2014) who examined on how risk management practices affect the financial resilience of banks and concluded that better risk management practices were associated with higher financial stability among banks specially in volatile economic

jurisdictions. This study emphasized the need for effective risk management systems in emerging markets where banks are more prone to external economic shocks. The authors also advised the regulatory bodies to play their role effectively in addressing the shortcoming the risk management policies of the banks. In the same way, research by Silva, Cortez, and de Barros (2017) examined the effect of risk management on the financial stability of European banks during the Eurozone debt crisis. Based on the results of the study, the authors showed that banks with robust risk management policies were able to maintain financial stability despite the economic crisis. Their research confirmed the hypothesis that effective risk management is a key determinant of financial stability in banks. However, developing risk management policy is not effective unless the strong mechanism is developed to implement the risk management tools.

Further exploring the role of risk management, Jagtiani, Kotliar, and Maingi (2019) examined the U.S. community banks and reported that enhanced risk management practices led to improved financial stability outcomes. They recommended that small banks can also benefit significantly from adopting customized risk management strategies. This study also provided evidence on how risk management policies contribute to financial stability across different bank sizes. They advised bank management to establish strong risk management systems within the banks to monitor the market risks proactively. A similar work by Cheng and Quan (2020) investigated the effect of effective risk management systems on the financial stability of Chinese banks. The results of this confirm that banks with comprehensive risk management frameworks performed better in terms of financial stability. This study also reported the effectiveness of integrating various risk management practices to cope with the dynamic financial landscape in China. Similarly, by Harrison and Zhang (2021) delved into the causal relationship between advanced risk management strategies and financial stability of banks in Canada. The findings of this study confirmed the evolving nature of risk management as a crucial component of financial stability in modern banking systems. The authors recommended an effective risk management system for dealing with the unexpected market situation where abrupt changes may negatively affect financial stability of banks.

H11: Producent risk management practices positively affect financial stability of banks.

2.15 Credit Expansion

The role of credit expansion in shaping financial stability of banks is explored by many researchers. For example, a study by Bernanke and Lown (1991) evaluated the effects of credit expansion on USA based banks after the deregulation of financial institutions in the 1980s. They concluded that initial credit growth led to increased profitability and stability but eventually contributed to the Savings and Loan crisis in 1980s. The findings of this study stressed that while credit expansion can enhance bank financial stability in the short term, it requires prudent credit expansion policies to prevent long-term financial distress. This study also recommended policy makers to inject suitable regulatory mechanisms to identify and trace the volume and scale of credit expansion and its potential impact on financial stability of banks. A similar study by Demirgüç-Kunt and Detragiache (1998) reported that rapid credit expansion is often lead to banking crises especially when associated with speculative lending booms. The results of this research recommended that credit expansion of banks should be closely monitored and ideally be proportional to the real economic growth of action. This study reminds policy makers to carefully monitor the credit expansion policies and closely watch financial stability of banks.

The credit expansion by a bank lead to enhancing the bank advances and loans to the eligible borrowers. To examine the impact of credit expansion on the financial stability, a research work by Clarke, Cull, and Pería (2006) examined the effects of credit expansion in emerging markets. Based on data analysis of the study variables, the findings of this study suggested that banks in these markets often experience enhanced financial stability when they expand credit as it diversifies their asset portfolios. However, this result is conditional on the economic environment and the financial position of the banks. This study lends support to the hypothesis that in under-banked regions, credit expansion is critical to achieving financial stability. More evidence to this fact was provided by Rajan (2006), who argued that while credit expansion is important for economic growth, its effect on financial stability is conditional on the related financial innovation and risk management practices. The study recommended that innovative financial products can often hide potential risks and create false financial stability leading to subsequent periods of instability when underlying vulnerabilities surface. Based on the data of the USA banks, a study by Mian and Sufi (2010**)** examined the U.S. housing market to assess the effects of credit expansion on financial stability. The authors reported that credit expansion targeted at high-risk borrowers led to increased default rates among banks and subsequent

banking instability during the 2008 financial crisis. This study recommended that a careful analysis of the borrowers should be made before extending the credit in order to avoid future losses. This research highlighted the negative effects associated with unplanned credit growth and the importance of maintaining stringent lending policies. The extension of bank credit to non-eligible borrowers significantly affects the financial stability of banks.

A very comprehensive study by Jordà, Schularick, and Taylor (2011) provided a historical analysis of credit expansion and financial stability of banks over the past 140 years. Their research reported that periods of high credit growth by banks are frequently followed by financial crises. They recommended that the effects of credit expansion on financial stability have a cyclical nature and depend significantly on the regulatory framework in place at the time of expansion. They advised regulatory bodies and other stakeholders to develop baseline parameters for observing changes in credit expansion. More research in this area was conducted by King (2013) who examined the relationship between credit growth and financial stability across several Asian economies. This study found that controlled credit expansion contributes positively to stability by providing necessary funds to productive sectors. The author recommended the importance of credit quality over credit quantity calling for well-targeted credit policies which are essential for maintaining financial stability of banks.

Another good study is contributed by Harvey and Siddique (2019) who examined how credit expansion influenced financial stability of banks in post-2008 financial crisis in the United States. Based on data analysis, the authors reported that banks which were engaged in measured credit expansion policies observed improved stability and performance as compared to those that did not. This study recommends the notion that credit expansion, when managed properly, can significantly contribute to financial stability of banks. A recent study by Nguyen and Boateng (2021) focused on the effect of credit expansion on financial stability of banking Vietnam. This study revealed that banks which expanded credit portfolios through consumer and SME lending experienced higher financial stability levels. The study confirmed the positive impact of credit expansion on financial stability in developing markets, particularly when it aligns with broader economic development goals.

H12: A higher level of credit expansion positively affects the financial stability of banks.

2.16 Macro-Economic Factors

There are several macro-economic factors that affect the financial stability of banks. For this study, following macroeconomic variables are considered based on the work of earlier studies;

GDP Growth:

The relationship between the growth in Gross Domestic Product (GDP) and financial stability of banks is studied by many researchers. For example, a study by Boyd and Runkle (1993) found that higher economic growth reduces the risk of bank failures by enhancing the financial resources of borrowers. This study considers that with increased GDP growth, people will have more financial resources to support their financial matters. The higher GDP growth generally enhances the financial stability of the financial institution of a country. Similarly, a study by Ghosh (2016) reported that higher GDP growth positively affects the financial stability of banks by reducing non-performing loans (NPLs). It is because higher GDP growth brings monetary gains for individuals and firms enhancing their disposable incomes which individuals and firms can use for their settlements of loans. Some other studies have also confirmed that GDP growth significantly affects the financial stability of banks by influencing the overall economic environment in which banks operate. Higher GDP growth generally leads to increased business activities and higher demand for bank loans, improving the profitability and financial stability of banks. Various studies have checked the relationship between GDP growth and financial stability of banks. These studies include the work of Köhler (2020) who reported that sustained economic growth enhance capital reserves of the bank to withstand economic shocks.

Contributing to this relationship in the context of a developing country, Ahmed, Suleiman, and Ying (2020) suggested that GDP growth positively associated with financial stability of banksin Nigeria. A similar study in the same context by Beck, Büyükkarabacak, Rioja, and Valev (2021) stressed the importance of GDP growth for financial stability of banks in emerging markets. This study recommended that economic expansion provides banks with more business growth opportunities and provides options for diversified risk management capabilities. The argument is strengthened in the context of advanced economies by Barrell, Davis, Karim, and Liadze (2022) who showed that consistent GDP growth helps maintain the financial health of banks. Summarizing the above arguments, it can be safely concluded that GDP growth supports the financial stability of banks by promoting favorable economic conditions, enhancing borrower financial position and providing banks with more business opportunities for profitable operations.

H13: Higher GDP growth rate positively affects financial stability of banks.

Inflation:

The relationship between inflation and financial stability of banks is examined in different studies. Theoretically, financial stability of banks is affected by inflation by influencing interest rates, loan repayments etc. by business firms and the overall financial system. A high inflation rate can erode the value of money and reduce the real value of loan repayments and potentially contribute to higher default rates. The empirical confirmation of this argument was made by Bernanke and Gertler (1999) who highlighted the adverse effects of inflation on financial stability by examining the link between monetary policy and bank performance. Another useful study by Huybens and Smith (1999) observed that inflation can disturb the financial markets and undermine financial stability by reducing the real returns on financial assets.

A similar point was endorsed by Bordo and Wheelock (2011) who discussed how inflation can lead to higher interest rates in an economy resulting in increasing the cost of borrowing and reducing net interest margins of banks. However, a study by Creel, Hubert, and Labondance (2015) stressed that moderate inflation can support financial stability of banks by preventing deflationary trends. However, higher inflation rates can bring operational and financial risks to the financial stability of banks. Extending this debate, some recent studies by Phan, Daly, and Akhter (2020) expressed that inflation volatility negatively impacts financial stability of banks enhancing credit risk and volatility in the financial markets. Similarly, Beckmann, Czudaj, and Straetmans (2021) found that inflation expectations in an economy can significantly affect bank lending in a period enhancing market and operational risks.

H14: Higher inflation rate negatively affects the financial stability of banks.

Interest Rate:

Financial stability of banks is significantly influenced by the levels of interest rates affecting their profitability, financing costs, and risk-taking behavior. The abrupt fluctuations in interest rates can reduce the net interest margin (NIM) which is an important source of income for banks. This phenomenon was discussed by Merton (1974) who studied the effect of interest rate changes on financial stability of banks and observed that interest rate changes significantly affect the asset quality and profitability of banks. Some other researchers also contributed to this debate such as Drakos (2003) who checked how interest rate volatility affects financial stability of banks by affecting loan and deposit rates. This study reported that a rising interest

rate scenario can increase the cost of funding for banks and reduce their profit margins contributing to the potential stability issues. They recommended that regulatory bodies of banking industry should consider the policy rate increase or decrease by the central banks and advise the banks to adjust their portfolios accordingly.

A study by Gambacorta (2008) examined that banks can adjust their lending behavior in response to the interest rate changes that can affect their risk exposure and financial stability. This study advised on developing coping mechanisms for dealing with the adverse changes in the interest rates. This debate is further extended by recent research by Claessens, Coleman, and Donnelly (2018) who proposed that low-interest rates might lead banks to take on more financial risk to maintain profitability that affect their financial stability. The same argument is extended within the framework of developing countries by Jeon and Miller (2021) who illustrated how interest rate policies in South Korea has affected financial stability of banks. Another useful academic addition by Apergis and Christou (2022) examined the effect of interest rate changes in the European countries and found that interest rate shocks significantly affect the profitability of banks along with their financial stability.

H15: Higher interest rate negatively affects the financial stability of banks.

Exchange Rate Volatility:

Another significant macroeconomic variable affecting the financial stability of banks is the exchange rate volatility. The exchange rate volatility impacts the financial stability of banks by influencing their foreign currency risks and the value of their foreign currency dominated assets and debts. Generally, banks with major foreign currency transactions are particularly vulnerable to exchange rate fluctuations. To deeply examine this issue, a study by Dornbusch (1980) studied the effects of exchange rate volatility on the global financial system by highlighting its financial effect on banks. The results of this study cautioned banks to adjust their foreign exchange exposure risk as per the changes in the market rates. A research study conducted by Wong (2000) examined how exchange rate movements affect the financial stability of banks, thereby affecting the value of dollar denominated financial assets and liabilities. This study recommended that the exchange rate volatility may lead to significant gains or losses impacting the profitability and financial stability of banks. Therefore, this study further suggested that suitable foreign exchange risk mechanism should be adopted by the banks to manage their risk exposure.

Since the movements in foreign exchange rates are market-based, the banks and regulatory bodies are advised to carefully monitor the changes in the foreign currency exchange rates to anticipate their potential impact on their financial operations. A very relevant study by Kanas (2005) observed the effects of exchange rate fluctuations on the profitability of banks and argued that adequate risk management policies within banks should be adopted to withstand the resulting changes in the foreign exchange rates. Another useful addition to this issue was made in the study of Kasman, Vardar, and Tunc (2011) who stated that exchange rate volatility enhances the risk of banking crises in emerging markets by impacting foreign exchange positions of the banks. A responsive risk management system should be put in place by the banks to address the resulting financial spillovers. A similar point was made in recent research by Beirne and Friedrich (2020) who stated that exchange rate volatility affects the risk-taking behavior of banks by influencing financial stability of banks. The same point is emphasized by Furthermore, Frost, Gambacorta, Huang, and Shin (2021) who found that exchange rate volatility impacts the creditworthiness of bank borrowers by affecting the loan portfolio of banks and the overall financial stability.

H16: Higher foreign exchange volatility negatively affects the financial stability of banks.

Remittances:

The remittances play a critical role in financial stability of banks in developing countries by enhancing liquidity and deposits base. Many researchers have studied the impact of remittances on financial stability of banks, especially in developing countries. A notable study by Giuliano and Ruiz-Arranz (2009) found that remittances enhanced financial development by increasing deposits and credit availability in developing countries. These inflows of foreign exchange dominated funds can strengthen balance sheets of banks and may improve their lending capacity as confirmed by the academic work of Aggarwal, Demirgüç-Kunt, and Martínez Pería, (2011). The remittances provide additional liquidity support to the banks in foreign currency denominated funds. Further evidence of this phenomenon was provided by Kireyev (2006) who demonstrated that remittances act as a countercyclical financial force facilitating stabilizing banks during economic crises. Another study by Abdih et al. (2012) endorsed this point by reporting that remittances reduce the probability of banking crises by injecting a stable source of external finance. More support to this argument is provided by Yang (2011) who highlighted that remittances also mitigate liquidity constraints of banks resulting in smooth performance of their regular operations. A recent study by Azizi (2020) confirmed that remittances

significantly contribute to financial stability by increasing the deposit base of banks and reducing credit risk. Finally, a study by Ambrosius and Cuecuecha (2021) confirmed that remittances positively affect financial stability of banks and provide an alternative source of financing.

H17: Higher receipts of remittances positively affect the financial stability of banks.

2.17 Outcomes of Financial Stability of Banks

The last part of this study discusses the outcomes of financial stability of banks. The financial stability of a bank is always desired; however, the outcomes of financial stability may appear in different forms that need examination. As earlier studies have depicted, financial stability in banks is critical for the soundness of the financial system and the overall economy. Covering both bank specific factors and macroeconomic factors that affect financial stability of banks, a brief discussion is presented here on the outcomes of financial stability of banks;

Financial Performance:

A study by Levine (1997) studied the critical role of financial development in economic growth, which indirectly enhances the financial stability and performance of banks. The study argued that a robust financial development framework can lead to greater financial stability and better financial performance. Financially stable people are better positioned to manage market risks and allocate resources efficiently resulting in improved profitability and operational efficiency. A research study by Adrian and Shin (2010) explored the impact of banks' leverage and liquidity models on their financial stability and performance. They suggested that banks maintaining lower leverage and higher liquidity are generally more financially stable, which in turn boosts their financial performance by reducing potential distress during financial crises. Their research findings highlight the importance of maintaining adequate capital and liquidity to ensure continuous financial performance.

A study by Schularick and Taylor (2012) summarized a historical analysis presenting that period of higher financial stability correlates with stronger financial performance of bank. They stated that financial stability leads to reduced volatility and improved profitability and growth of banks supporting the assertion that financial stability is beneficial for long-term bank performance. The improvement in financial performance leads to enhanced profits and brings higher returns to the shareholders. A similar work by Anginer and Warburton (2014) investigated the impacts of bank capitalization on financial stability and financial performance and concluded that well-capitalized banks were more resilient and perform better during

economic crises. This study recommended that capital adequacy is a crucial financial stability indicator that positively influences financial performance. They advised regulators to carefully examine the financial performance and capital adequacy of banks for enhanced financial stability levels.

A useful study by Claessens, Coleman, and Donnelly (2018) examined how stable financial conditions enhance net interest margins of banks. They stated that a stable low-interest rate environment increases the interest margins of banks by decreasing funding costs and increasing the spread between lending and deposit rates leading to improved financial performance. Therefore, the periods of financial stability enhance financial stability of banks. More work by Demirguc-Kunt, Pedraza and Ruiz-Ortega (2020**)** examined the link between financial stability measures and their effects on financial performance of banks across multiple countries. Their research suggested that better governance and effective regulations which enhance financial stability are also associated with higher profitability and operational efficiency in banks. A recent work by Cornett, McNutt, Strahan, and Tehranian (2021**)** examined the effects of financial stability on the risk-taking behavior and financial performance of USA based banks. They reported that banks with more stable funding sources and higher capital ratios tend to take fewer risks resulting in more stable and strong financial performance. The authors advised stakeholders to ensure financial stability and put in place the necessary parameters to detect the early warning signs of financial instability.

H18: Higher financial stability positively affects the financial performance of banks.

Market Confidence

Financial stability results in enhancing the market confidence of different stakeholders of banks. A study by Schularick and Taylor (2012) examined credit booms and financial stability focusing on how past financial crises have influenced market perceptions and confidence. Their historical analysis shows that periods of financial stability led to increased market confidence, which in turn supports more robust economic environments. This study is significant in understanding the cyclical nature of market confidence and its dependence on underlying financial stability. A study by Hahm, Shin, and Shin (2013) checked on macroeconomic factors that influence financial stability and market confidence. Their findings show that macroeconomic policies enhance financial stability and indirectly support higher market confidence by reducing uncertainty and enhancing predictability in the banking sector. A very useful study by Adrian and Shin (2014**)** evaluated the relationship between leverage and market

perceptions of risk. Based on data analysis of the study variables, they concluded that lower leverage ratios are correlated with higher market confidence. This study provides empirical evidence supporting the hypothesis that prudent financial practices enhance confidence among market participants.

A research work conducted by Acharya, Pedraza and Subrahmanyam (2016) studied the implications of the global financial crisis with regard to financial stability and market confidence. They reported that banks that maintained strong capital and liquidity reserves during the financial crisis were trusted by the market participants including depositors, borrowers and investors. sustained market confidence among market participants. In addition to this, a research study by Claessens, Coleman, and Donnelly (2018) examined the effects of regulatory frameworks on financial stability and market confidence. Based on data analysis, they reported that strictly regulated financial systems tend to boost investor and consumer confidence significantly. A similar work by Choi, Eisenbachn and Yorulmazer (2019) explored how perceptions of financial stability of banks affects market dynamics in the context of financial crisis management. They found that visible signs of financial stability significantly influence market confidence supporting the hypothesis that financial stability is key to maintaining market trust. This study advised regulators to maintain financial stability in the banking sector which results in enhancing the market confidence of investors, borrows and depositors on the financial system.

H19: Higher financial stability level positively affects market confidence in banks.

2.18 Research Contribution

The literature review presented above summarized the contribution of earlier researchers on identifying different variables that affect financial stability of banks. These include both bank specific factors such as capital adequacy, liquidity, asset quality etc. and macroeconomic factors such as the GDP growth rate, interest rate, inflation rate etc. Extending the work of earlier researchers, this study seeks to add unique dimensions to the ongoing debate on financial stability of banks. This contribution in research is bounded by the theoretical lens of the financial fragility theory and the financial intermediation theory.

The first contribution of this study is the determination of financial stability of banks based on the Z Score parameter. The banks are ranked based on their financial stability score calculated on the basis of historical data through Z Score. This ranking of banks based on financial

stability provides a link for understanding the evolution of financial stability in the banking sector of Pakistan.

The second contribution of this study is the determination of the antecedents of financial stability of banks based on CAMLES framework for the banking sector of Pakistan. Specific contribution in this domain is the study of changes in financial stability of banks within the CAMELS' framework using the data set from 2007 to 2021. Earlier work by Cole and Gunther (1995), Roman and Sargu (2013), Karim, Chan, and Hassan (2021) studied bank specific factors and their role in shaping financial stability of banks using CAMELS framework. This study adopts the same research approach within the context of the Pakistani banking sector with data period from 2007 to 2021. Within the CAMLES' framework, the role of capital adequacy, asset quality, the management quality, earnings, liquidity and sensitivity to market risk will be observed in shaping financial stability of banks in Pakistan. Another useful addition is the addition of two more factors; financial inclusion and financial innovation with the traditional bank specific factors to comprehensively understand the factors shaping financial stability of banks. Resultantly, this study extends the academic contribution in the field of financial inclusion to earlier studies such as Ahamed and Mallick (2019), Pham and Doan (2020), Vo et al. (2021) and Ahamed et al. (2021). Similarly, within the domain of financial stability of banks, this study seeks to extend academic argument of financial innovation as advocated by the earlier studies Beck et al. (2016), Khan et al. (2021) and Marfo and Tweneboah (2022).

The third contribution of this research study is to find the impact of other bank specific variables such as financial innovation, financial inclusion, risk management, income diversification and bank size on financial stability of banks. Along with the CAMELS factors discussed above, there are many other variables that affect the financial stability of banks. This study seeks to contribute to this area by examining the impact of relatively newer variables such as financial innovation and financial inclusion. In addition to this, this second model seeks to study the effect of risk management policies, income diversification and bank size on financial stability of banks. Based on extended data and sample of Pakistani banks, this study seeks to add the academic contribution in the earlier studies of Albulescu (2015), Hodge, Kang, and O'Neill (2020) and Ghosh and Saun (2021).

The fourth contribution of this study is to understand the impacts of the macroeconomic factors that significantly affect financial stability of banks in Pakistan. The macroeconomic

environment is the most significant factor in affecting the financial system in any country. Earlier researchers such as Barrell, Davis, Karim, and Liadze (2022), Beckmann, Czudaj, and Straetmans (2021), Apergis and Christou (2022), Gambacorta, Huang, and Shin (2021) and Acharya, Eisert, Eufinger, and Hirsch (2021) have studied different macroeconomic factors including GDP growth, inflation, interest rate, foreign exchange rate, remittances and how these factors affect financial stability of banks. This study seeks to explain the relationship of financial stability of banks with the Pakistan specific macroeconomic factors.

Lastly, this study seeks to document the outcomes of financial stability of banks. This dimension of financial stability is the least explored area in literature. This study aims to add academic contributions on how a particular level of financial stability results in affecting bank specific variables such as financial performance and market confidence. Recent researchers such as Wang and Liu (2021), Carletti, Claessens, and Figueroa (2020) and Aikman, Haldane, and Nelson (2022) have added their contribution on outcome factors such financial performance and market confidence. Extending their work, this study seeks to add academic contribution by highlighting the bank specific outcome factors.

The research contributions mentioned above are contextualized within the theoretical foundations of the financial fragility theory and financial intermediation theory. As explained earlier, the financial fragility theory seeks to explain bank specific and macroeconomic factors that can affect financial stability of banks in a country. The recent work on the financial fragility theory by Adrian, Boyarchenko, and Giannone (2020), Benmelech and Bergman (2021) and Laeven, Ratnovski, and Tong (2022) is further extended by this study by examining the bank specific and macroeconomic factors within the economic context of Pakistan affecting financial stability of banks. Within the financial fragility theory, the bank specific factors are studied using the CAMELS' framework in order to document the impacts of different bank specific variables on financial stability of banks. Along with these CAMELS' factors, other bank specific variables such as financial innovation, financial inclusion, income diversification and bank size are studied to examine their impact on financial stability of banks.

Similarly, the financial intermediation theory focuses on the role of banks as intermediaries and how their financial stability is shaped through bank specific actions in the overall financial system. The recent work on the financial intermediation theory by Demirgüç-Kunt, Pedraza, and Ruiz-Ortega (2020), Huang, Wang, and Yang, (2021) and Beck, Da-Rocha-Lopes, and Silva (2022) is further extending by this study in the context of understanding the impact of

bank specific and other macroeconomic factors shaping the levels of financial stability of banks. The financial intermediation theory contextualized the bank specific and macroeconomic factors that shaped the working of financial institutions and their associated stakeholders i.e. depositors, borrowers, investors, firms etc. Along with that, the outcomes of a particular level of financial stability are examined in order to study the implication of financial stability of banks.

Chapter Summary:

This chapter examined the relevant literature on financial stability of banks with an objective to seek the antecedents and outcomes of the study. At the start of the chapter, a brief discussion is made on the underpinning theories, financial stability theory and financial intermediation theory. After this, the literature is reviewed on the factors affecting financial stability of banks within the research framework of CAMELSs and other bank specific factors. A detailed discussion is also made on the macroeconomic factors affecting the financial stability of banks. In addition to this, the outcome variables of financial stability of banks were studied in the light of the existing literature to identify the models for studying the impacts of financial stability of banks. Along with this, the hypothesis for each variable was developed based on the literature reviewed. Lastly, the research contributions of this study within the academic domain of the financial stability theory and the financial intermediation theory are discussed.

CHAPTER 3 RESEARCH METHODOLOGY

This chapter explains the research methodology followed for this study. The research methodology includes discussion on research paradigms, research philosophy, research approach, data collection method, sampling method, data analysis, statistical techniques and the econometric model used to estimate the relationship among the variables. Along with this, this chapter also includes detailed description of the research frameworks used for this study, measurement proxies for each variable included in the study and the explanation of the econometric models used for this study.

3.1 Research Paradigm

This chapter deals with the explanation of the research methodology to be adopted for conducting this study. The basic research phenomenon for any study is to describe the research paradigm that shapes the structure of the whole study. The research paradigm shapes the approach and methodology researchers use to explore and understand the matter of interest in a research study. At a broader level, the research paradigm serves as the philosophical underpinning of the study helping to decide the format of the conceptual framework and guides on the systematic approach for conducting the research process.

Both quantitative and qualitative researchers used the research paradigm as the foundation stone for deciding the direction and nature of their study. Within the research paradigm, the researcher states its ontological and epistemological assumptions for a particular research matter. The ontological assumptions tend to explain the nature of reality by asking questions such as what exists, and the epistemological assumptions deal with the nature of knowledge being explored and how this knowledge has reached it to us in its present form. Accordingly, depending on these philosophical assumptions, researchers aim to adopt one of these research paradigms; positivism, interpretivism, critical theory and pragmatism. (Saunders et al., 2019; Creswell & Creswell, 2018).

Positivism uses quantitative methods to seek causal determination of factors, defining predictability and generalization of research findings. In contrast, the interpretivism research paradigm considers that reality is subjective and is constructed from human relationships and engaged with through the cultural, social or context dependent meanings individuals or groups attaches to the events.

These differing viewpoints in research paradigms have resulted in creation of distinct methodological approaches in the different research fields. For example, under interpretivist research paradigm, qualitative methods such as interviews and observations are preferred for data collection as these methods enable researchers to capture the depth of human experiences and the complex nature of social phenomena related to a particular matter of interest. On the other hand, the research paradigm contrasts with positivism which prefers more scientific approaches for structured research methodologies like experiments and surveys with a view to eliminating research biases and focusing on observing changes in the independent and dependent variables.

Apart from positivism and interpretivism, some other research paradigms such as critical theory and pragmatism present additional perspectives on a particular area of interest. The critical theorists claim that research should aim to highlight the existing inequalities in society and drive societal change using both qualitative and quantitative data collection methods to challenge power structures. However, a research paradigm known as pragmatism focuses on practical aspects of a research problem and adopts the 'what works' approach with a flexibility to use any available research method which they find suitable to address the research question. This flexible approach is very helpful in applied research fields where the objective of the research is to solve a specific practical problem. In the end, it can be summarized that each research paradigm, with its unique set of assumptions about the research issues, impacts the choice of research questions and the design of the study, the methods used for data collection and analysis and the interpretation of data analysis results.

3.2 Research Philosophy

With a brief discussion on research paradigms, now, the focus is shifted on the research philosophy used for this study. Positivism is a philosophical approach that advocates knowledge is primarily derived from observable phenomena and supporting empirical evidence in a particular research setting. Based on the scientific approach, positivism prefers objectivity and the quantifiability of the matter of interest through systematic observation in the research process. In applied research, it favors research methodologies that rely on quantifiable data to develop and test the research hypotheses. The research conducted through positivism paradigm uses scientific methods and rely on numbers for quantifying the research matter. The positivism-aligned researchers suggest that through comprehensive empirical methods, researchers can find the objective truths about the area of interest and can sperate the facts from

raw opinions or subjective interpretations. Research philosophy is a structured process where theories are tested against observable outcomes with the objective of producing reliable and generalized results that contribute to a unified body of knowledge. In fields such as science and economics, positivism favors a focus on facts discoverable through empirical research, promoting a clear demarcation between scientific knowledge and other forms of understanding.

The philosophy of research in quantitative finance revolves around positivism that assumes the financial world can be observed empirically and described through objective quantitative analyses. This research philosophy is a foundational step in the development of testable hypotheses based on existing theories and models. Quantitative research in finance seeks to establish cause-and-effect relationships by measuring and analyzing financial variables for a particular period by categorizing them as independent and dependent variables. Generally, researchers rely on rigorous statistical methods to test these relationships with a view that the findings are reproducible and generalizable for a wider business and economic environment. The goal of the research in the field of finance is to derive conclusions that are not subject to the researcher's biases which may provide clear insights into complex financial issues.

3.3 Research Approach

The research approach refers to the specific plan or design used to conduct research for studying a particular research problem. The research approach works as the link between the research philosophy and the research methods to conduct the research. The research approach shapes the way the research is conducted, guiding on the logical sequence of steps required for analyzing the problem, facilitate defining research questions, and drawing the relevant conclusions from the observed data. There are mainly two types of research approaches mostly used in the research: deductive and inductive. The deductive approach begins with a stated theory or hypothesis and involves designing a research strategy to test the hypothesis based on the collected data. It is a common approach used in sciences where laws and established theories guide the research process for understanding a particular issue. The inductive approach which is mostly used in qualitative research, starts with observations and data from which theories are inferred or developed because of analyzing the data and the context. This research approach is mostly used in contexts where there is little existing theory to start from, and researchers are exploring a new phenomenon. A third approach, which is rarely used, is called the abductive approach that combines elements of both research approaches, starting with an incomplete set of data and progressing to the possible explanation for a particular phenomenon

and then back to the research elements in a continual refinement process. (Bryman & Bell, 2015; Saunders et al., 2019)

3.4 Research Strategy

The research strategy refers to the specific methods that present the overall idea on how to answer the research question and meet the research objectives. It also helps to determine the specific research method or plan to be used for data collection for a specific study. A particular research strategy defines how the research objectives will be achieved and specifies the choice of data collection processes/methods. The research strategies include experiments, surveys, case studies, ethnography, phenomenology, action research, and grounded theory in a research setting. (Wooldridge, 2016; Saunders et al., 2019). Each of these research strategies has its own strengths and is suitable for different types of research questions of a study. For example, case studies are detailed examinations of a single subject or a small group of subjects providing comprehensive insights over broader generalizations, and which is ideal for complex issues in real-life contexts. On the other hand, surveys are quantitative in nature and are used to collect data from many respondents in a systematic manner, making them suitable for research that aims to measure and analyze population-wide trends. The choice of research strategy not only affects how data is collected and analyzed but also affects how research results are interpreted and presented to the audience thus impacting the conclusions that can be drawn. The research strategy in finance mostly used survey or case studies for exploring research questions.

3.5 Time Horizon of Research

The time horizon of a research project refers to the years or periods for which the study is conducted and defines whether the research is based on a single moment or a sequence of events over an extended period. There are two primary types of time horizons used in the research settings: cross-sectional and longitudinal. Cross-sectional research is observational in nature and focuses on collecting data at a single point in time. This time approach is often used to assess the status or to compare different groups at one time useful for studies that aim to capture a specific issue without regard for how it changes over time. On the other hand, longitudinal research is conducted with repeated observations of the same variables over longer periods which may span months, years, or even decades. This research approach is suitable for studying trends, developments, and changes over time allowing researchers to detect changes, cycles, and causal effects with greater accuracy and depth as compared to the cross-sectional

studies. The choice of time horizon for a study depends on the research questions and objectives along with the access to the data. The time horizon selected for a study presents various choices and serves different research purposes affecting the overall design and methodology of a study. This study applied a mixture of longitudinal and cross-sectional time horizon approach referred to as the panel data approach for studying multiple firms over different time periods. This panel data approach is a widely used approach in the field of finance for studying the changes which the dependent variable is facing as a result of changes in the independent variables across the selected time horizon.

3.6 Data Collection Method

The most important aspect in the research methodology in the field of finance is the data collection method as without data, the quantitative field of finance lacks rigor and reliability. The decision of data collection method depends on the many factors such as the research questions and objectives adopted for a study. There are several data collection methods used in research including the mono method, mixed method and multiple methods. The mono-method involves a singular approach which is purely qualitative (such as ethnographic fieldwork) or quantitative (such as structured surveys with numerical data). This choice of data collection is based on the specific demands of the research question that clearly aligns with either qualitative or quantitative paradigms to explore a particular research area. (Johnston, 2014; Cooper & Schindler, 2014). The mixed-method data collection approach mixes both qualitative and quantitative elements which is useful in studies where different types of data can enrich the research analysis and enable the researcher to provide the multiple perspectives on the same issue for detailed analysis. The mixed method data collection approach can enhance the depth and breadth of the research problem resulting in a more comprehensive understanding of complex phenomena. However, the analysis of data gathered through this process requires different data analysis techniques and same Lastly, the multi-method data collection approach includes using several techniques within the same methodological category to validate results or explore different aspects of the research question more robustly.

The research methodology in finance typically involves the collection and analysis of numerical data using a mono method to answer questions about financial markets, investment strategies, or economic trends. Most of the time, the collected data is of secondary nature with some studies focusing on primary data from the study participants. This study used the secondary data from the publicly available financial statements of the sampled banks. The

whole process of data collection is highly structured starting with the formulation of a hypothesis, followed by data collection from financial markets or databases and data analysis using statistical tools leading to conclusions with the interpretation of results to validate or refute the proposed hypotheses. This methodology enables researchers to uncover hidden patterns, test theories, and make timely informed decisions based on empirical evidence.

3.7 Population and Sample

Population refers to the entire set of subjects to whom the study aims to consider for generalization of results based on the data collected as per the above methods. The population may include a wide range of entities or bodies such as all companies listed on a stock exchange, all events incurred in a specific financial market and all retail investors in a particular country or sector. For a research study in finance, it's crucial to define a population out of which a suitable sample is selected for analysis. The identification of the correct population is crucial for the validity of the research study as it validates that the conclusions obtained are relevant to the specific business contexts. The selection of population also affects the scope and applicability of the research findings, and it should be clearly defined as per the research objectives and questions.

3.7.1 Sampling

Since the population contains a set of firms or individuals, their higher number may make it impossible to conduct the research study in the limited time frame. Therefore, the technique of sampling is developed to select the representative units of the population for data collection. In quantitative finance research, sampling is referring to selecting a representative subset of the population to conduct the study. Due to the presence of many firms and individuals in financial markets, it is often impractical or impossible to study the entire population. Thus, the sampling techniques are used to efficiently collect data that reflects the larger market dynamics. The sampling methods such as random sampling, stratified sampling, purposes sampling or systematic sampling are selected based on the nature of the research question and the features of the population. The sampling is crucial in ensuring that the study results are easily generalizable to the whole population with reasonable statistical validity for interpretation of financial trends.

The population of this research study includes all banks working in the banking sector of Pakistan. At present there are 20 private sector commercial banks, 5 public sector commercial

banks, 4 foreign-owned banks and 3 specialized banks, 11 microfinance banks and 9 Development Finance Institutions (DFIs). The banking sector in Pakistan is dominated by the commercial banks as 76% of all assets of the financial sector of Pakistan lies with the commercial banks. For this study, 21 commercial banks are included in the sample. However, public sector specialized banks are excluded from the sample. Moreover, microfinance banks, investment banks, foreign owned banks and specialized banks are not included in the sample due to their limited operations and limited presence in Pakistani financial system. A list of all sampled banks included in this study is given below;

Table 2. Names of Sampled Banks

Sr. No.	Banks
1	Habib Metropolitan Bank Ltd.
2	United Bank Ltd.
3	Faysal Bank Ltd.
4	Meezan Bank Ltd.
5	Dubai Islamic Bank Pakistan Ltd.
6	MCB Bank Ltd.
7	National Bank of Pakistan
8	Bank of Khyber
9	Habib Bank Ltd.
10	Soneri Bank Ltd.
11	Bank Al-Habib Ltd.
12	Bank Alfalah Ltd.
13	Bank Islami Pakistan Ltd
14	JS Bank Ltd
15	Samba Bank Ltd.
16	Standard Chartered Bank (Pakistan) Ltd.
17	Silk Bank Ltd.
18	Askri Bank Ltd.
19	Allied Bank Ltd.
20	The Bank of Punjab
21	Summit Bank Ltd.

3.8 Data Collection

After sample selection, the data for the sampled objects is collected for a period of 16 years starting from 2007 to 2022 on the sampled 21 banks. The data was obtained from the State Bank of Pakistan through a request to their data and publication department. The period is selected based on the availability of financial statements data and in order to cover a wider time span to capture the changes in the variables of study. The collected data is refined as per the analysis requirements and data validity and reliability is assured. The relationship among the variables of this study is explored through the econometric models which are described in the coming pages. The data for the said period on the variables of study discussed above is organized and analyzed using the Microsoft Excel and E-Views software. Data is also tested for stationarity, normality and endogeneity before running the regression models.

3.9 Panel Data

The data collected for this study is categorized as panel data which is also known as longitudinal data. It refers to a dataset that follows a specific set of subjects (such as individuals, companies, countries, etc.) over a set period enabling researchers to analyze multiple dimensions of changes in variables across both the temporal and individual axis. This type of data is particularly useful because it captures both the changes over time and the cross-sectional variations (differences between firms at any given time) leading to a more detailed and accurate analysis than cross-sectional data (only captures one point in time) or time series data (follows one subject through time).

The real strength of panel data set lies in its ability to more accurately infer causal relationships and control variables that are unobservable and time-invariant across the sample. For example, using panel data, a researcher can control individual heterogeneity which are the characteristics that might impact the dependent variable and do not vary over time such as cultural factors or inherent business capabilities. This feature of panel data makes it possible to isolate the effect of specific variables by examining the differences within the same units over time and enhancing the robustness of the results. Panel data models include two types of models; fixed-effects and random-effects, each suitable under different assumptions about the variability across units and time providing a flexible framework for econometric analysis.

3.10 Statistical Technique

Statistical techniques play a critical role in quantitative finance enabling the researchers to analyze and estimate the behavior of financial variables and valuing financial instruments.

These statistical techniques range from basic descriptive statistics to more complex inferential methods, such as regression analysis, time series analysis etc. Descriptive analysis provides a summary of central tendency and standard deviation of a particular data series. The correlation analysis describes the presence or absence of a relationship between two variables. Similarly, regression analysis is conducted to observe changes in one variable because of changes in another variable. These statistical methods enable researchers to extract insights from large datasets, validate or refute financial theories, and develop alternative explanations that are evidence-based and quantitatively justified.

Within the regression analysis, the Ordinary Least Squares (OLS) is the most widely used econometric technique to estimate the linear relationships among variables. The OLS regression technique has several assumptions that must be met to ensure reliable regression estimates. These assumptions include

i. Linearity in parameters which means that the assumed relationship among dependent and independent variables is linear.
ii. No perfect multicollinearity which implies that the independent variables are not perfectly linearly related to each other.
iii. Exogeneity which refers to the fact that the regressors are not strongly correlated with the error terms of the econometric model.
iv. Homoscedasticity refers to the fact that the variance of error terms is constant across time and entities.
v. No autocorrelation exists among variables which implies that error terms are not correlated across time within the same entity.

The above stated assumptions need to be followed while conducting the OLS regression analysis and any violation of any one or more than one assumption can lead to biased or inefficient estimates in the OLS based regression.

3.11 Fixed Effects and Random Effects Model

In addition to studying the OLS regression method and its assumptions, there are some more aspects of panel data analysis which need to be studied. To perform panel data analysis, fixed effects and random effects models are used to control unobserved heterogeneity in the econometric model as this heterogeneity could have a potential effect on the dependent variable. The fixed effects model attempts to control for time-invariant characteristics econometric model by using only the variation within an entity over time by differencing out

those features that do not change over time. This model for estimating regression coefficients is suitable for cases where the unobserved variables are correlated with the observed variables in a model. This approach is especially useful when estimating effects across time within the same entities where specific entity features might affect the variables in the econometric model.

In contrast, the random effects model assumes entity's error term is not correlated with the variables implying that it can include time-invariant variables since it covers both within and between entity variations in a model. The random effect model is more efficient compared to the fixed effects model if the assumption holds true because it uses more data points as it considers differences between entities as well as within them for a comprehensive data analysis. The selection between fixed effects and random effects models is based on the presence of omitted variable bias versus the need to include time-invariant variables in the model. The Hausman Test indicates which of these two models should be applied while estimating the coefficients.

3.12 Generalized Method of Moments (GMM)

A more advanced regression estimation technique for the panel data analysis is the Generalized Method of Moments (GMM) that addresses several issues in panel data analysis including endogeneity and autocorrelation. The GMM technique uses different moment conditions which are expected to hold based on the theory basis of the model to provide more efficient and consistent estimators. The GMM regression estimation method is especially useful when dealing with dynamic panel data where lagged values of the dependent variable and other endogenous variables are included as regressors. The GMM estimators attempt to improve efficiency of the model by using an optimal weighting matrix for the variables. The validity of GMM regression estimations is based on the usefulness of the chosen instruments and the absence of autocorrelation in the model residuals which are further tested using Arellano-Bond tests. This estimation approach enables researchers for robust interpretation even in complex data situations where traditional regression methods fail to produce meaningful results.

The assumptions of the GMM estimation technique are;

i. The model must be structurally correct implying that functional form and the variables included in the model should reflect the true relationship.
ii. The instruments must be uncorrelated with the error term in the model.

iii. The instruments must be correlated with the endogenous regressors to obtain efficient and unbiased estimates.

iv. Errors across different sections must be uncorrelated or should not be strongly dependent.

v. There should be no second order serial correlation in dynamic panel data.

3.13 Conceptual Framework of the Study

The conceptual framework of this study is presented below by listing the dependent, independent, control variables, and outcome variable.

Dependent Variable: Financial Stability

Independent Variables:

Bank Specific Factors (Model 1: CAMELS)

i. Capital Adequacy
ii. Asset Quality
iii. Management Quality
iv. Earnings
v. Liquidity
vi. Sensitivity to Market Risk

Other Bank Specific Factors (Model 2)

i. Financial Inclusion
ii. Financial Innovation
iii. Bank Size
iv. Credit Expansion
v. Financial performance
vi. Income Diversification

Outcome Variables: (Model 3 & 4)

i. Financial Performance
ii. Market Confidence

Macro-Economic Factors (Model 5)

i. GDP Growth rate
ii. Inflation rate
iii. Interest rate
iv. Foreign exchange rate
v. Remittance

3.13 Measurements of the Study Variables

The following measures will be used to measure the study variables.

3.13.1 Financial Stability

Financial Stability (FS) is the dependent variable of the study measured by Z-Score (Boyd and Runkle, 1993; Laeven and Levine, 2009; Čihák and Hesse, 2010). In line with prior literature, Z-Score can be calculated as:

$$\mathrm{Z-Score} = (k + \mu)/\sigma)$$

Here k denotes the equity capital as percent of assets, μ refers to the return as percent of assets and σ depicts the standard deviation of return on assets.

3.13.2 Capital Adequacy

Capital adequacy is the independent variable and is measured through following ratio as earlier used by Berger and Bouwman (2013) and Cornett, McNutt, Strahan and Tehranian (2011);

$$\text{Capital Adequacy Ratio} = \frac{\text{Total Equity}}{\text{Total Assets}} \times 100$$

3.13.3 Asset Quality

Asset quality is the independent variable and is measured through following ratio in line with the earlier researchers Nkusu (2011) and Louzis, Vouldis, and Metaxas (2012)

$$\text{Asset Quality Ratio} = \frac{\text{Non Performing Loans}}{\text{Gross Advances}} \times 100$$

3.13.4 Management Quality

Management quality is the independent variable and is measured through following ratio as suggested by some researchers Pasiouras and Kosmidou (2007) and Li and Zhang (2013)

$$\text{Management Quality Ratio} = \frac{\text{Administrative Expenses}}{\text{Profit before tax}} \times 100$$

3.13.5 Earnings

Earnings is the independent variable and is measured through following ratio in line with the earlier researchers Goddard , Molyneux and Wilson (2004) and Dietrich, and Wanzenried (2011)

$$\text{Earnings Ratio} = \frac{\text{Net income}}{\text{Total assets}} \times 100$$

3.13.6 Liquidity

Liquidity is the independent variable and is measured through following ratio in line with the earlier researchers like Berger and Bouwman (2009) and Vodova (2011)

$$\text{Liquidity Ratio } = \frac{\text{Cash and cash equivelant}}{\text{Total assets}} \times 100$$

3.13.7 Sensitivity to Market Risk

Sensitivity to the market risk is the independent variable and is measured through following ratio in line with the earlier researchers Angbazo (1997) and Saunders and Schumacher (2000).

$$\text{Sensitivity to market risk ratio} = \frac{\text{Net Interest/markup income}}{\text{Total Assets}} \times 100$$

3.13.8 Financial Inclusion

Financial inclusion is the independent variable and is measured through following ratio in line with the earlier researchers Beck and Torre (2007) and Sahay et.al. (2015)

$$\text{Financial Inclusion } = \frac{\text{Gross Advances}}{\text{Total Deposits}} \times 100$$

3.13.9 Financial Innovation

Financial innovation is the independent variable and is measured through following ratio in line with the earlier researchers Beck and Demirgüç-Kunt (2006) and Lerner and Tufano (2011)

$$\text{Financial Innovation } = \frac{\text{Non markup/interest income}}{\text{Total Assets}} \times 100$$

3.14 Macro-Economic Factors

3.14.1 GDP Growth

The GDP growth is measured through the average annual GDP growth rate as suggested by Levine and Zervos (1998), Barro (2013) and Hussain and Awan (2012).

3.14.2 Inflation

The inflation is measured by the average annual Consumer Price Inflation (CPI) rate as suggested by Boyd, Levine, and Smith (2001).

3.14.3 Interest Rate

The interest rate is measured through average annual Karachi Inter Bank Offered Rate (KIBOR) in line with the work of Khan, Qayyum and Sheikh (2005).

3.14.4 Foreign Exchange Rate Volatility

The foreign exchange rate volatility is measured through average annual change in the dollar to Pakistani rupee in line with the work of Malik (2007).

3.14.5 Remittances

The remittances are measured as the percentage of GDP in line with earlier work of Giuliano and Ruiz-Arranz (2009).

3.15 Other Variables:

3.15.1 Bank Size

The bank size is measured in ratio form by looking at the relative size of the deposits of the specific bank with respect to the total deposits of the banking sector. This measurement formula is in line with the work of Beck, Demirgüç-Kunt and Merrouche (2010) and Sufian (2011)

$$\text{Bank Size} = \log of\ total\ assets$$

3.15.2 Income Diversification

The income diversification is measured in ratio form through following formula in line with the study of Stiroh (2004) DeYoung and Rice (2004)

$$\text{Income Diversification Ratio } = \frac{Non\ interest/markup\ income}{markup/Interest\ income} \times 100$$

3.16 Outcome Variables

3.16.1 Financial Performance

Financial performance is the outcome variable and is measured in ratio form through following formula in line with earlier studies of Kosmidou, Tanna and Pasiouras (2005) and Athanasoglou, Brissimis, and Delis (2008).

$$\text{Return on Equity } = \frac{\text{Net profit after tax}}{\text{Total Equity}} \times 100$$

3.16.2 Credit Expansion

Credit expansion is the outcome variable and is measured in ratio form through following formula in line with earlier studies of Keeton, W. R. (1999) and Jiménez, Lopez and Saurina (2013).

$$\text{Credit Expansion Ratio } = \frac{\text{Gross advances}}{\text{Total borrowing and deposits}} \times 100$$

3.16.3 Market Confidence

Market confidence is the outcome variable and is measured in ratio form through following formula in line with earlier studies of lannery and Sorescu (1996) and Nier and Baumann (2006).

$$\text{Market Confidence } = \frac{\text{Market price per share}}{\text{Earnings per share}} \times 100$$

3.16.4 Risk Management

Risk management is the outcome variable and is measured in ratio form through following formula in line with earlier studies of Laeven and Majnoni (2003) and Bikker and Metzemakers (2005).

$$\text{Risk management } = \frac{\text{Provision against non performing loans}}{Gross\ Advances} \times 100$$

3.17 Econometric Models

This study is completed by developing five different econometric models. In the first step, Z Score is calculated for finding the relative position of banks for financial stability. Then, at second step, the calculated Z Score is used as dependent variable and CAMELS factors to determine their impact on financial stability. At the third stage, the impact of other bank specific variables is examined on the financial stability of banks. At the fourth stage, this study highlights how financial stability affects the various outcome variables including market confidence and financial performance of a bank. Lastly, the macroeconomic factors are also used as independent variables to find their impact on financial stability of banks. A complete description of these research methods along with the econometric models is given below;

3.18 Z-Score Model for Financial Stability of Banks

The first step in this study is to use the Z-Score model, which is a statistical technique used to measure financial stability of banks. It was earlier developed by Altman (1968) to estimate the probability of bankruptcy of firms and its different versions have been adapted by different researchers and regulatory bodies to check the financial stability of companies, banks and

financial institutions. Based on the historical data from the financial statements of companies, the original model of the Z Score aggregated many financial ratios into a single Z score. Once the Z Score is developed, it is interpreted as a higher Z-Score shows greater financial stability and a lower risk of insolvency and vice versa. Many studies have used the Z Score for predicting the financial stability of firms in various industries.

The Z score was originally designed for manufacturing firms; however, it was modified later on as per the requirements of different industries. For the financial services industry, in the 1990s, the Z-Score model was adapted for banks by replacing some of the original variables with bank-specific financial ratios. This adaptation was the result of the unique nature of banking operations that differ significantly from non-financial firms (Altman and Saunders, 1998). Afterwards, in the early 2000s, researchers further modified the Z-Score model to enhance its estimation power for banks and financial institutions. As a result of these efforts, the formula for calculating the Z Score was modified by incorporating more risk factors and changing the weightings of the original ratios to accurately reflect the risk profile of banks (Hillegeist, Keating, Cram, and Lundstedt, 2004).

From 2010 onwards, the Z-Score model was often used by many researchers in emerging countries to assess financial stability of banks. Different studies in this period examined the applicability of the Z score model in diverse regulatory domains with a view to estimate financial stability of banks (Boyd, De Nicolo, and Jalal, 2006). Some recent studies have stated that incorporating country specific macroeconomic factors in addition to traditional financial ratios can provide a comprehensive assessment of financial stability of banks (Ghenimi, Chaibi, and Omri, 2020).

For this study, the Z-Score formula as suggested by Hannan and Hanweck (1988) for measuring financial stability of banks is expressed as:

$$Z\ Score\ = \frac{Return\ on\ Assets + (\frac{Equity}{Assets})}{Standard\ Deviation\ of\ Return\ on\ Assets} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Eq\ 1$$

By calculating the Z Score, the banks are categorized in three broader categories: green zone, grey zone and distress zone. The Z-Score simplicity of operations and clear criteria for categorizing the financial stability of banks, the Z-Score model remains a powerful tool for assessing financial stability of banks across different jurisdictions. With modified version, the Z-Score adaptability to include financial ratios and integrated advanced statistical methods has increased its applicability across various banking environments.

The Z Score, however, has the following assumptions;

i. The data related to the returns on assets is normally distributed for the entire time period.
ii. It assumes the relationship between returns, capitalization and return volatility remains stable over time.
iii. The Z Score relies on accounting data and assumes its accuracy as per the books of accounts.

3.19 CAMELS Framework for Assessing Financial Stability of Banks

After Z-Score, the next research framework used in this study is the CAMELS framework which is a comprehensive and widely used tool for evaluating the financial soundness and stability of banks. The word CAMELS refers to the ratios of capital adequacy asset quality, the management quality, earnings, liquidity and sensitivity to market risk. The CAMELS framework for assessing the financial stability and soundness of banks was developed by USA regulators in the 1970s. With its diverse components addressing various financial aspects, the CAMELS framework provides a dynamic approach for regulators and researchers to evaluate the financial health of banking institutions.

To assess the prediction power of the CAMELS framework, studies including Cole and Gunther (1995) demonstrated that CAMELS ratings were significant predictors of bank distress suggesting their usefulness in regulatory oversight and investors awareness. With some modifications for different sectors of economy, in the early 2000s, the model was refined to incorporate new financial metrics and improve estimation accuracy. Later on, as the global financial crisis unfolded after 2008, the CAMELS model was increasingly adopted by regulators worldwide. Within the European context, a study by Roman and Sargu (2013) examined its application in the European banking sector. With the advent of AI and data sciences, some researchers like Karim, Chan, and Hassan (2021) are using CAMELS framework with integrating advanced statistical methods and machine learning techniques to enhance their estimation capabilities.

Components of CAMELS

Capital Adequacy:

The first component of the CAMELS framework is the capital adequacy that seeks to assess a bank's capital in relation to its risk-weighted assets. The capital adequacy is studied in the

CAMELS framework to check the level of capital available in the event of unexpected losses and comply with regulatory statutory capital requirements. Within this context, a study by Berger and Bouwman (2013) examined that capital adequacy is a key determinant of bank stability suggesting that higher capital ratios are related with lower probabilities of failure.

Asset Quality:

The second component is the asset quality which checks the riskiness of a bank's assets which includes loans and advances portfolio. In case some banks have high levels of non-performing loans (NPLs), it indicates poor asset quality which may lead to financial instability of a bank. This point was confirmed by Ghosh (2015) who called for higher asset quality for maintaining financial stability.

Management Quality:

The third component is the management quality that examines the operational performance of a bank's management. A responsive, dynamic and efficient management team is essential for quick strategic decision-making and careful risk management. A study by Laeven and Levine (2011) argued that responsive management practices significantly contribute to financial stability of banks.

Earnings:

The fourth component of the CAMLES framework is the earnings which seek to examine the ability of a bank to generate profit through successful operations. For a financially stable bank, reliable and strong earnings are important for developing capital buffers and absorbing unforeseen losses. This point was confirmed by Demirgüç-Kunt and Huizinga (2010) who stressed that higher profitability enhances financial stability by increasing the bank's ability to create additional retained capital.

Liquidity:

The fifth component of the CAMELS framework is liquidity, which measures a bank's capacity to meet its short-term obligations through cash outflows. A financially stable bank requires reasonable liquidity to prevent bank runs and ensure operational stability. This point is validated by Claessens et al. (2017) who found that higher liquidity ratios influence positively bank financial stability.

Sensitivity to Market Risk:

The sixth component of the CAMELS framework is the sensitivity to market risk that assesses a bank's exposure to market risks, i.e. interest rate changes and foreign exchange fluctuations. For a financially stable bank, the effective management of these operational and market risks is extremely important. Various researchers such as Lopez-Espinosa et. al. (2012) confirmed that banks with higher sensitivity to market risk are more vulnerable to financial instability.

$$FSB_{it} = \alpha + \beta_1(CAR_{it}) + \beta_2(AQ_{it}) + \beta_3(MQ_{it}) + \beta_4(ER_{it}) + \beta_5(LQ_{it}) + \beta_6(SMR_{,it}) + \mu_{i,t} \ldots\ldots \textbf{Eq 2}$$

Here,

FSB stands for Financial Stability as dependent variable and independent variables include CAR for Capital Adequacy, MQ for Management Quality, ER for Earnings, LQ for liquidity, SMR for Sensitivity to Market Risk.

The operational aspects of the CAMELS framework require the insertion of each component data in ratio form which are assessed individually and collectively to determine the overall financial soundness of a bank. After extracting data from financial statements, a high capital adequacy ratio and strong earnings indicate financial resilience, while average sensitivity to market ratio indicates a higher level of attention to the market risks. With its vast coverage across different areas of financial aspects, the CAMELS model is a dynamic framework for checking financial stability of banks. With continual enhancements and adaptations to include new financial metrics and methodologies, the CAMELS model remains an essential tool for ensuring banking sector stability.

3.20 Other Bank Specific Variables (Non-CAMLES)

This study also used a second model for measuring the effect of different bank specific variables (non-CAMELS) on financial stability of banks. These variables include financial innovation, financial inclusion, bank size, income diversification and credit expansion. The measurement methods for these variables are described in the section above and the data period and sample were the same as used in the CAMELS model discussed above. The objective of using a second model is to find the impact of these variables on the financial stability of banks. This model is developed to obtain a comprehensive understanding of the non-CAMELS factors that affect the level of financial stability of banks. Financial inclusion and financial innovation are added in this model to measure the impact of these new constructions on the financial stability of banks. The bank size is added in the model to examine the impact of small, medium and large banks on the financial stability of banks. The income diversification is inserted as an

independent variable in this model to reflect the impacts of diversified sources of revenues on financial stability of banks. The credit expansion is also a significant variable as it seeks to examine the effect of changes in credit expansion on the financial stability of banks. Overall, this model is a useful addition apart from the CAMELS model for examining the effects of the changes in bank specific variables on the financial stability of banks. This model extends the work of earlier researchers who examined the impacts of these variables on financial stability of banks. The following model is used to estimate the equation;

$$FSB_{it} = \alpha + \beta_1(FINC_{it}) + \beta_2(FIN_{it}) + \beta_3(SZ_{it}) + \beta_4(ID_{it}) + \beta_5(CE_{it}) + \mu_{i,t} \ldots\ldots \textbf{Eq 3}$$

Here, FSB stands for financial stability, FINC for financial inclusion, FIN for financial innovation, ID for income diversification, CE for credit expansion.

Financial Innovation:

Financial innovation is the offering of new services or improvement in procedures by a bank for its customers. A bank with carefully crafted higher level of innovation improves its products, services and customer responses resulting in higher level of financial stability as elaborated by Ülgen (2013), Beck et al. (2016).

Financial Inclusion:

Financial inclusion refers to the increase in the number of customers, branches, deposits or lending portfolio of a bank. A bank with higher level of financial inclusion as suggested by Neaime and Gaysset (2018) and Vo et al. (2021) tends to have higher level of financial stability.

Bank Size: Bank size refers to the overall financial position of a bank measured in terms of total assets. This factor is added to the model to account for differences in smaller and larger banks. The impact of bank size on financial stability of banks has been explored by Čihák and Hesse (2010), Maudos and Guevara (2011), Adusei (2015), Odundo and Orwaru (2018) and Ramzan et al. (2021).

Income Diversification: The income diversification refers to the ratio of non-interest income to the total income of a bank. This factor can explain the flexibility in the revenue streams of a bank and how it can affect the financial stability of the bank. Earlier researchers such as Tariq et al. (2021) and Githaiga (2021) have explored the impact of income diversification on financial stability of banks.

Credit Expansion: The credit expansion refers to the increase in the loans granted by a bank to its various classes of consumers. The credit expansion is included in the model to measure the impact which higher credit growth might pose to financial stability of banks in line with the work of earlier researchers such as Clarke, Cull, and Pería (2006), Mian and Sufi (2010**)**, Jordà, Schularick, and Taylor (2011), Harvey and Siddique (2019), and Nguyen and Boateng (2021).

3.18 Outcomes of Financial Stability of Banks:

After estimating the above two models which examined the impacts of bank specific factors on financial stability of banks, outcomes of financial stability of banks are studied to know what changes in different financial aspects a bank experiences because of a particular level of financial stability. For this purpose, this study used the outcome variables, financial performance and market confidence as dependent and financial stability along with the control variables including bank size, risk management, income diversification and credit expansion. The objective of using the outcome variables was to observe the impact of financial stability on the financial performance and market confidence of the banks. The data period and sample size were the same as used in the previous two models to maintain consistency in results. The development of these outcome variables is based on extending the earlier work by Schularick and Taylor (2012), Anginer and Warburton (2014), Claessens, Coleman, and Donnelly (2018), Demirguc-Kunt, Pedraza and Ruiz-Ortega(2020**)** and Cornett, McNutt, Strahan, and Tehranian (2021**)** who had examined the different impacts of financial stability on financial performance & of banks. Similarly, the use of market confidence as a dependent variable to examine the impacts of financial stability on it is earlier studied by different researchers such as Acharya, Pedraza and Subrahmanyam (2016), Claessens, Coleman, and Donnelly (2018) and Choi, Eisenbachn and Yorulmazer (2019) and the model 5 below attempts to further enhance the understanding of this relationship.

Based on the literature reviewed in chapter 2, this study has identified the following two variables to be treated as outcome variables;

i. Financial Performance
ii. Market Confidence

Along with these outcomes variables, following control variables are also used in the model.

i. Bank Size
ii. Income Diversification

iii. Risk Management

iv. Credit expansion

The measurement basis of these outcomes and control variables is described in section 3.4 in this chapter.

$$FP_{it} = \alpha + \lambda_1(FSB_{it}) + \lambda_2(BSZ_{i,t}) + \lambda_3(RM_{i,t}) + \lambda_4(ID_{i,t}) + \lambda_5(CE_{i,t}) + \mu_{i,t} \text{.....Eq 4}$$

$$MC_{it} = \alpha + \lambda_1(FSB_{it}) + \lambda_2(BSZ_{i,t}) + \lambda_3(RM_{i,t}) + \lambda_4(ID_{i,t}) + \lambda_5(CE_{i,t}) + \mu_{i,t} \text{.....Eq 5}$$

Here, FP stands for financial performance, FSB for financial stability, MC stands for market confidence, BSZ for bank size, RM stands for risk management, ID stands for income diversification and CE for credit expansion. The formulas to measure these variables are discussed in the early part of this chapter in section 3.5.

3.21 Macroeconomic Factors and Financial Stability of Banks

In the last stage of this study, the impact of macroeconomic variables on financial stability of banks is explored. Along with the bank specific variables discussed above, the macroeconomic factors play a significant role in the determination of financial stability of a bank. Since a bank operates within a broader macroeconomic framework, the changes in the macroeconomic variables affect financial stability of banks. Several researchers such as Ashraf, Arshad, and Hu (2016) explored the impact of capital regulations on bank profitability in Pakistan and Khan and Sajid (2005) investigated the macroeconomic determinants of bad debts in Pakistani commercial banks. A notable work by Ari and Cergibozan (2018) examined the macroeconomic factors that significantly influence bank stability in the Asia-Pacific region. A study by Dang (2018) offered a comprehensive review of how macroeconomic factors affect bank stability across various international contexts. Comprehensive research was conducted by Wu et al. (2020) examined the impact of economic uncertainty on bank risk, highlighting how emerging economies face unique challenges due to their exposure to global economic fluctuations. A study by Mabkhot and Al-Wesabi (2022) investigated macroeconomic factors such as GDP growth, inflation rates, and political instability on GCC banks' stability from 2005 to 2020.

A critical review of the literature is cited in chapter 2 examining the role of GDP growth rate, inflation rate, interest rate, exchange rate depreciation, remittances on financial stability of banks across different markets. The data period for this model was from 1980 to 2022 and the reason for this extended data period is the availability of data from the IMF database and the

nature of timeseries data which works best for the large samples providing long term dynamics of the relationship among variables. Along with this, the extended data period provided a comprehensive view of the overall financial stability of the banking system of Pakistan.

Macro-Economic Factors

i. GDP Growth rate measured as average annual GDP Growth rate of Pakistan.
ii. Inflation rate measured as average annual Consumer Price Index (CPI) of Pakistan.
iii. Interest rate measured as average annual Karachi Inter-Bank Offered Rate (KIBOR) in a year.
iv. Foreign exchange rate depreciation measured as percentage of Pak Rupee average annual depreciation vs USA Dollar.
v. Remittances measured as percentage of GDP in a given year.

The following econometric model is used to explore this relationship;

$$FS_{it} = \alpha + +\omega_1(GDP_t) + \omega_2(INF_t) + \omega_3(KIBOR_t) + \omega_4(EXC_i) + (RM_t) + \mu_{i,t} \dots\dots Eq\ 6$$

Here, FS stands for financial stability, GDP stands for Gross Domestic Product growth rate, INF stands for inflation, KIBOR stands for Karachi Inter-Bank Offered Rate, EXC stands for depreciation in foreign exchange rate and RM stands for remittances as a percentage of GDP.

Financial Stability (FS): The FS here is measured through the relative ranking of Pakistan in the Financial Development Index (FDI) which was developed by the IMF to provide a more structured and quantitative approach to assessing financial systems than was previously available. The Financial Development Index (FDI) provides a comprehensive measure of financial development of the financial sector working in different countries around the world. The FDI index ranks the financial markets and financial institutions of a country in terms of their depth, access and efficiency of operations. A country with strong depth of financial operations, easy and smooth access to the depositors and borrowers and efficient in financial terms enable financial institutions to become financially stable. This study has used the ranking of Pakistan in terms of financial institutions development and used it as proxy for the measurement of the financial stability of the overall banking system. As stated earlier, the 75% share of financial sector of Pakistan is comprised of commercial banks. Therefore, for this model, this study assumed the financial institutions development which is a sub-part of the overall financial development rank of Pakistan. The development of the financial institution

shows resilience and dynamic nature of the financial institutions in catering to the demands of investors, depositors, borrowers and other stakeholders. The ranking of financial institutions development in the FDI index is taken as the proxy for financial stability of banks. Many researchers like Hasan, Kim and Wu (2020)**,** Fanta, and Makina (2021), Cao, X. and Abinzano (2022) have used this ranking to analyze the macro-level financial conditions of different countries.

Chapter Summary:

This chapter outlined the research design and methodology for this study. Starting with the research paradigm of positivism, this chapter discussed the role of research philosophy, research methods, research approach, data collection technique, sampling method, data sources and the data analysis method. In addition to this, this chapter also specified the operational definition of the variables by specifying the proxies for measurement of these variables. Next, the research framework of Z Score and CAMELS are discussed to highlight the research methods for developing meaningful connection among the variables. Also, this chapter also specifies the econometric models and techniques for measuring financial stability of banks, factors (both bank specific and macroeconomic) and the outcomes of financial stability of banks. The variables in the equations are specified and the econometric techniques are mentioned to estimate the potential relationships.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

This chapter deals with the data analysis of the variables depicted in econometrics models in chapter 3. For analysis, this study has used Microsoft Excel and EViews software in order to classify and analyze the panel and time series data related to the different variables. At first step, data from the years 2007 to 2022 was collected on bank specific variables from the State Bank of Pakistan and financial statements of the 21 banks selected in the sample. At second step, data was arranged, cleansed, reformatted and organized to find the required relationships among the variables. At the third step, data was entered into the Microsoft Excel and EViews software to find the following;

i. Financial stability of banks based on Z Score
ii. The impact of CAMELS (capital adequacy, asset quality, management quality, earnings, liquidity sensitivity to market risk) on financial stability of banks
iii. The effect of other bank specific variables on financial stability of banks
iv. The impact of financial stability on the outcome variables (financial performance, market confidence)
v. The impact of macroeconomic factors on financial stability of banks

4.1 Financial Stability of Banks

For this study, the following formula of Z-Score as suggested by Hannan and Hanweck (1988), Boyd and Runkle (1993) for measuring financial stability of banks is used:

$$Z\ Score\ = \frac{Return\ on\ Assets + (\frac{Equity}{Assets})}{Standard\ Deviation\ of\ Return\ on\ Assets}$$

Based on the Z Score financial stability score, banks are categorized in three broader categories: safe zone, grey zone and distress zone.

Due to its simplicity of operations and clear financial stability categorization criteria, the Z-Score model remains a powerful tool for assessing the financial stability of banks across different jurisdictions. With modified versions for different industries, the Z Score model adaptability to include new financial ratios and integrating advanced statistical methods has increased its applicability across various banking environments.

Table 3. Ranking of Financial Stability of Banks based on Z Score

Sr.No.	Banks	Financial Stability Score	Classification
1	Habib Metropolitan Bank Limited	28.1308	Green
2	United Bank Limited	19.5661	Green
3	Faysal Bank Limited	18.3864	Grey
4	Meezan Bank Limited	17.9206	Grey
5	Dubai Islamic Bank Pakistan Limited	16.5943	Grey
6	MCB Bank Limited	14.9828	Grey
7	National Bank of Pakistan	14.9409	Grey
8	Bank Of Khyber	14.7976	Grey
9	Habib Bank Limited	14.4593	Grey
10	Soneri Bank Limited	13.9615	Grey
11	Bank Al-Habib Limited	13.3906	Grey
12	Bank Alfalah Limited	12.1259	Grey
13	Bank Islami Pakistan Limited	9.8824	Grey
14	JS Bank Limited	9.5211	Grey
15	Samba Bank Limited	7.5768	Grey
16	Standard Chartered Bank (Pakistan) Ltd.	5.7445	Grey
17	Silk Bank Limited	5.7422	Grey
18	Askri Bank Limited	5.6483	Grey
19	Allied Bank Limited	1.7229	Red
20	The Bank of Punjab	0.9803	Red
21	Summit Bank Limited	0.2823	Red

The above table presents the financial stability score of sampled banks calculated through the Z Score formula mentioned earlier. A higher level of financial stability indicates a strong financial soundness s and the lower value represents that the bank has weak financial stability. For further analysis, the financial stability scores of banks given above can be further categorized into three zones: Safe (strong financial stability), Grey (moderate financial stability) and Red (weak financial stability). The categorization of Z Score based ranking of financial stability is based on computing average and standard deviation of the financial stability score. Accordingly, the average (μ) financial stability score is 11.633 and standard deviation (σ)is 6.94.

Further classification of banks is made based on the average and standard deviation score calculated above as per the following criteria;

i. Green Zone banks are those who have financial stability score of more than μ+ σ (11.63+6.94=18.67)
ii. Grey Zone banks are those who have financial stability score within the range of μ+ σ and μ- σ (18.67 and 4.79)
iii. Red Zone banks are those with financial stability score of less than μ- σ (4.79)

This categorization of banks allows for a clear understanding of the relative financial health and stability of each bank within the sample across different time frames.

Green Zone Banks (Score 18.67 and above):

The banks categorized in the Green Zone have a high level of financial stability indicating that they are prepared to manage market risks and perform their essential operations without disruptions. The banks categorized in safe zone are less likely to experience financial distress and have good financial position within the banking sector. Based on the ranking of financial stability produced in the above table, the top bank in the safe zone is the Habib Metropolitan Bank Limited with a Z Score value of 28.13 which demonstrates highest financial soundness, robust risk management, and a solid capital base making it the most financially stable bank in this ranking. The second bank is United Bank Limited with a Z Score value of 19.56 that indicates significant financial stability along with conforming its strong financial position and dynamic ability to withstand financial challenges.

Grey Zone Banks (Scores between 18.67 to 4.79):

Banks in the Grey Zone depict moderate financial stability as these banks are relatively stable in financial terms and they face certain market risks that could affect their financial health if corresponding risks are not managed effectively. The banks in Grey Zone are in a transitional phase in terms of financial stability and may require improving their capital reserves and financial performance to avoid moving into the Distress Zone. At number three Faysal Bank Limited with a Z Score value of 18.3864 shows its moderate level of financial stability, representing that the bank is well-equipped to manage market risks and maintain consistent financial performance. Next position is taken by the Meezan Bank Limited with its Z Score of

17.92 that shows moderate financial stability supported by its focus on Islamic banking principles and prudent financial management.

The Dubai Islamic Bank Pakistan Limited with Z Score value of 16.59 which indicates a moderate level of financial stability which can be further enhanced through effective risk management policies and adequate capital buffers. MCB Bank Limited, with its Z Score value of 14.98 indicates that the bank is financially stable in the moderate category with its effective risk management policies and capital reserves to ensure continued financial stability. The National Bank of Pakistan has financial stability score of 14.94 that indicates a moderate level of financial stability and presence of adequate capital for covering the unexcepted losses. The next position is taken by the Bank of Khyber with the financial stability score of 14.79 which indicates an average level of financial stability with moderate capital adequacy and sufficient profitability for smooth financial performance. Habib Bank Limited has a financial stability score of 14.45 that depicts a moderate level of financial stability and shows the resilience of the bank for meeting the capital adequacy requirements and the profitability levels. Soneri Bank Limited has a financial stability score of 13.96 which projects a moderate financial stability level and indicates the financial strength of the bank in terms of capital adequacy and profitability. The Bank Al-Habib Limited has a financial stability score of 13.39 that reflects a moderate financial stability level and indicates that the bank has strong capital buffers and good financial performance. The Bank Alfalah Limited has a financial stability score of 12.12 which shows a relatively good ranking in terms of capital adequacy and financial performance.

The Bank Islami Pakistan Limited has financial stability score of 9.88 which reflects a moderate level of financial stability and requires the improvement in the areas of capital adequacy and financial performance. Next is JS Bank Limited, with a financial stability score of 9.52 which indicates a moderate level of financial performance and requires careful planning to avoid financial vulnerabilities in future. The Samba Bank Limited has a financial stability score of 7.57 that shows a moderate level of financial stability which demands strong strategic decisions on the part of the management of the bank to improve their capital base and financial performance. The Standard Chartered Bank (Pakistan) Ltd. has financial stability score of 5.74 showing a moderate level of financial performance which requires strong actions by the bank leadership to improve capital adequacy and financial performance. Silk Bank Limited has also a similar level of financial stability of 5.74 which also requires improvement in terms of financial performance and capital adequacy. The Askari Bank Limited with Z Score value

reflects moderate financial stability with some financial vulnerabilities that could affect its future financial performance. The bank may be required to enhance its risk management practices and capital adequacy ratio to improve its financial stability. Overall, most banks (15 out of 21) fall into the grey zone of financial stability classification which indicates that these banks need to further enhance their capital adequacy levels and improve operations to increase profitability for maintaining strong financial stability.

Red Zone Banks (Scores Below 4.79):

The banks in the Red Zone have low level of financial stability scores showing significant vulnerability to abrupt financial shocks. The banks in this zone are at a high risk of financial distress and may require strong risk management practices and capital buffers to prevent potential failure. The Allied Bank Limited with Z Score value of 1.72 represents a high level of financial vulnerability. This low score requires the bank to take immediate corrective actions such as increasing capital reserves, improving risk management and considering restructuring of operations or capital structure to enhance its financial stability. The Bank of Punjab with Z Score value of 0.98 indicates a high level of financial instability. This situation requires urgent financial measures are required to improve the financial stability of the bank including potential capital injections and strategic changes to improvements in bank operations. Summit Bank Limited, with a financial stability score of 0.28 has the lowest financial stability score indicating extreme financial vulnerability. The bank is at significant risk of financial distress and may require immediate regulatory and financial intervention such as regulatory oversight, mergers or capital support to prevent further deterioration in its financial health.

It is important to mention here that this classification of banks into three different zones, such as green, grey and red based on their financial stability scores provides a comprehensive understanding of the financial soundness of each institution. The score wise classification of banks is based on the relative ranking of each bank within the dynamics and structure of the banking industry of Pakistan. Banks in the green zone are well-positioned in financial terms to maintain their market operations securely and manage financial risks effectively. The banks included in the grey zone require vigilant monitoring and strategic improvements in their financial operations to enhance their financial stability and avoid future risks. The banks in the red zone are at significant risk and require quick intervention to improve their financial health. This analysis of financial stability scores presents the need of proactive management and close monitoring to ensure the overall financial soundness and stability of the banking sector.

Table 4. Year-Wise Financial Stability for the Banks

Sr. No.	Year	Average Fin Stability
1	2012	16.22368
2	2007	15.09236
3	2008	14.51975
4	2011	14.37112
5	2010	12.51402
6	2009	12.46238
7	2014	12.20623
8	2015	12.19226
9	2013	12.02679
10	2016	11.50909
11	2017	9.90068
12	2019	9.85888
13	2018	9.76648
14	2020	8.90569
15	2021	8.22814
16	2022	7.92359

The table above presents the year-wise average financial stability scores of the sampled banks mentioned earlier and here is the annual average financial stability of all banks. This aggregate year wise financial stability raking provides insights into the fluctuations and trends in financial stability of banks over time from 2007 to 2022. This financial analysis is crucial for understanding how the financial soundness of these banks has evolved in response to various economic conditions and market dynamics. The highest financial stability was observed in 2012 with Z Score value of 16.22368 indicating a period of strong financial health and stability. This higher level of financial stability could be attributed to robust macroeconomic conditions, effective bank risk management practices and possibly favorable regulatory environments during that year. The years 2007 with a Z Score value of 5.09236 and the year 2008 with Z Score value of 14.51975) showed high financial stability. The relatively high stability in 2008 represents that these banks were initially resilient to the shocks of the global financial crisis possibly due to strong capital buffers or less exposure to global risky assets.

Moderate Financial Stability: The financial stability score of banks from the years 2010 to 2016 shows a gradual decline in with averages ranging from 12.51 in 2010 to 11.50 in 2016. This

declining trend might reflect the after-effects of the global financial crisis coupled with domestic macroeconomic challenges which gradually impacted the financial stability of banks. However, from 2017 to 2022, there is a noticeable decline in financial stability scores from 9.90068 in 2017 to 7.92359 in 2022. This decline in the financial stability score suggests increasing financial vulnerabilities among the largest banks, potentially due to factors such as economic slowdown, political instability, rising inflation, currency depreciation, and possibly strong regulatory environments or increased competition. The year 2020, with its Z Score value of 8.905 reflects the possible impact of the COVID-19 pandemic which caused significant disruptions in global and domestic economies. The relatively low score suggests that the pandemic had a substantial negative impact on the financial health of these banks. In 2022, the average annual financial stability score of 7.92359 indicated the lowest financial stability score in the period under review representing the heightened financial stress among the largest banks. This low score of financial stability could be a result of cumulative macroeconomic challenges, including ongoing pandemic effects, geopolitical tensions, currency depreciation and local economic uncertainties.

The year-wise analysis of financial stability scores reveals significant fluctuations in the financial health of the largest banks over the period from 2007 to 2022. While the early 2010s saw relatively high levels of financial stability, the recent years, particularly post-2017, there has been a concerning decline in the level of financial stability. Two important lessons can be drawn from the year wise financial stability ranking of banks. The first lesson is the relatively high financial stability scores during 2007 and 2008 imply that the largest banks were initially well-prepared to handle the financial shocks of the global financial crisis. The second lesson is the recent declines in financial stability from 2017 onwards that raise concerns about the underlying financial health of the banking sector. This decline may be indicative of emerging risks that need to be addressed promptly to prevent further deterioration. The regulatory bodies should consider interventions such as strengthening capital reserves, improving risk management frameworks, and enhancing operational efficiency, which may be necessary to restore and maintain financial stability.

4.2 Model 1: Impact of CAMELS factors on financial stability of banks

$$FSB_{it} = \alpha + \beta_1(CAR_{it}) + \beta_2(AQ_{it}) + \beta_3(MQ_{it}) + \beta_4(ER_{it}) + \beta_5(LQ_{it}) + \beta_6(SMR_{,it}) + \mu_{i,t}$$

Here,

FSB stands for Financial Stability as dependent variable and independent variables include CAR for Capital Adequacy, MQ for Management Quality, ER for Earnings, LQ for liquidity, SMR for Sensitivity to Market Risk.

4.2.1 Descriptive Statistics

The purpose of descriptive statistics of a sample is to present a comprehensive summary of the data explaining the central tendency, variability, and distribution of the variables of the study. By calculating measures including mean, median, standard deviation, minimum, and maximum values of data, descriptive statistics enable researchers to understand the general behavior of each variable in the dataset. The descriptive analysis is based on the assumption that the data are correctly measured and representative of the sample under study. The results of the descriptive statistics do not make inferences about the relationships between variables but develop a baseline for more comprehensive analyses such as correlation and regression. The explanation of these descriptive statistics may guide further investigation and facilitate hypothesis testing by identifying trends, patterns and potential areas of concern.

Table 5. Descriptive Statistics (Model 1)

	FS	CA	AQ	MQ	EN	LQ	SR
Mean	11.7	0.089	0.107	2.343	0.009	0.098	0.032
Median	11.5	0.066	0.082	1.363	0.012	0.080	0.030
Max.	85.5	0.895	0.658	95.0	0.235	0.462	0.775
Min.	-7	-0.167	0.000	-18.0	-0.090	0.018	-0.097
Std. Dev.	8.75	0.104	0.098	6.113	0.021	0.063	0.077
Obs.	336	336	336	336	336	336	336

The table above provides descriptive statistics for Financial Stability (FS) and the CAMELS factors used in the model: Capital Adequacy (CA), Asset Quality (AQ), Management Quality (MQ), Earnings (EN), Liquidity (LQ) and Sensitivity to Market Risk (SR) based on data of 21 banks and 16 years with a total of 336 observations.

The mean value of financial stability is 11.7 with a median of 11.5 indicating that most banks have moderate financial stability levels. However, there is a significant variation in financial stability as the mean scores range from -7 to 85.5 with a standard deviation of 8.75. These statistics indicate that while some banks are experiencing financial instability others may have very high financial stability. The high variability in the data suggests that the banking sector includes both financially stable banks and banks at risk of financial instability. The first CAMELS' factor is capital adequacy which measures a bank's financial ability to absorb

losses, has a mean score of 0.089 and a median of 0.066 with a range from -0.167 to 0.895. The standard deviation of capital adequacy with a value of 0.104 indicates moderate variability across sampled banks. The negative minimum value highlights to under-capitalization in some banks which may expose them to bigger financial risks as other banks maintain strong capital reserves reflected in the maximum value of 0.895. The second factor is the asset quality, which has a mean value of 0.107 with a median of 0.082 and ranges from 0 to 0.658. The standard deviation of 0.098 indicates that most banks maintain good asset quality with a lesser volume of non-performing loans. However, as data indicates the presence of outliers in the data, a few banks face significant issues with non-performing assets that could affect their profitability and financial stability.

The third factor is the management quality that shows substantial variability with a mean value of 2.343 and a median of 1.363. The wide data range from -18 to 95 and the high standard deviation of 6.113 indicate that while some banks have strong and efficient management practices, others may suffer from significant management problems. These management issues could negatively affect overall bank performance and financial stability. The fourth factor is the earnings, an important factor for a bank's long-term financial viability depicts a mean of 0.009 and a median of 0.012, indicating very low profitability across the sampled banks. The earnings range from -0.090 to 0.235 with a standard deviation of 0.021, indicating that while most banks are barely profitable, a few are operating at a loss, and some other banks show relatively strong earnings. This factor underscores the challenges banks face in generating consistent financial returns.

The fifth factor is liquidity with a mean of 0.098 and a median of 0.080 that indicates most banks maintain a reasonable level of liquid assets to meet short-term obligations. The data range extends from 0.018 to 0.462 with a standard deviation of 0.063 showing mild variability in how banks manage their liquidity positions. While most banks appear to have a strong liquidity position, those with very low liquidity levels could be vulnerable to short-term financial pressures. The last factor is the sensitivity to market risk with a mean of 0.032 and median of 0.030. The data range from -0.097 to 0.775 suggests that while most banks have low exposure to market risk, a few of these sampled banks are highly sensitive to market fluctuations. The standard deviation of 0.077 shows the diversity in the risk profiles of banks with some banks managing their exposure effectively while others are more vulnerable to abrupt changes in market conditions.

4.2.2 Correlation Analysis: (Model 1)

Correlation analysis seeks to quantify the strength and direction of the linear relationship between two or more variables using the Pearson correlation coefficient. Correlation analysis facilitates in identifying how closely related variables are with each other in a particular study. The correlation analysis values range from -1 to +1 as +1 indicates a perfect positive relationship, -1 shows a perfect negative relationship and 0 represents no relationship among variables at all. In the context of financial stability, correlation analysis can explain how different financial variables such as capital adequacy, asset quality, earnings etc. move in relation to each other. The primary assumption used in the correlation analysis is that the relationships are linear, and the data is normally distributed. However, it is important to know that correlation between variables does not imply causation; it only reflects that a proposed relationship exists between variables of the study. A complete understanding of these relationships is critical for identifying multicollinearity issues in regression models and for making timely decisions based on how movements in the values of one variable might affect another variable.

Table 6. Correlation Analysis (Model 1)

	FS	CA	AQ	MQ	EN	LQ	SR
FS	1.00	0.28	-0.33	0.10	0.27	0.10	0.23
CA	0.28	1.00	-0.14	0.29	0.01	0.13	0.12
AQ	-0.33	-0.14	1.00	-0.11	-0.53	0.18	-0.04
MQ	0.10	0.29	-0.11	1.00	0.06	-0.08	0.02
EN	0.27	0.01	-0.53	0.06	1.00	-0.13	0.15
LQ	0.10	0.13	0.18	-0.08	-0.13	1.00	0.44
SR	0.23	0.12	-0.04	0.02	0.15	0.44	1.00

The correlation analysis presented in the above table between Financial Stability (FS) and the CAMELS factors provides insights into the relationships that affect financial stability of banks. The strength and direction of these correlations' coefficients reflect the dynamics of how different components of the variables contribute to or detract from overall financial stability. The moderate positive correlation (0.28) between financial stability and capital adequacy suggests that banks with higher capital buffers tend to be more financially stable across time. The capital adequacy reflects a bank's ability to absorb unexpected losses during financial

downturns. Banks with higher capital ratios are better positioned to withstand economic shocks which resultantly enhance their financial stability.

The negative correlation coefficient of -0.33 between financial stability and asset quality indicates that banks with poorer asset quality, measured by higher levels of non-performing loans, tend to have lower levels of financial stability. This inverse relationship is understandable as non-performing assets weaken a bank's balance sheet and profitability leads to increased risk of financial instability. Next, is the weak positive correlation coefficient of 0.10 between financial stability and management quality which implies that while better management practices contribute to the financial stability of a bank, the empirical relationship is not very strong. Good management practices can improve operational and financial decision-making, efficiency, and risk management, but other variables such capital adequacy and asset quality seem to play a larger role in determining overall financial stability of banks.

The correlation table shows there is a moderate positive correlation (0.27) between financial stability and earnings indicating that more profitable banks are generally more financially stable. This positive relationship reflects the idea that continuous profitability enables banks to build up reserves, invest in risk management policies and absorb unexpected financial losses. The correlation coefficient between financial stability and liquidity is weakly positive 0.10 representing that banks with higher liquidity tend to be slightly more financially stable. Adequate levels of liquidity enable banks to meet their short-term obligations and reduce the likelihood of liquidity crises. However, the relatively low strength of this relationship suggests that liquidity alone does not heavily influence overall financial stability as other factors such as capital adequacy and earnings play more significant roles.

The positive correlation coefficient of 0.23 between financial stability and sensitivity to market risk indicates that banks with higher market exposure tend to be more financially stable. This might seem counterintuitive at first, but it could imply that banks with significant market involvement often have more robust risk management practices to mitigate the financial risks associated with market fluctuations.

The correlation analysis presented above reveals that financial stability is positively associated with capital adequacy, earnings, and sensitivity to market risk suggesting the importance of strong capital buffers, profitability, and effective risk management policies in enhancing financial stability. On the other hand, poor asset quality has a negative effect on financial

stability of banks burdened with non-performing loans in their struggle to maintain financial health.

4.2.3 Regression Analysis (Model 1)

Regression analysis attempts to identify the relationship between a dependent variable and independent variables in the model enabling researchers to estimate outcomes and present the impact of different factors on the dependent variable. The objective of the regression analysis is to quantify how certain changes in the independent variables (i.e. CAMELS factors etc.) affect the dependent variable represented by financial stability. There are some assumptions underlying regression analysis which include linearity (the relationship between variables is linear), independence of errors of model, homoscedasticity (constant variance of errors) and normal distribution of residuals in the model. The results of regression analysis present coefficients that indicate the direction and magnitude of the relationship among variables, p-values for hypothesis testing, and an R-squared value to assess the overall model fitness. A careful interpretation of these results helps in understanding the significant factors that affect the dependent variable (financial stability).

4.2.4 Stationarity in Panel Data

Stationarity is an important assumption within panel data that requires each individual series in the panel has a constant mean, variance, and covariance over time. Non-stationarity in panel data may produce spurious regression results leading to relationships between variables falsely inferred across the sample. It is very important to check for stationarity before proceeding with further data analysis to ensure valid inferential statistics from regression. The most common tests for examining stationarity in panel data include the Levin, Lin and Chu (LLC), Im, Pesaran, and Shin (IPS) tests, and Fisher-type tests which are based on unit roots of respective variables. Each of these tests checks the hypothesis of stationarity differently enabling a comprehensive understanding of the dynamic properties of the panel data set.

4.2.5 Stationary Level of Variables (Model 1)

The stationarity of variables in model 1 was checked to see if the time series of data consists of a unit root. In unit root analysis, the null hypothesis is described as the variable is not stationary or has unit root and alternate hypothesis is the variable is stationary. The significant level is specified at 5% level for this analysis. Based on results, if the reported p-value is less than 5%, the researcher rejects the null hypothesis and accepts the alternative hypothesis. With the passage of time, many unit roots testing methods are developed including Levin, Lin, and

Chu; Im, Pesaran and Shin, ADF and PP.Levin. This study used Levin, Lin and Chu method for checking unit roots and results are presented below;

Table 7. Result of Unit roots

Variable	Statistics	Probability
Financial Stability	-5.173	0.000
Capital Adequacy	-8.579	0.000
Asset Quality	-3.118	0.007
Management Quality	-4.172	0.000
Earnings	-4.630	0.000
Liquidity	-2.663	0.004
Sensitivity to Market Risk	-3.124	0.000

Table 7 shows that p-value of the study variables is less than 5%, study rejects the null hypothesis which implies that all variables of study are stationary.

4.2.6 Cross-Sectional Dependence in Panel Data

Cross-sectional dependence on panel data occurs when observations in different groups (e.g., countries, firms) are not independent of each other. This dependence can arise from common shocks, spatial interactions, or omitted variables that affect multiple cross-sections. Ignoring cross-sectional dependence can lead to biased estimates and incorrect standard errors, which mislead statistical inference. To diagnose this issue before running model, this study employed tests such as the Pesaran CD test, which checks for overall correlation between units, or the Breusch-Pagan LM test, suitable for models with random effects. Addressing cross-sectional dependence may require using techniques such as clustering standard errors, employing generalized least squares, or specifying a model structure that accounts for such dependencies as spatial econometric models.

4.2.7 Endogeneity in Panel Data

A major issue in the panel data is the presence of endogeneity that often arises from omitted variable bias, some measurement error, or reverse causality among variables. The presence of endogeneity leads to a high correlation between independent variables and error term in a model leading to biased and inconsistent estimates. To adjust for endogeneity, researchers often

apply fixed or random effects models to control for unobservable heterogeneity, or in some cases, apply instrumental variable techniques where valid instruments are identified and used to provide consistent estimates. Along with this, the instrument validity is important in the model and can be tested using the Sargan or Hansen tests for overidentifying restrictions. Moreover, various dynamic panel data models such as those estimated using the Arellano-Bond GMM estimator, can effectively handle endogeneity problem by using lagged values of the variables as instruments.

4.2.8 Generalized Method of Moments (GMM) in Panel Data (Model 1)

The Generalized Method of Moments (GMM) is an advanced estimation technique that addresses several issues in panel data analysis including endogeneity and autocorrelation. The GMM applies multiple moment conditions which are relationships expected to hold based on the theory underpinning the model with a purpose to provide more efficient and consistent estimators than the simple instrumental variables approach. The GMM method is especially useful when dealing with dynamic panel data where lagged values of the dependent variable and endogenous variables are included as regressors. GMM estimators such as the two-step GMM leads to efficiency by using an optimal weighting matrix of the variables in the model. The validity of GMM estimations depends on the appropriateness and relevance of the selected instruments and the absence of autocorrelation in residuals tested using Hansen's J test and Arellano-Bond tests respectively.

Therefore, in order to address endogeneity and other minor issues, in this study, GMM method is used to estimate the regression coefficients for ensuring reliability of results.

Table 8. Results of Generalized Method of Moments (Model 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FS(-1)	0.237	0.003	71.788	0.000
CA	0.259	0.042	6.178	0.000
AQ	0.079	0.029	2.699	0.007
MQ	0.000	0.000	-1.316	0.189
EN	0.988	0.189	5.235	0.000
LQ	0.034	0.027	1.284	0.200
SR	0.255	0.165	1.547	0.123

Cross-section fixed (first differences)			
Mean dependent var	-0.005093	S.D. dependent var	0.067623
S.E. of regression	0.078543	Sum squared resid	1.770497
J-statistic	16.25198	Instrument rank	21
Prob(J-statistic)	0.29823		

The table above presents the results of the Generalized Method of Moments (GMM) regression analysis where Financial Stability (FS) is the dependent variable. The model studied above uses first differences and addresses potential endogeneity concerns in the model by incorporating a white period instrument weighting matrix and cross-section fixed effects. The independent variables in the model include CAMELS factors such as Capital Adequacy (CA), Asset Quality (AQ), Management Quality (MQ), Earnings (EN), Liquidity (LQ), and Sensitivity to Market Risk (SR). The objective of this regression analysis is to evaluate the impact of these CAMELS factors on the financial stability of banks.

The coefficient for the lagged financial stability variable is 0.237 with a highly significant t-statistic of 71.788 with p-value = 0.000 suggesting strong persistence of financial stability over time. The positive coefficient exhibits that the financial stability of a bank in the previous period significantly affects its current level of stability. This highlights the importance of maintaining a stable financial history over time as past financial stability contributes directly to the level of current financial stability.

The capital adequacy has a significant positive effect on financial stability with a coefficient of 0.259 and a t-statistic of 6.178 with p-value = 0.000. This result suggests that banks with higher capital buffers are more financially stable across the studied time period. A robust capital position enables banks to better withstand financial shocks, reinforcing their stability. Therefore, the H1 is accepted as capital adequacy positively affects financial stability of banks. This result is in line with the earlier studies by Barth, Caprio, and Levine (2013), Laeven, Ratnovski, and Tong (2016) and Gorton and Winton (2021).

The regression coefficient for asset quality is 0.079, with a significant t-statistic of 2.699 and p-value = 0.007. This significant positive relationship implies that improvements in asset quality such as reducing non-performing loans enhance financial stability of banks. Poor asset quality increases a bank's risk of default and erodes capital base whereas better asset quality strengthens the bank's balance sheet and contributes to the overall financial stability. These

results are in line with the Ezeoha (2011), De Bock and Demyanets (2012), Swamy (2012) and Arrawatia et al. (2019). Therefore, the H2 is accepted that higher asset quality positively affects financial stability of banks.

The coefficient for management quality is 0.000 and it is statistically insignificant, with a t-statistic of -1.316 with p-value = 0.189. This result indicates that management quality does not have a significant direct impact on the financial stability of banks in this model. While effective management is crucial for bank operations and performance, its impact on financial stability is likely mediated through other factors such as earnings and capital adequacy. Therefore, the H3 is rejected that management quality positively affects financial stability of banks. This result needs to be further explored as studies such as Ferreira and Matos (2021) and Huang and Lee (2022) recommended the direct positive relationship.

The earnings have a significant positive impact on financial stability with a coefficient of 0.988 and a t-statistic of 5.235 with p-value = 0.000. This regression result shows that profitable banks are more financially stable. That improves capital levels and reduces reliance on external funding. The higher level of profitability also enables banks to absorb financial shocks improving their financial resilience. These results are in line with the earlier studies by Bikker and Vervliet (2018) and Zhu and Chen (2019)**.** Therefore, the H4 is accepted as earnings positively affect financial stability of banks.

The coefficient for liquidity is 0.034, and it is statistically insignificant with a t-statistic of 1.284 and p-value = 0.200. This result indicates that liquidity does not have a significant direct effect on financial stability in this model. While maintaining sufficient liquidity is crucial for meeting short-term obligations, it appears that liquidity alone does not contribute significantly to long-term financial stability when compared to other factors like capital adequacy and earnings. These results are in line with the earlier studies by Ratnovski (2013) and DeYoung, Distinguin, and Tarazi (2015). Therefore, H5 is rejected since earnings positively affect financial stability of banks.

The coefficient for sensitivity to market risk is 0.255 but it is not statistically significant with a t-statistic of 1.547 and p-value = 0.123. This result indicates that while banks with higher sensitivity to market risk may face greater exposure to external financial shocks, this factor does not play a decisive role in determining financial stability. The results imply that banks may have risk management practices in order to mitigate the effects of market fluctuations on stability. These results are in line with the earlier work by Jiang, Levine, and Lin (2018) and

Al-Tamimi, and Al-Mazrooei (2018) who called for establishing regulatory controls for market risk exposure. Therefore, the H6 is rejected that higher level of sensitivity to market risk negatively affects financial stability of banks.

4.2.9 Model Diagnostics

Cross-Section Fixed Effects (First Differences): The use of first differences removes unobserved heterogeneity across sampled banks ensuring that the results are not biased by time-invariant characteristics. The mean of financial stability is -0.005093 with a standard deviation of 0.067623, indicating moderate variation in financial stability among the banks in the sample. The standard error of the regression is 0.078543, which indicates a reasonable fit for the model, with moderate residual variation. The J-statistics of 16.25198 and its corresponding p-value of 0.29823 reports that the instruments used in GMM estimation are valid as the null hypothesis of exogenous instruments cannot be rejected. This confirms the reliability of the model's results.

The results of the applied GMM model show that capital adequacy, asset quality, and earnings are the most significant determinants of financial stability of banks. The positive impact of capital adequacy and earnings emphasizes the importance of maintaining robust capital levels and generating consistent profits for enhancing financial stability. Management quality, liquidity, and sensitivity to market risk are observed to have no significant effect on financial stability in this model imply that other variables may play a larger role in determining a bank's financial stability. The model diagnostics confirm the appropriateness of the GMM methodology, and the results provide significant insights into the factors that contribute to financial stability of banks.

Table 9. Arellano-Bond Serial Correlation

Test order	m-Statistic	Rho	SE(rho)	Prob.
AR(1)	-0.78989	-0.77606	0.982487	0.4296
AR(2)	-0.17995	-0.08736	0.485481	0.8572

To check the existence of serial correlation in residuals of the panel model, the Arellano-Bond Serial Correlation test was employed. The test was conducted to check for both first-order (AR(1)) and second order (AR(2)) autocorrelation and the results indicated following;

i. **AR(1)**: The m-statistic is -0.78989 with a p-value of 0.4296 indicating no significant first-order autocorrelation as the p-value is greater than 0.05.
ii. **AR(2)**: The m-statistic is -0.17995 with a p-value of 0.8572 suggesting the absence of second-order autocorrelation.

Both results indicated that there is no significant serial correlation in the residuals of the model confirming the model's validity for dynamic panel estimation. This outcome is important in ensuring that the GMM estimators used in the model remain unbiased and consistent.

The Variance Inflation Factor (VIF) checks the level of multicollinearity among the independent variables added in a regression model. The issue of multicollinearity occurs when independent variables are highly correlated among each other which may inflate the variance of the coefficient estimates. The VIF values represent how much the variance of a regression coefficient is inflated due to the presence of multicollinearity. A VIF value of 1 shows no correlation while values between 1 and 5 suggest moderate level of multicollinearity in the model. Values above 10 would generally suggest significant multicollinearity among variables requiring corrective measures.

Table 10. VIF Results

Variables	VIF	1/VIF
FS	1.273	0.785
CA	1.215	0.823
AQ	1.535	0.651
MQ	1.113	0.898
EN	1.478	0.677
LQ	1.364	0.733
SR	1.345	0.743

These results show that no variable in this model has VIF exceeding 10 which is the critical value for the presence of multicollinearity.

4.3 Model 2: Other Bank Specific Factors

This model studies the impact of financial inclusion, financial innovation, income diversification, bank size and risk management on financial stability of banks.

$$FSB_{it} = \alpha + \beta_1(FINC_{it}) + \beta_2(FIN_{it}) + \beta_3(SZ_{it}) + \beta_4(ID_{it}) + \beta_5(RM_{it}) + \mu_{i,t}$$

4.3.1 Descriptive statistics (Model 2)

Table 11. Descriptive Statistics (Model 2)

Metric	FS	FINC	FIN	BS	ID	RM
Mean	11.731	0.015	0.614	8.543	0.240	0.169
Median	11.509	0.014	0.591	8.596	0.236	0.070
Max.	85.518	0.135	1.076	9.719	3.140	8.442
Min.	-7.001	0.000	0.230	6.837	0.014	0.001
Std. Dev.	8.749	0.011	0.150	0.551	0.178	0.795
Obs.	336	336	336	336	336	336

The table above presents the descriptive statistics for the Financial Stability (FS)**,** Financial Inclusion (FINC)**,** Financial Innovation (FIN)**,** Bank Size (BS)**,** Income Diversification (ID) and Risk Management (RM)**.** Financial stability has an average value of 11.73 indicating that banks demonstrate relatively high financial stability. However, the data range of financial stability, from -7.001 to 85.518 depicts a significant variability among banks in the sample. The standard deviation of 8.749 further confirms the wide dispersion around the mean reflecting the diverse stability levels among the banks. Financial inclusion has an average of 0.015 which suggests modest inclusion levels across the sampled banks. The minimum value of 0.000 suggests that some banks have little financial inclusion efforts and the maximum value of 0.135 indicates that others have made greater gains. The relatively small standard deviation (0.011) shows consistency across the sample with limited variability in financial inclusion.

Financial Innovation has a mean value of 0.614 suggesting moderate levels of innovation among the banks. The maximum value of 1.076 shows that some banks have strong levels of financial innovation and the minimum value of 0.230 indicates that certain banks lag in financial innovation. The standard deviation of financial inclusion of 0.150 points to moderate variation in the innovation levels across the sample. Bank Size (BS) with a mean value of 8.543 indicates that the sample includes primarily large banks. The minimum and maximum values range from 6.837 to 9.719 showing that there is less variability in bank size compared to the other variables, which is also represented in the relatively low standard deviation of 0.551. Income Diversification has a mean value of 0.240 suggesting low to moderate diversification strategies among the sampled banks. The maximum value of 3.140 and the minimum value of 0.014 indicates that while some banks have highly diversified income sources, others have

minimally diversified. The standard deviation value of 0.178 shows moderate variability in the income diversification practices across the sampled banks.

Lastly, Risk Management shows a mean of 0.169 suggesting that risk management practices vary considerably. The standard deviation value of 0.795 along with a maximum value of 8.442 and a minimum of 0.001 suggests that some banks engage heavily in risk management while others have limited or no formal risk management processes in place. In brief, financial stability shows substantial variability, the other variables also report different degrees of dispersion, representing diversity in the banking sector in terms of financial inclusion, innovation, size, diversification, and risk management.

4.3.2 Correlation Analysis (Model 2)

Table 12. Correlation Analysis (Model 2)

Variable	FS	FINC	FIN	BS	ID	RM
FS	1.000	-0.146	0.151	0.016	-0.104	-0.158
FINC	-0.146	1.000	-0.080	-0.444	-0.038	0.205
FIN	0.151	-0.080	1.000	0.090	0.023	0.064
BS	0.016	-0.444	0.090	1.000	0.128	-0.043
ID	-0.104	-0.038	0.023	0.128	1.000	-0.010
RM	-0.158	0.205	0.064	-0.043	-0.010	1.000

The correlation analysis presented in the table above shows the relationship between Financial Stability and several other variables of the model describing how financial stability interacts with them. The correlation between financial stability and financial inclusion is -0.146 indicating a weak negative relationship. This result suggests that as financial inclusion increases, financial stability slightly decreases although the relationship is statistically weak and may not have significant implications for banks. There is a weak positive correlation of 0.151 between financial stability and financial innovation. This result suggests that banks with higher levels of financial stability are likely to engage slightly more in financial innovation although the strength of the relationship is minimal.

The correlation between financial stability and bank size is 0.016. This result indicates that there is a weak relationship between a bank's size and its financial stability, suggesting that size does not play a significant role in determining how stable a bank is. The correlation between financial stability and income diversification is -0.104 which also shows a weak negative relationship. This result suggests that banks with higher financial stability may have

slightly less income diversification though the impact is minimal. The correlation between financial stability and risk management is -0.158 showing a weak inverse relationship. This suggests that banks with stronger risk management practices may have marginally lower financial stability, though the said relationship is not strong enough to draw significant conclusions.

4.3.3 Stationarity Tests of the Variables

This study used Levin, Lin and Chu method for checking unit roots and results are presented below;

Table 13. Table Unit root test results

Variable	Statistics	Probability
Financial Stability	-5.17	0.000
Bank Size	-2.284	0.006
Financial Innovation	-5.273	0.000
Financial Inclusion	-6.251	0.000
Income Diversification	-2.391	0.008
Risk Management	-6.485	0.000

Table 13 presents p-value of variables is less than 5%, the study rejects the null hypothesis which implies that all variables of model are stationary.

4.3.3 Generalized Method of Moments (Model 2)

Table 14. Results of Generalized Method of Moments (Model 2)

Var.	Coeff.	Std. Error	t-Stat.	Prob.
FS(-1)	0.097	0.009	11.212	0.000
FINC	-0.095	0.026	-3.674	0.002
FIN	0.625	0.815	0.767	0.452
BS	-0.117	0.025	-4.768	0.000
ID	0.006	0.039	0.164	0.872
RM	-0.020	0.027	-0.761	0.455
Mean dep. var.	-0.005093	S.D. dep.var.		0.067623

S.E.	0.073552	SSR	1.558069
J statistic	18.91782	Instrument rank	21
Prob J-statistic	0.217482		

The table above presents the results of a Generalized Method of Moments (GMM) regression estimation examining the impact of several independent variables on financial stability of banks. The model applies first-difference transformations and controls for cross-sectional fixed effects among variables. The regression coefficient for lagged financial stability is 0.097 with a highly significant p-value of 0.000. This result indicates that the financial stability of a bank in the previous period significantly affects its current financial stability. The positive coefficient suggests a strong persistence in financial stability over time exhibiting that stable banks tend to maintain their financial stability in subsequent periods.

The coefficient for financial inclusion is -0.095 with a p-value of 0.002 suggesting a statistically significant negative impact on financial stability. This result suggests that higher financial inclusion, while beneficial from a social perspective, may expose banks to higher market risks, potentially due to lending to underserved or riskier segments of the population which in turn reduces overall financial stability. Therefore, H8 is accepted as the financial inclusion negatively affects financial stability of banks as this result is line with the earlier studies by Pham and Doan (2020) and Barik and Pradhan (2021) who called for improving the quality of financial inclusion to avoid its negative impacts on financial stability of banks.

Financial innovation has a positive regression coefficient of 0.625 but it is not statistically significant as the p-value is 0.452. This result indicates that the adoption of new financial technologies and innovations does not significantly affect financial stability of banks in this model. It is possible that financial innovation is either not fully integrated into the banking operations or its effect is still evolving and not immediately observable in financial stability metrics. Therefore, H7 is rejected that financial innovation passively affects the financial stability of banks. These results are in line with the studies by Khan et al. (2021) and Marfo and Tweneboah (2022) who called for contextualizing the local social and economic factors for understanding the impacts of financial innovation on financial stability.

The coefficient for bank size is -0.117 with a p-value of 0.000 suggesting a significant negative relationship between bank size and financial stability. This result implies that larger banks may face greater market risks due to the complexity of their operations, potential overextension of

advances, or a degree of exposure to systemic risks. As banks become larger, their financial stability tends to decrease potentially due to these increased market risk factors. Therefore, H10 is accepted that bank size negatively affects financial stability of banks in line with the earlier studies by Zhang, Li, and Ma (2011) and Laeven, Ratnovski, and Tong (2014) who cautioned on the financial complexities associated with large banks.

Income diversification has a small positive coefficient of 0.006 but it is not statistically significant with p-value of 0.872. This result implies that diversification of income sources does not play a crucial role in shaping financial stability. It may also indicate that income diversification is already well managed within the sample of banks, or that other factors overshadow their contribution to financial stability. Therefore, H9 is rejected that income diversification positively affects the financial stability of banks. This result is line with the earlier work by Tariq et al. (2021) and Adem (2022) who argued for balancing the income streams and considering other risk factors before making diversification decisions.

The coefficient for risk management is -0.020, with a p-value of 0.455 showing no significant effect on the financial stability of banks. This result suggests that variations in risk management practices do not strongly impact financial stability of banks. It is possible that risk management practices, as mandated by regulatory bodies, are uniformly applied across the sampled banks leading to limited variation in their effect on financial stability.

The p-value for the J-statistics is greater than 0.05 suggesting that the over-identifying restrictions are valid, and the instruments used in the GMM model are appropriate. This result confirms that the model does not suffer from instrument misspecification. The standard error of regression has a value of 0.073552 which indicates that the model fits the data with relatively low errors. The lower standard error implies a good fit to the data. Moreover, the mean dependent variable (-0.005093) and S.D. dependent variable (0.067623) provide information on the overall variability in the dependent variable (financial stability) across the dataset.

The results highlighted above indicate persistence of financial stability over time, as indicated by the significance of lagged financial stability. Additionally, the negative impact of financial inclusion on financial stability suggests that expanding financial services to broader, riskier segments of the population may reduce overall financial stability. Larger banks appear to face more significant market challenges in maintaining financial stability as reflected in the negative relationship between bank size and financial stability. On the other hand, financial innovation,

income diversification, and risk management do not support strong or statistically significant impacts on financial stability in this model. The model's validity is confirmed by the J-statistics indicating appropriate use of instruments in the GMM technique.

Table 15. Arellano Bond Serial Correlation Test

Test order	m-Stat.	Rho	S.E.(rho)	Prob.
AR(1)	-0.92639	-0.61703	0.666055	0.3542
AR(2)	-0.72451	-0.1276	0.54125	0.3145

Arellano Bond Test was performed to check serial correlation in the residuals of the dynamic panel data model to ensure the validity of the GMM estimator. The test results for AR(1) show a test statistic of -0.92639 with a p-value of 0.3542 indicating no significant first-order serial correlation. The AR(2) test which assesses second-order serial correlation, reported a p-value of 0.3145 which is also above 0.05. The lack of significant AR(2) correlation is crucial for confirming the validity of the model, as second-order correlation would imply issues with the instruments or model specification. Since AR(2) is not significant in this case, the instruments used in the GMM model are appropriate. Overall, the absence of significant serial correlation confirms that the GMM estimator is valid.

The results of the VIF are presented below:

Table 16. VIF Results

	VIF	1/VIF
FS	1.082	0.924
FINC	1.325	0.755
FIN	1.043	0.958
BS	1.275	0.784
ID	1.030	0.971
RM	1.076	0.929

All variables have VIF values below 1.5 suggesting that multicollinearity is not an issue in this model. This means the independent variables are relatively uncorrelated, allowing for reliable

coefficient estimates without inflating standard errors. The model can thus be interpreted with confidence in the accuracy of the relationships between variables.

4.4 Outcome Variable (Model 3)

Model 3 studies the impact of financial stability on the financial performance of banks. This model uses bank size, risk management, income diversification and credit expansion as control variables.

$$FP_{it} = \alpha + \lambda_1(FSB_{it}) + \lambda_2(BSZ_{i,t}) + \lambda_3(RM_{i,t}) + \lambda_4(ID_{i,t}) + \lambda_5(CE_{i,t}) + \mu_{i,t} \text{.....Eq 4}$$

4.4.1 Descriptive Statistics

Table 17. Descriptive Statistics (Model 3)

	FP	FS	ID	RM	CE	BSZ
Mean	0.018	0.203	0.240	0.169	0.531	8.543
Median	0.130	0.200	0.236	0.070	0.512	8.596
Max.	3.360	1.000	3.140	8.442	0.893	9.719
Min.	-14.740	0.007	0.014	0.001	0.190	6.837
Std. Dev.	0.937	0.094	0.178	0.795	0.130	0.551
Obs.	336	336	336	336	336	336

The table above provides a summary of descriptive statistics for variables of model 3 including Financial Performance (FP), Financial Stability (FS), Income Diversification (ID), Risk Management (RM), Credit Expansion (CE), and Bank Size (BSZ). These descriptive statistics offer insights into the various variables affecting financial performance of banks. The mean value for financial performance is 0.018, with a median of 0.130. However, the wide range from -14.74 to 3.36 indicates substantial variation in profitability across the sampled banks. Some banks experienced huge financial losses while others generated significant returns on investors' funds. The high standard deviation (0.937) shows the disparities in profitability, suggesting that while some banks maintain stable earnings others may struggle for a longer time. The independent variable, financial stability, has a mean value of 0.203 with the maximum value at 1.000 and the minimum at 0.007. The financial stability has a standard deviation of 0.094 which indicates relatively low variability indicating that most banks have consistent levels of financial stability. While some banks maintain strong financial stability, there are a few exceptions at the other end, potentially highlighting vulnerabilities in specific institutions.

The mean value for income diversification is 0.240 with a maximum of 3.140 indicating that some banks have adopted diversified income streams for sustainable financial returns. The standard deviation of income diversification is 0.178 which shows moderate variation in income diversification strategies. This variation in income diversification could reflect different business models with some banks diversifying their revenue sources and others continue to rely excessively on traditional banking revenue streams. Risk management has reported a mean of 0.169 with a wider range from 0.001 to 8.442. The high value of standard deviation (0.795) exhibits that various banks adopt very different approaches to risk management. While some banks have extensive risk management practices in place, others have relatively modest risk management systems which could expose them to potential financial risks in volatile market conditions.

The mean value for credit expansion is 0.531 with a standard deviation of 0.130 indicating that most banks follow conservative lending practices with the data range from 0.190 to 0.893. This moderate variation in the data suggests that while most banks expand credit to different classes of customers cautiously, some banks may pursue more aggressive credit growth strategies. Bank size has a mean value of 8.543 and a standard deviation of 0.551 showing that the banks in the sample are relatively uniform in size. The minimum value of bank size is 6.837 while the maximum is 9.719 suggesting that there are no significant exceptions in terms of bank size in the sampled banks.

The descriptive statistics presented above displayed significant variation in financial performance and risk management across banks. While most banks demonstrate consistent levels of financial stability, the range in financial performance highlights disparities in profitability. The variability in income diversification and risk management practices indicates that banks may adopt different strategies to ensure operational efficiency.

4.4.2 Correlation analysis (Model 3)

Table 18. Correlation results (Model 3)

	FP	FS	ID	RM	CE	BSZ
FP	1.000	0.180	0.022	-0.200	-0.144	0.143
FS	0.180	1.000	-0.104	-0.158	-0.079	0.016
ID	0.022	-0.104	1.000	-0.010	-0.058	0.128

RM	-0.200	-0.158	-0.010	1.000	0.254	-0.043
CE	-0.144	-0.079	-0.058	0.254	1.000	-0.460
BSZ	0.143	0.016	0.128	-0.043	-0.460	1.000

The correlation matrix above explains the relationships between Financial Performance (FP), Financial Stability (FS), Income Diversification (ID), Risk Management (RM), Credit Expansion (CE), and Bank Size (BSZ). A moderate positive correlation (0.180) indicates that better financial performance is associated with increased financial stability. Profitable banks tend to have more resources to manage risks contributing to greater financial stability. The negative correlation coefficient (-0.200) highlights that banks focusing on risk management may incur short-term profitability losses as effective risk management can come at the cost of profitability particularly in volatile economic environments. The negative correlation between credit expansion and financial performance (-0.144) implies that rapid credit expansion could be detrimental to financial performance possibly due to increased default risks potential in times of aggressive lending practices.

A weak negative correlation coefficient (-0.104) between financial stability and income diversification shows that diversification may not necessarily enhance financial stability possibly due to the complexity and management challenges associated with multiple income sources. The positive correlation coefficient of 0.254 between risk management and financial performance indicates that banks focusing on risk management are more likely to control credit growth effectively helping to reduce potential risks from excessive lending to customers. A significant negative correlation (-0.460) between financial performance and bank size suggests that larger banks are more conservative in expanding credit likely due to greater regulatory oversight or higher internal risk controls compared to smaller banks. The matrix highlights important dynamics between profitability, stability, and operational strategies. While profitability tends to enhance financial stability, conservative risk management practices or credit expansion may negatively affect performance. Additionally, larger banks appear to be more cautious in credit expansion, and income diversification does not necessarily improve financial stability, suggesting that balancing risk and operational strategies is key for banks.

4.4.3 Stationarity Test of Variables (Model 3)

This study used Levin, Lin and Chu method for checking unit roots and results are presented in table 19. The results show that p-value of all variables is less than 5% therefore, this study rejects the null hypothesis which implies that all variables of model are stationary.

Table 19. Unit roots and results

Variable	Statistics	Probability
Financial Performance	-2.857	0.002
Financial Stability	-5.132	0.000
Bank Size	-5.273	0.000
Credit Expansion	-6.251	0.000
Income Diversification	-2.391	0.008
Risk Management	-3.152	0.002

4.4.4 Results of Generalized Method of Moments (Model 3)

Table 20: Results of Generalized Method of Moments (Model 3)

Var.	Coeff.	Std. Error	t-Stat.	Prob.
FP (-1)	-0.054	0.001	-64.030	0.000
FS	6.825	0.062	110.006	0.000
ID	0.168	0.048	3.478	0.001
RM	-0.223	0.003	-71.640	0.000
CE	0.588	0.071	8.265	0.000
BS	0.134	0.035	3.845	0.000

Mean dep. Var	0.007499	S.D. dep. Var	1.316244
S.E.	1.317711	Sum squared resid	500.0725
J statistic	13.82321	Instrument rank	21
Prob. J statistic	0.538977		

The table above presents the results of the Generalized Method of Moments (GMM) technique estimating the impact of financial stability and other bank-specific variables on financial performance. The lagged financial performance has a negative coefficient of -0.054 with a

statistically significant p-value of 0.000. This suggests that there was a slight reversion in financial performance implying that high profitability in one period used to decrease slightly in the following period. This trend indicates that banks cannot sustain exceptionally high profits indefinitely, which usually normalize over time.

The coefficient for financial stability is 6.825 with a highly significant p-value of 0.000. This positive relationship exhibits that financial stability significantly enhances financial performance. Banks with stronger financial stability are more likely to report higher profits as they can manage market risks more effectively and enhance confidence among investors. Therefore, it can be safely argued that financial stability plays a critical role in ensuring the long-term profitability of banks. Therefore, H12 that financial stability positively affects the financial performance of banks, is accepted.

The income diversification has a positive and significant impact on financial performance with a coefficient value of 0.168 and a p-value of 0.001. This result implies that banks that diversify their income sources can perform better financially. By relying on diverse revenue streams, banks can reduce market risk and increase their ability to withstand market fluctuations thereby enhancing profitability. Therefore, H13 income diversification positively affects the financial performance of the banks is accepted.

Risk management presented a significant negative coefficient of -0.223 with $p = 0.000$ indicating that robust risk management practices, while essential for long-term stability, may negatively affect short-term profitability. This result might be due to the operational costs associated with implementing comprehensive risk management controls that may limit the bank's capacity for aggressive growth strategies and reducing immediate profits.

Credit expansion has a positive regression coefficient of 0.588 with a significant p-value of 0.000. This result indicates that banks that increase their lending portfolios to various classes of customers tend to experience higher financial performance. The expansion of credit leads to higher interest income of banks with the conditions that default risks are well-managed. This result emphasizes the importance of balancing loan growth with proper risk management practices to maintain profitability. Bank size has a positive and significant impact on financial performance with a coefficient of 0.134 and a p-value of 0.000. Larger banks generally benefit from economies of scale and have more diversified operations with a wider customer base

leading to contribute positively to financial performance. This result also implies that larger banks have a competitive advantage over the smaller one in terms of profitability.

The diagnostic statistics mentioned as J-statistic of 13.82321 with a p-value of 0.538977 indicate that the instruments used in this GMM estimation are valid implying that the model is well-specified with no overidentification issues. The standard error of regression (1.3177) and the sum squared residuals (500.0725) suggest that the model has a reasonable fit.

These GMM regression results signifies the importance of financial stability, income diversification, credit expansion, and bank size in driving financial performance of a bank. However, the negative impact of risk management on profitability suggests a trade-off between maintaining sound risk management controls and achieving short-term financial gains. Banks with stronger financial stability levels and more diversified operations are more likely to maintain sustained profitability. This model guides for the development of a balanced approach between risk management and aggressive growth strategies to optimize financial performance in the banking sector.

Table 21. Arellano Bond Serial Correlation Test

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-1.166459	-224.69	192.6257	0.2434
AR(2)	-0.814251	-20.877	10.51539	0.4175

The Arellano Bond Test presented in table 21 examines the presence of autocorrelation in the residuals of a dynamic panel data model which is important for ensuring validity of Generalized Method of Moments (GMM) estimation.

i. AR(1): The test statistic (-1.166459) with a p-value of 0.2434 shows that there is no significant first-order autocorrelation.
ii. AR(2): The test statistic (-0.81425) with a p-value of 0.4175 suggests that there is no second-order autocorrelation.

The following table represents the results of the VIF of the model.

Table 22. VIF Results

	VIF	1/VIF
FP	1.089	0.918
FS	1.065	0.939
ID	1.029	0.972
RM	1.128	0.887
CE	1.367	0.731
BSZ	1.309	0.764

The results indicate that no variable in the model has the problem of multicollinearity.

4.5 Model 4

Model four deals with measuring the impact of financial stability on market confidence. This model also uses risk management, income diversification and credit expansion as control variables.

$$\boldsymbol{MC_{it} = \alpha + \lambda_1(FSB_{it}) + \lambda_2(BSZ_{i,t}) + \lambda_3(RM_{i,t}) + \lambda_4(ID_{i,t}) + \lambda_5(CE_{i,t}) + \mu_{i,t}}$$ **.....Eq 5**

4.5.1 Descriptive Statistics (Model 4)

Table 23. Descriptive Statistics (Model 4)

	MC	FS	ID	BSZ	CE	RM
Mean	5.618	0.203	0.240	8.543	0.531	0.169
Median	3.146	0.200	0.236	8.596	0.512	0.070
Max.	27.628	1.000	3.140	9.719	0.893	8.442
Min.	-19.020	0.007	0.014	6.837	0.190	0.001
Std. Dev.	7.427	0.094	0.178	0.551	0.130	0.795
Obs.	336	336	336	336	336	336

The table presented above describe the descriptive statistics for Market Confidence (MC), Financial Stability (FS), Income Diversification (ID), Bank Size (BSZ), Credit Expansion (CE), and Risk Management (RM) across 336 observations.

The mean value for market confidence is 5.618 with a large standard deviation of 7.427 reflecting substantial variability in market perceptions among investors across banks. The data range, from a minimum of -19.020 to a maximum of 27.628, highlights the differences in market sentiments with some banks enjoying high levels of confidence while others face

significant negative sentiment. Financial stability has a mean value of 0.203 and a relatively small standard deviation of 0.094 suggesting that most banks have similar levels of financial stability. The minimum value of 0.007 and the maximum value of 1.000 indicate that most banks maintain a consistent level of financial stability. This consistency in financial stability is crucial for maintaining confidence and reducing systemic risk within the banking sector.

The mean value of income diversification is 0.240 with a standard deviation of 0.178 reflecting moderate variability within the sampled banks. The maximum value of 3.140 presents that some banks have adopted more diversified income streams, reducing their market exposure to risks associated with dependence on traditional banking operations. In contrast, other banks, with a minimum value of 0.014 may rely on fewer income sources, making them more susceptible to economic shocks. Bank size has a mean value of 8.543 and a standard deviation of 0.551 suggesting limited variability in the scale of operations across the banking sector. The minimum bank size is 6.837 while the maximum is 9.719 showing that most banks operate within a similar size range. Larger banks may benefit from economies of scale and operational efficiencies while smaller banks may focus on more personalized services of selected customers' base.

Credit expansion has a mean of 0.531 with a standard deviation of 0.130 which suggests that most banks maintain similar lending practices with some differences in loan portfolio growth. The data range from 0.190 to 0.893 indicates that some banks pursue more aggressive credit expansion strategies that could increase profitability but also elevate risk if not managed effectively. Risk management has a mean of 0.169 and a standard deviation of 0.795 suggesting significant variation in how banks handle their risk portfolios. The minimum value of risk management of 0.001 suggests that some banks have minimal risk management frameworks, while others, with a maximum value of 8.442 have a more comprehensive risk management system in place. The wide variation indicates the differing levels of risk exposure and mitigation strategies across institutions, which can have implications for both short-term profitability and long-term financial stability.

The descriptive statistics presented above highlight notable variability across key operational and risk management metrics in the banking sector. While financial stability and credit expansion are relatively consistent across the sampled banks, market confidence, income diversification, and risk management show significant differences. Banks with higher market confidence and diversified income streams are likely to be positioned better to withstand

economic shocks while those banks with effective risk management systems are better equipped to mitigate financial instability.

4.5.2 Correlation analysis (Model 4)

Table 24. Correlation Analysis (Table 4)

	MC	FS	ID	BSZ	CE	RM
MC	1.000	0.244	0.013	0.629	-0.356	-0.323
FS	0.244	1.000	-0.104	0.016	-0.079	-0.158
ID	0.013	-0.104	1.000	0.128	-0.058	-0.010
BSZ	0.629	0.016	0.128	1.000	-0.460	-0.043
CE	-0.356	-0.079	-0.058	-0.460	1.000	0.254
RM	-0.323	-0.158	-0.010	-0.043	0.254	1.000

The correlation table presented above offers a detailed view of the relationships between various financial variables. Market Confidence (MC) shows a moderate positive correlation with financial stability (0.244). This suggests that improvements in financial stability can have a moderate effect on boosting market confidence among investors. The strongest positive correlation is between market confidence and bank size with a coefficient value of 0.629 signifying that larger banks tend to maintain higher market confidence. This result could be because larger banks are perceived to be more financially stable and capable of handling economic shocks. Market confidence and risk management show a negative correlation of -0.323 indicating that higher risk management practices may reduce market confidence. This result could be due to the perception that increased risk management practices signal higher inherent business risks, making investors more cautious.

Income diversification presents almost no correlation with market confidence or financial stability with correlations of 0.013 and -0.104, respectively. This result suggests that income diversification might not significantly affect these two variables in this context. Credit expansion has a negative correlation with both market confidence (-0.356) and financial stability (-0.079) which implies that higher credit expansion could lead to reduced market confidence and financial stability. This could be due to concerns over unsustainable lending practices or the potential for increased non-performance loans. The results of correlation analysis indicate that bank size appears to be the strongest positive contributor to market confidence, while risk management and credit expansion could pose market challenges negatively affecting both market confidence and financial stability.

4.5.3 Stationarity Tests of Variables for Model 4

This study used Levin, Lin and Chu method for checking unit roots and results are presented below in table 25 which shows that p-value of study variables is less than 5% therefore, the study rejects the null hypothesis which implies that all variables of model are stationary.

Table 25. Unit roots and results

Variable	Statistics	Probability
Market Confidence	-2.857	0.000
Financial Stability	-5.132	0.000
Bank Size	-5.273	0.000
Credit Expansion	-6.251	0.000
Income Diversification	-2.391	0.008
Risk Management	-3.152	0.002

The stationarity test reveals that all variables are stationary and there is no issue of unit roots.

4.5.3 Generalized Method of Moments (Model 4)

Table 26. Results of Generalized Method of Moments (Model 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MC(-1)	0.251	0.017	14.339	0.000
FS	8.105	3.411	2.376	0.018
ID	0.009	2.278	0.004	0.997
BSZ	4.952	0.616	8.042	0.000
CE	0.592	1.111	0.533	0.594
RM	-2.229	0.045	-49.995	0.000

Mean dep. Var	0.4715	S.D. dep. Var.	2.96
S.E.	2.9926	Sum square resid.	2579.19
J statistic	14.8119	Instrument rank	21.00
Prob. J statistic	0.4651		

The table above presents the results of the Generalized Method of Moments (GMM) estimation that checks the effect of various banking variables on Market Confidence (MC). The GMM estimation model uses first differences and white-period instrument weighting to account for heteroskedasticity and serial correlation. The coefficient for the lagged value of market

confidence is 0.251 with a significant t-statistic (14.339) and p-value (0.000). This result suggests that previous levels of market confidence have a positive and persistent effect on current market confidence. Banks with strong market confidence in the past are likely to retain or build on that momentum highlighting the inertia in market perceptions among investors.

Financial stability has a positive coefficient of 8.105 with a t-statistic of 2.376 and p-value of 0.018 showing a significant effect on market confidence. This result suggests that banks with greater financial stability enjoy higher market confidence among investors. The financial stability reassures market participants of the bank's ability to withstand economic shocks enhancing their overall market perception. The coefficient for income diversification is 0.009 but with an insignificant p-value of 0.997. This result implies that income diversification does not have a statistically significant effect on market confidence. It emphasizes that banks' attempts to diversify revenue streams may not directly lead to enhance market sentiment possibly because the market focuses more on core financial performance metrics.

Bank size is a significant factor affecting market confidence with a coefficient of 4.952 and a highly significant p-value of 0.000. This result indicates that larger banks typically benefit from greater market confidence, likely due to perceptions of enhanced financial stability, better resource management practices, and a wider capacity to absorb financial shocks. The market perceives larger institutions as safer contributing to the higher confidence observed among banks.

Credit expansion has a positive coefficient of 0.592 with an insignificant p-value of 0.594 suggesting that the impact of credit expansion on market confidence is statistically negligible. While traditionally credit growth is often taken as a sign of business growth, it appears that in this case, it does not significantly affect market perceptions. Risk management shows a significant negative impact on market confidence with a coefficient of -2.229 and a p-value of 0.000. This result indicates that banks with more stringent risk management policies may experience a lower level of market confidence. This counterintuitive result could stem from market concerns that rigorous risk management controls might limit profitability or growth particularly in more aggressive banking environments.

The J-statistic of 14.8119 and its p-value (0.4651) show that the instruments used in the model are valid and there is no overidentification problem. This result suggests that the model is appropriately specified, and the regression estimates are reliable. The GMM estimation

demonstrates that financial stability and bank size are crucial factors of market confidence and risk management has a negative impact. These findings imply that while financial stability and size enhance market sentiment, rigorous risk management practices may be viewed as restricting growth negatively affecting confidence. On the other hand, income diversification and credit expansion do not significantly affect market confidence, indicating that the market focuses on core financial stability rather than revenue structure or aggressive lending practices.

Table 27. Arellano Bond Serial Correlation Test

Test	m-Stat.	Rho	S.E.(rho)	Prob.
AR(1)	-0.78989	-0.77606	0.982487	0.4296
AR(2)	-0.17995	-0.08736	0.485481	0.8572

Arellano Bond Test checks the presence of autocorrelation in the residuals of a dynamic panel data model:

i. AR(1): The test result depicts a t-statistic of -0.78989 and a p-value of 0.4296 indicating no significant first-order autocorrelation in the residuals.
ii. AR(2): The test result reported a t-statistic of -0.17995 and a p-value of 0.8572, suggesting no second-order autocorrelation.

The absence of significant AR(2) autocorrelation is important for ensuring the consistency of the GMM estimator as second-order serial correlation would violate model assumptions.

The following table represents the results of the VIF for all variables in the model;

Table 28. VIF Results

Variables	VIF	1/VIF
MC	2.092	0.478
FS	1.113	0.898
ID	1.034	0.967
BSZ	2.116	0.473
CE	1.366	0.732
RM	1.252	0.799

These results show that no variable of the model has a problem of multicollinearity.

4.6 Model 5: Impact of Macro Economic Factors on Financial Stability of Banks

$$FS_{it} = \alpha + +\omega_1(GDP_t) + \omega_2(INF_t) + \omega_3(KIBOR_t) + \omega_4(EXC_i) + (RM_t) + \mu_{i,t} \dots\dots Eq\ 6$$

4.6.1 Descriptive Statistics (Model 5)

Table 29. Descriptive Statistics (Model 5)

	FS	GDP	KIBOR	PKR	RM	CPI
Mean	0.234	4.738	10.440	6.688	8.843	10.605
Median	0.230	4.750	10.200	6.650	8.350	10.750
Max.	0.290	7.700	13.500	8.600	14.100	13.500
Min.	0.170	-0.900	7.100	4.600	4.800	7.400
Std. Dev.	0.035	2.004	1.728	1.131	2.763	1.537
Obs.	42.000	42.000	42.000	42.000	42.000	42.000

The table above presents the descriptive statistics for different variables reflecting the economic and financial environment. Financial Stability (FS) has a mean value of 0.234 and low variability (Std. Dev = 0.035) indicating relative consistency in financial stability throughout the sample period. The narrow data range from 0.170 to 0.290 suggests that the financial system remained within a stable bank with minimal market risk exposure. GDP growth rate showed a mean value of 4.738 with greater variability represented by standard deviation of 2.004 and data ranging from -0.9 to 7.7. This variation captures periods of both economic contraction and expansion in the sampled time frame. The economic downturns as indicated by negative values could potentially affect financial stability while periods of strong GDP growth support it.

KIBOR, representing the interest rate**,** has a mean of 10.44 with moderate variability (Std. Dev = 1.728). Higher interest rates with maximum value of 13.5 indicate periods of tightened monetary policy which can significantly slow economic growth but may help curb inflationary pressures leading to long-term stability. The PKR Exchange Rate varies between 4.6 and 8.6 with a mean of 6.688. The higher exchange rate volatility (Std. Dev = 1.131) indicates that significant foreign exchange pressures could negatively impact external sector vulnerabilities and overall financial stability. Remittances (RM) with a mean value of 8.843 and a wider data range (4.8 to 14.1) reflect their critical role in supporting the balance of payments and household income leading to creating positive impacts on financial stability. CPI measuring inflation shows a mean of 10.605 with a data range of 7.4 to 13.5. Inflationary pressures can erode the real income of people and affect both the banking sector and consumer confidence significantly affecting financial stability.

Overall, the above presented descriptive statistics highlighted the interplay between macroeconomic indicators and financial stability. The variability in GDP growth, exchange rates, and inflation could pose significant risks, while the more stable financial stability and interest rate environment could help mitigate those risks underscoring the importance of both domestic and external economic factors in maintaining financial stability.

4.6.2 Correlation Analysis (Model 5)

Table 30. Correlation results (Model 5)

	FS	GDP	KIBOR	PKR	RM	CPI
FS	1.000	-0.195	-0.106	-0.619	0.887	-0.020
GDP	-0.195	1.000	-0.175	0.169	-0.431	-0.234
KIBOR	-0.106	-0.175	1.000	0.459	0.110	-0.373
PKR	-0.619	0.169	0.459	1.000	-0.643	-0.364
RM	0.887	-0.431	0.110	-0.643	1.000	0.112
CPI	-0.020	-0.234	-0.373	-0.364	0.112	1.000

The correlation table presented above provides insights into the relationships between Financial Stability (FS) and macroeconomic variables used in this model. FS and GDP have correlation coefficient of (-0.195) which suggests that financial stability slightly decreases as GDP grows. This result could indicate that during periods of rapid economic growth, financial institutions may take on more risk reducing overall financial stability.

FS and KIBOR have correlation coefficients of (-0.106) that show the slight negative relationship between FS and interest rates (KIBOR). This result implies that higher borrowing costs might make it harder for businesses and consumers to manage debt affecting financial stability of banks. However, the overall correlation is weak, suggesting this impact isn't very strong. FS and PKR have a correlation coefficient of (-0.619) that indicates a strong negative correlation between FS and the exchange rate (PKR). This result shows that the local currency depreciates the financial stability of banks significantly. Currency depreciation can increase the cost of foreign debt and imports leading to financial stress for businesses and banks.

FS and Remittances (RM) has correlation coefficient (0.887) that shows the strong positive correlation between FS and remittances. This result indicates that inflows from overseas workers help stabilize the financial system by providing a consistent source of foreign currency, which strengthens the overall liquidity of the economy and financial institutions. FS and Inflation (CPI) has a correlation coefficient of (-0.020) that shows the negligible correlation

between FS and inflation. This result suggests that inflationary changes do not directly impact financial stability of banks. However, inflation may affect other economic variables such as interest rates and exchange rates, which in turn, may influence financial stability. Overall, remittances play an important role for financial stability while exchange rate volatility and interest rates present risks to financial stability. The data indicates that financial stability is sensitive to external factors like remittances and exchange rate fluctuations especially in developing economies like Pakistan.

4.6.3 Stationarity (Model 5)

Table 31. Results of ADF Test

Variable	ADF Statistic	p-value	Stationarity Level
FS	-3.121	0.03	Stationary at level
PKR	-2.781	0.07	Non-stationary at level but stationary at 1st difference
GDP	-2.951	0.05	Stationary at level
KIBOR	-2.012	0.28	Non-stationary at level but stationary at 1st difference
CPI	-1.891	0.34	Non-stationary at level but stationary at 1st difference
RM	-3.451	0.01	Stationary at level

Table 31 provides the results of Augmented Dickey Fuller (ADF) test that checks stationarity in time series data. The results indicate that FS, GDP and RM are stationary at their levels and PKR, KIBOR and CPI are non-stationary at level but stationary at first difference. Stationarity is critical for reliable time series regression, particularly in avoiding spurious results. Once the required level of stationarity is achieved, the regression model is run to estimate the variables' impact on financial stability.

4.6.4 Variance Inflation Factor VIF:

The results of VIF are given in the table below;

Table 32. Results of ADF Test

Variable	VIF	Tolerance
GDP	1.180	0.847
CPI	1.090	0.917
KIBOR	1.200	0.833

RM	2.850	0.351
PKR	2.720	0.368

The results indicate that GDP, CPI and KIBOR have no multicollinearity while RM and PKR have very mild levels of multicollinearity. The threshold value for VIF is 5 and all variables in the model have a score below this threshold level. Given the nature of time data of macroeconomics nature, this level of multicollinearity is negligible. The overall results of the ARDL model are further validated through diagnostics tests.

4.6.5 Bound Test for Co-Integration:

Table 33. Result Bound Test for Co-Integration

Statistic	Value	Critical Values (5%)
F-statistic	5.10	I(0): 2.86, I(1): 4.01
p-value	0.01	-

The bounds test confirms the presence of long run relationship among the financial stability and independent variables i.e. GDP, CPI,RM,PKR and KIBOR. The F-statistic has a value of 5.10 which exceeds for both the upper bound value 2.86 with I(1) and lower bound value 4.01 with I(1). The p-value indicates that relationship is statistically significant at 1% level as represented in the above table.

4.6.6 ARDL Model

The Autoregressive Distributed Lag (ARDL) is a sophisticated econometric technique used to analyze both short-run and long-run relationships among variables. The ARDL is used regardless of whether the data of variables is stationary at levels (I(0)), first difference (I(1)) or a mix of both. The ARDL models are particularly helpful when analyzing time series data where variables may have different orders. One key aspect of ARDL is that it estimates both short-term dynamics and long-term equilibrium relationships among variables in a single framework enabling for more robust analysis. This method is applied in macroeconomic modeling to check the impact of independent variables on a dependent variable over time, especially when lags are involved.

Table 34. Results of ARDL (Long-Run Coefficients)

Variable	Coefficient	Std. Error	p-value

GDP	0.015	0.006	0.02
CPI	-0.007	0.004	0.08
KIBOR	-0.005	0.005	0.14
RM	0.018	0.006	0.01
PKR	-0.010	0.003	0.04

The table above provides the results of long run coefficients of the variables. The results indicate that GDP with coefficient value of 0.015 and p-value 0.02 imply that it significantly affects financial stability in the long run. The positive impact of GDP on the level of financial stability of banks demonstrates that the increase in the GDP provides additional deposits and returns to the banks thereby enhancing their financial stability. This result emphasizes the role of consistent economic performance in enhancing the resilience of the financial system. Therefore, H13 is accepted that GDP growth leads to financial stability. This result is in line with the earlier studies by Ahmed, Suleiman, and Ying (2020) and Barrell, Davis, Karim, and Liadze (2022) who found that GDP growth rate positively affects financial stability.

The CPI has a coefficient value of -0.007 with p-value 0.08 which indicates a negative but marginal impact of inflation on the financial stability of banks. This result may explain the wealth and income erosional effect of inflation for both individuals and businesses thereby reducing the overall financial stability of banks. Therefore, H14 is rejected as inflation may not significantly affect the financial stability in case of Pakistan. This result is in conflict with the studies conducted by Phan, Daly, and Akhter (2020) and Beckmann, Czudaj, and Straetmans (2021) who argued that inflation may significantly affect financial stability of banks. It may be the case as this study measures financial stability in aggregate form at country level data. KIBOR has a coefficient value of -0.005 with p-value 0.14 implying a negative but insignificant relationship between the interest rates and the financial stability of banks. This result suggests that monetary policy transmission to financial stability is weak in the long run, possibly due to interest rate insensitivity in the informal sector and systematic rigidities in the financial sector. Therefore, H15 is rejected that higher interest rates negatively affect the financial stability of a country. This result is in line with the earlier work by Gambacorta (2008) and Apergis and Christou (2022).

The RM has a coefficient value of 0.018 with p-value 0.01 indicating a strong positive impact of remittances on the financial stability of banks. This result indicates that remittances directly increase the foreign exchange reserves, reducing balance of payments vulnerabilities. Accordingly, the higher remittances enhance the banking sector liquidity by increasing deposit bases which improve household financial resilience and reduce non-performing loans. The

PKR has a coefficient value of -0.010 with p-value 0.04 demonstrating significant negative impact of rupee depreciation on the financial stability of banks. This result implies that with depreciation in the value of rupee, it escalates the domestic currency value of foreign-denominated debts, increases import costs specially for essential commodities and intermediate goods and may cause capital flight as investors seek to preserve the asset values. These findings report that structural policies aimed at enhancing GDP growth in a sustainable manner, formalizing remittance channels and implementing exchange rate hedging mechanisms would be most effective for sustaining long-term financial stability of banks. Therefore, the H15 and H16 are accepted as both foreign exchange rate volatility and remittances significantly affect financial stability. These results are in line with the earlier studies by Azizi (2020) and Ambrosius and Cuecuecha (2021) in the context of remittances and Beirne and Friedrich (2020) and Frost, Gambacorta, Huang, and Shin (2021) in the context of foreign exchange volatility.

Table 35. Results of Short Run Dynamics (ECM)

Variable	Coefficient	Std. Error	p-value
ΔFS(t-1)	0.200	0.080	0.020
ΔGDP(t)	0.010	0.004	0.030
ΔCPI(t)	-0.004	0.002	0.070
ΔRM(t)	0.012	0.004	0.010
ΔPKR(t)	-0.006	0.002	0.050
EC(t-1) (λ)	-0.480	0.100	0.000

The table here presents the results of short run dynamics Error Correction Model (ECM). The results presented above reveal the immediate effects of change in the variables on the financial stability of banks. GDP growth shows a smaller but significant positive effect with a coefficient value of 0.010 and p-value 0.030 likely to reflect quick confidence impacts and inventory cycle responses of the small businesses. The CPI has coefficient value of -0.004 with p-value 0.070 indicating insignificant yet marginal effect of inflation on financial stability of banks. The above analysis also reports the acute sensitivity of financial stability to remittance flows and exchange rate movements with immediate and pronounced effects. The results indicate that a 1% increase in remittances boosts financial stability by 0.012 units through rapid liquidity injection effects as remittances inflows directly increase bank fund enabling credit expansion. The higher remittances also strengthen currency markets through increased foreign currency supply. The PKR has a negative but significant impact on financial stability through coefficient value -0.060 and p-value 0.050. This result may be interpreted as local currency depreciates the market players react with heightened volatility as participants adjust to new

market expectations. Overall, the error correction mechanism's strength with -0.48 coefficient indicates an exceptionally active adjustment process with near 50% of disequilibrium corrected annually. This analysis suggests banking system in Pakistan has self-stabilizing tendencies but also requires suitable policy interventions at precise timing to complement these automatic market adjustments.

Table 36. Diagnostics Tests

Test	Statistic	p-value
Breusch-Godfrey (Serial Correlation)	1.50	0.26
Breusch-Pagan (Heteroskedasticity)	1.90	0.20
Jarque-Bera (Normality)	2.20	0.15
CUSUM (Stability)	Within bounds	-
CUSUMSQ (Variance Stability)	Within bounds	-

Above table presents the diagnostic tests which confirm the statistical robustness and reliability of the ARDL model results presented in the previous tables. The table above shows the Breusch-Godfrey test with p-value 0.26 which indicates that there is no evidence of serial correlation in residuals of the variables indicating that model has adequately captured all time-dependent trends in the data. The next diagnostic test is the Breusch-Pagan test with p-value 0.20 which confirms homoskedasticity reporting that the variance of errors remains constant across observations. Accordingly, the variables and model are statistically validated with efficient estimates. Another diagnostic tool is the Jarque-Bera test with p-value 0.15 which shows that residuals follow a normal distribution satisfying the normality assumption required for reliable hypothesis testing about the coefficients. The three diagnostic tests reported above demonstrate that the model and results are reliable for estimation purposes. Lastly, to examine the structural breaks, the CUSUM and CUSUMSQ tests report stability within bounds sending strong evidence that the estimated relationships among variables remained consistent throughout the data period. Overall, these diagnostic results collectively assure regarding the variables and model that:

i. model is correctly specified with appropriate functional form and variable selection,
ii. estimated coefficients are unbiased and efficient, and
iii. statistical inferences drawn from the model are valid.

Chapter Summary:

This chapter reported the results of the data analysis conducted for the purposes of identifying relationships among the variables. Starting with the results of financial stability ranking of banks, this chapter reported the relative position of banks over time. Next, model 1 was estimated by studying the impact of CAMELS' factors on financial stability of banks. Then model 2 was estimated that included other bank specific variables and their impact on financial stability of banks. Next, models 3 and 4 were estimated to study the impact of financial stability on the financial performance and the market confidence of banks. Afterwards, the impact of macroeconomic factors on the aggregate financial stability of banks was reported accordingly. The descriptive statistics, correlation analysis, stationarity tests, GMM estimation, VIF values and Serial Correlation tests were performed and reported for all estimated models.

CHAPTER 5: FINDINGS, POLICY RECOMMENDATIONS AND CONCLUSION

5.1 Findings

This study was conducted to know the antecedents and outcomes of financial stability of banks. The antecedents here refer to the bank specific and macroeconomic factors that affect the level of financial stability of banks in a country. The outcome of financial stability is intended to study the impacts of financial stability on the different bank specific variables. Based on the hypothesis developed in chapter 2 and their subsequent acceptance and rejection through data analysis performed in chapter 4, the following significant findings of this study can be summarized here;

i. A significant majority of sampled Pakistani banks (18 out of 21) have moderate or higher level of financial stability measured through Z Score. This finding indicates that there is a need to improve capital adequacy and operational profitability of banks. Although 3 to 4 banks are facing a lower level of financial stability, adequate regulatory provisions for capital reserves and enhanced operational performance can improve their status.

ii. Based on model 1 which measured the impact of CAMELS factors on financial stability of banks, capital adequacy significantly affects the financial stability of banks with a positive relationship. This result indicates that financial stability is significantly affected by the level of capital adequacy of a bank. Without a significant capital base, a bank cannot maintain financial stability which is crucial for satisfying consumers, depositors, borrowers, shareholders and other stakeholders.

iii. The model 1 also reported that the asset quality significantly affects the financial stability of banks. This finding underscores the importance of extending high quality advances to the customers to strengthen the financial stability of the bank. The financial stability of the bank may experience volatility in case of a higher ratio of non-performing loans thereby affecting the asset quality.

iv. Based on model 1, it is reported that the earnings also significantly impact financial stability of banks which implies that a bank with strong profitability will have a higher level of financial stability. The earnings play a significant role in the financial stability of a bank as a bank facing losses may severally affect its financial stability.

v. Liquidity, in combination with other factors such asset quality and earnings, facilitates enhancing the financial stability of a bank. The crucial importance of liquid assets is

evident as the business of banking requires sufficient cash and cash equivalents for operational aspects.

vi. Model 2 reported that financial inclusion significantly affects the financial stability of banks. The results indicate that this relationship between financial stability and financial inclusion is in the inverse direction. In other words, this relationship needs to be cautiously studied as extending banking advances to less qualified customers may negatively affect the financial stability of banks.

vii. The model 2 also reported that bank size may significantly affects the financial stability level of a bank. With higher bank size, financial stability tends to have an inverse relationship implying that big size banks have complex operations interwind with many other firms. Therefore, larger banks need to carefully manage their operations to maintain their financial stability.

viii. Model 3 measured the impact of financial stability on financial performance of banks. The results indicated that financial stability significantly affects the financial performance of banks. The higher level of financial stability enhances the financial performance of banks, stressing the importance of a stable bank for good financial performance. This finding is significant for understanding the positive relationship between financial performance and financial stability of banks.

ix. Model 4 measured the impact of financial stability on market confidence of banks. This finding indicated that financial stability significantly enhances the market confidence of banks. The market participants interpret higher financial stability as an indicator of financial soundness resulting in a higher marker price for bank shares.

x. Model 5 measured the impact of macroeconomic factors on the financial stability of banks. The findings indicated that GDP growth rate, interest rate, remittances and foreign exchange volatility significantly affect financial stability of banks in Pakistan. This finding indicates that the macroeconomic environment shapes the structure and processes of the financial system in which the banks operate

xi. Overall, financial stability is influenced by both bank specific and macroeconomic factors. There is a dire need to continuously examine the levels of financial stability of banks in Pakistan and closely monitor the bank specific factors that can affect financial stability of banks. As most banks in Pakistan are in grey zone having moderate level of financial stability, any significant bank specific or macroeconomic event might affect the financial stability of banks.

5.2 Policy Recommendations

This study has produced significant findings for the banking industry, regulatory bodies, consumers, shareholders and govt. agencies and other stakeholders of the banking system. A brief list of policy recommendations based on the findings of the study is given here;

5.2.1 Capital Adequacy

i. Banks should maintain adequate capital buffers to sustain the financial stability levels required for operational and strategic objectives.
ii. Banks should enhance capital adequacy by improving equity levels and retaining earnings. This objective can be achieved through conservative lending practices and strategic financial decisions related to dividend payouts and raising equity capital.
iii. The regulatory bodies should strictly monitor the capital requirements of banks and stress test, or scenario analysis may be conducted to ensure compliance with minimum capital requirements or Basel III capital requirements.

5.2.2 Asset Quality

i. A should have a rigorous asset quality monitoring system along with the transparent credit assessment processes to evaluate the quality of loans.
ii. An early warning system should be put in place for identifying the non-performing loans by bank management to ensure the minimum loan defaults. Any increase in non-performing loans directly affects financial stability of banks.
iii. The regulatory bodies should strictly oversee the asset quality of banks to prevent the increase in non-performing loans. The periodic asset quality reviews and stress tests can enhance the asset quality assessment.

5.2.3 Earnings

i. A bank should maintain stable profitability levels by offering market-oriented products and services to different classes of customers.
ii. Along with enhancing revenues, a bank should also consider reducing costs by adopting technologies, cutting unnecessary administrative costs and adopting fee-based models for enhancing revenues.

iii. The regulatory bodies should carefully examine the profitability matrix of the banks, and an early warning system should be in place for identifying loss making banks and develop strategies to ensure the continuity of their operations.

5.2.4 Liquidity

i. A careful analysis (liquidity coverage ratio or net stable funding ratio etc.) of the liquidity position of a bank must be made by the management periodically to identify any short-coming and develop policies to ensure sufficient liquidity.
ii. A bank should diversify its sources of funding and must balance the short- and long-term funding sources to ensure the adequate liquidity provision in a bank.
iii. The regulatory bodies should also carefully examine the liquidity position of banks and established metrics such as LCR should be made compulsory for compliance.

5.2.5 Financial Inclusion

i. The bank management should carefully decide on extending products and services under the banner of financial inclusion as it can also negatively affect the asset quality and liquidity.
ii. Bank management should ensure that financial inclusion efforts do not result in extending bank services to unqualified borrowers resulting in an increase in non-performing loans affecting financial stability of banks.
iii. The regulatory authorities should also develop strict benchmarks for receiving banking services and clear guidelines should be issues for the banks for maintaining quality banking services.

5.2.6 Bank Size

i. The bank management should consider the implications of increasing the size and scope of banking services as an overly expanded bank may become too big to manage and may affect the overall financial stability of the system.
ii. The regulatory bodies should carefully monitor the ‘too big to fail’ banks as very large banks may develop riskier behavior and disturb the overall financial system. Additional reporting and compliance criteria should be there for big banks.

5.3 Conclusion

This study was conducted to know the antecedents and outcomes of financial stability of banks. Both bank specific and macro-economic factors were studied to measure their effect on

financial stability of banks. Based on data of Pakistani banking industry, this study seeks to identify factors that significantly affect financial stability of banks. The data analysis confirmed that capital adequacy, asset quality, earnings, financial inclusion and bank size are factors that significantly affect financial stability of banks. From the macroeconomic side, GDP growth rate, inflation rate, remittances and foreign exchange rate volatility significantly affected financial stability of banks. Lastly, this study seeks to understand the impact of financial stability on financial performance and market confidence of banks. This study recommends adequate levels of regulatory supervision to monitor the level of financial stability of banks to make their operations sustainable and protect the rights of depositors, shareholders and consumers.

5.4 Future Research Directions

This research was an effort to measure the level of financial stability of Pakistani banks and exploring the factors that affect the financial stability. This study used both bank specific and macroeconomic factors for studying their impact on financial stability of banks. The sample banks were Pakistan based commercial banks, and the data period was 17 years from 2007 to 2022.

For future researchers, the author recommends the following points;

i. The financial stability index may be developed based on multiple factors to rank the banks across the industry.
ii. Sector specific studies may be conducted in the public sector vs private sector banks with a wider sample size from multiple countries.
iii. More advanced techniques may be used for estimating financial stability using AI, machine learning and real time data.
iv. Inclusion of more sampled banks by taking samples from South Asia, Central Asia or other emerging economies.
v. Data period may be enhanced to account for more changes across the study time.
vi. Alternate econometric techniques may be used for estimating regression results of multiple variables.
vii. A primary data survey to assess the confidence of banks may be conducted with access to top management.
viii. A special study may be undertaken on microfinance banks, investment banks and specialized banks to understand their operational performance and financial stability.

ix. Variables such as institutional quality, political uncertainty, fraudulent behavior, off-balance sheet arrangements etc. may be measured and reported given the nature of Pakistani economy.

x. The present practice of merging or acquiring smaller banks by the larger banks as encouraged by SBP may be examined to report the cost-benefits for such transactions.

Chapter Summary:

This chapter discussed the findings of this study based on the results obtained in front of the data analysis completed in chapter 4. The findings highlight the factors that significantly affect financial stability of banks and report the outcome factors which are shaped by the level of financial stability of banks. After that, the policy recommendations are provided for regulatory bodies, banks and other stakeholders to develop policy parameters and guidelines for ensuring financial stability in the banking sector. A financially stable banking sector requires strict adherence to the capital adequacy requirements, strong asset quality, dynamic earnings and effective risk management practices. Lastly, this chapter presented the future research directions for the researchers to further explore these concepts and relationships among variables based on a wider sample size, using different proxies, additional time periods of data and alternate econometric techniques.

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Annexure 1: Basel III Framework on Banking Supervision

The Basel III Framework on Banking Supervision was introduced by the Bank for International Settlements (BIS) to improve the quality of bank regulation, supervision, and risk management. After the financial crises of 2008, the Basel III guidelines were to further strengthen the regulatory conditions specified in the previous regulatory frameworks (Basel I and II). The objective of the Basel III framework was to improve the resilience of banks in times of financial crises by focusing on three key banking areas: capital adequacy, liquidity, and leverage. The State Bank of Pakistan (SBP) plays an important role in implementing the Basel III guidelines for the banking industry in Pakistan to ensure that commercial banks maintain adequate capital, manage liquidity shortfalls, and limit excessive leverage exposure to prevent systemic crises. The details of Basel III guidelines on capital adequacy, liquidity and leverage are given below;

1.Capital Adequacy:

The capital adequacy requirements under Basel III framework require banks to maintain a higher quality of capital to absorb unexpected losses. As a bank has different types of capital, Basel III imposes stricter requirements to ensure financial stability for each category. The first capital type is the Tier 1 Capital which is the highest quality capital, consisting primarily of common equity, which can absorb losses on a going-concern basis. The second type of capital is the Tier 2 Capital which is the supplementary capital that provides loss absorption in the event of a liquidation.

Specified Capital Ratios:

i. Common Equity Tier 1 (CET1) Ratio consists of common shares and retained earnings.
ii. Minimum CET1 Ratio is specified at 4.5%
iii. Capital Conservation Buffer is specified at 2.5%
iv. Total CET1 Requirement is specified at 7.0%.
v. Tier 1 Capital Ratio includes CET1 and other Tier 1 capital components.
vi. Minimum Tier 1 Capital Ratio is specified at 6.0%.
vii. Total Capital Adequacy Ratio (CAR): This ratio adds up both Tier 1 and Tier 2 capital reporting the overall capital adequacy of a bank.
viii. Minimum Total Capital Ratio is specified at 8.0%.
ix. Adding Capital Conservation Buffer of 2.5% makes it to 10.5% (8.0% + 2.5%).
x. Also, in some cases, Countercyclical Capital Buffer may be added which ranges from 0% to 2.5% depending on the financial environment.

Leverage Ratio: The leverage ratio is added in the Basel III framework as a non-risk-based tool to prevent excessive leverage in the banking system. The leverage ratio is calculated as the ratio of Tier 1 capital to the bank's total exposure which includes both on-balance-sheet and off-balance-sheet items. The minimum leverage ratio specified by the Basel II framework is the 3.0%. This ratio ensures that banks maintain a healthy balance between their capital and overall leverage.

Liquidity Requirements:

The liquidity is the most important aspect of a bank as it has to deal with the cash inflows and outflows on daily basis. The Basel III framework has introduced two liquidity standards for the banks to maintain sufficient liquid assets to fulfill their short-term and long-term obligations during periods of financial stress. These ratios are the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR).

Liquidity Coverage Ratio (LCR): The LCR requires banks to hold sufficient high-quality liquid assets (HQLA) to cover their net cash outflows over a 30-day financial stress period. The minimum LCR Requirement is 100%.

Net Stable Funding Ratio (NSFR): The NSFR requires banks to maintain a stable funding profile in relation to the composition of their assets and off-balance-sheet activities. The minimum specified NSFR requirement is 100%.

Requirements of Countercyclical Buffer:

The countercyclical capital buffer can be set by the SBP in response to economic conditions. During periods of excessive credit growth, banks may be required to build additional capital buffers to safeguard against potential credit losses when the economy slows down.

Systemically Important Financial Institutions (SIFIs):

The SBP specifies the Systemically Important Financial Institutions (SIFIs) which are the banks or financial institutions that are very large or have been interconnected in the overall financial system in a way that their failure could pose a threat to the entire financial system. Under the Basel II framework, these banks are required to hold additional capital reserves which is also called the SIFI surcharge.

SBP and Implementation of the Basel III Framework:

The SBP seeks to ensure that banks comply with the capital adequacy, leverage, and liquidity requirements of Basel III framework. To achieve this objective, the SBP issues regulations, guidelines, and circulars that implement Basel III standards.

The SBP also supervises banks through both off-site surveillance and on-site inspections. The off-site surveillance includes analyzing reports submitted by banks, while on-site inspections involve detailed audits of bank operations at the different locations of the banks.

The SBP requires banks to regularly conduct stress tests to assess their capability to absorb financial losses in adverse economic scenarios. The SBP itself conducts stress tests of different banks to evaluate systemic resilience of the banks.

In case, if a bank fails to meet the required criteria specified by the Basel III framework or shows signs of financial stress, the SBP can take corrective measures. These measures may include increasing capital requirements, restricting dividend, imposing penalties and taking regulatory actions.

Annexure 2: Financial Development Index Ranking of Pakistan

Year	Financial Development Index	Financial Institutions Index	Financial Markets Index
1980	0.10	0.17	0.03
1981	0.10	0.17	0.03
1982	0.11	0.18	0.03
1983	0.11	0.19	0.03
1984	0.11	0.19	0.03
1985	0.13	0.22	0.04
1986	0.14	0.23	0.04
1987	0.13	0.21	0.04
1988	0.13	0.22	0.03
1989	0.13	0.23	0.03
1990	0.12	0.22	0.03
1991	0.12	0.22	0.03
1992	0.12	0.21	0.02
1993	0.13	0.23	0.03
1994	0.13	0.22	0.03
1995	0.12	0.22	0.03
1996	0.21	0.20	0.22
1997	0.28	0.18	0.37
1998	0.30	0.23	0.35
1999	0.30	0.20	0.39
2000	0.31	0.21	0.39
2001	0.28	0.19	0.35
2002	0.30	0.23	0.35
2003	0.31	0.25	0.35
2004	0.36	0.26	0.46
2005	0.37	0.26	0.45
2006	0.36	0.27	0.45
2007	0.37	0.26	0.46
2008	0.32	0.25	0.37
2009	0.26	0.24	0.26
2010	0.21	0.25	0.16
2011	0.20	0.25	0.14
2012	0.20	0.26	0.14
2013	0.21	0.26	0.14
2014	0.21	0.27	0.14
2015	0.21	0.27	0.14
2016	0.21	0.28	0.14
2017	0.21	0.28	0.14
2018	0.22	0.29	0.14
2019	0.22	0.28	0.14
2020	0.22	0.29	0.14
2021	0.22	0.29	0.14

Annexure 3: List of Pakistani Banks

Public Sector Com. Banks (5)
First Women Bank Ltd. National Bank of Pakistan Sindh Bank Ltd.
The Bank of Khyber the Bank of Punjab
Local Private Banks (20)
Al-Baraka Bank (Pakistan) Ltd. Allied Bank Ltd.
Askari Bank Ltd. Bank AL Habib Ltd. Bank Alfalah Ltd.
Bank Islami Pakistan Ltd.
Dubai Islamic Bank Pakistan Ltd. Faysal Bank Ltd.
Habib Bank Ltd.
Habib Metropolitan Bank Ltd. JS Bank Ltd.
MCB Bank Ltd.
MCB Islamic Bank Ltd. Meezan Bank Ltd.
SAMBA Bank Ltd.
Silk Bank Ltd Soneri Bank Ltd.
Standard Chartered Bank (Pakistan) Ltd.
Bank Makramah Limited (formerly Summit Bank Ltd. United Bank Ltd.
Foreign Banks (4)
Citibank N.A. Deutsche Bank AG
Industrial and Commercial Bank of China Ltd.
Bank of China Limited
Specialized Banks (3)
Punjab Provincial Co-operative Bank Ltd.
SME Bank Ltd.
Zarai Taraqiati Bank Ltd.
All Commercial Banks (29)