



RESEARCH PAPER

The Financial Stability Spectrum of Pakistani Banks: Evidence from Advanced Z-Score Assessment

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ABSTRACT

This study investigated the financial stability of the commercial banks in Pakistan by using Z-score as the measure of the financial soundness. For the purpose of analysis, the data of 21 commercial banks in taken over the period 2007-2022. The study is based on the ranking of the banks according to their financial stability scores as measured by the Z-score. According to that ranking the classification of banks is done into three zones which includes green, grey and red zone banks to measure the relative levels of risk and stability within the banking sector. Next, the year wise average stability of banks is examined to highlight the changing financial vulnerabilities of the sampled banks over the year. Findings reveal that the banking that few of the banks in Pakistan are moderately stable and are employing risk management techniques and maintain capital buffers to withstand the financial shocks. Few of the banks lie in the green zone which are strongly stable and taking measure to sustain the financial shocks. Further, the banking sector showed relatively strong financial stability during the early years of the study, particularly in 2012, while a gradual decline in financial stability was observed after 2017. The study provides a comprehensive assessment of financial stability trends over a long period. The findings are useful for regulators, policymakers, investors, and bank management in identifying emerging financial risks and designing appropriate strategies to strengthen the banking sector.

KEYWORDS Financial Stability, Z-score, Commercial Banks, Volatility

Introduction

The nature of the business operations and the reliability and the performance of the financial transactions is largely impacted and improved by the growth of the modern banking system. Modern banking system has revolutionized the banking system by offering multiple services which includes variety of deposit accounts, lending services, collecting revenues and disbursing payments on behalf of the businesses and the customers. Advancement in these services with the passage of time has largely contributed to growth in deposits, investment, lending, enabling banks to reap the benefits of increased profitability across multiple regions worldwide. Banks, because of these services, have assumed a pivotal position in modern economies.

Banks, due to their diversified services, play very important role in inducing savings and investments in the economy, thereby contributing towards the efficient working of the financial system which leads to sustainable economic growth. The stability of the whole financial system is dependent upon the stability of the individual banks, their lending and investment decisions. Stability of the financial system requires

banking decisions that enable the entire banking system to respond effectively to market volatilities and uncertainties, leading to the efficient allocation of resources (Schinai, 2004).

Stable banking system is defined as a system in which all the entities coordinate towards mobilization of resources and channel these resources towards the most productive sectors of the economy. Financial stability refers to the bank's ability to withstand shocks by effectively managing credit, liquidity, and market related risks while providing reliable services to the customers continuously. Banks, as financial intermediaries, effectively manage deposits and lending portfolio by maintaining adequate levels of liquids and capital levels. Banks are, therefore, responsible for protecting depositors' funds by adopting effective risk management techniques in lending and investment activities. Moreover, banks' stability is largely dependent upon timely recovery of loans and their ability to generate adequate returns for investors.

The expansion in the banking services with its increased benefits has increasingly exposed banks to different types of risk such as credit risk, liquidity risk, operational risk and foreign exchange risks. Banking exposure to these risks and uncertainties weakens the stability of the financial system. Financial instability is contagious, which first impacts the entire financial system and then adversely affects economic growth (Charles P. Kindleberger, 1978; Hyman Minsky, 1992). Unstable banking system decreases the investors confidence, induces bank runs, increases insolvency risk and restrict credit availability. Instability in banking sector extend across the other sectors leading to vulnerabilities in overall economic system.

Stability at firm and aggregate level has been widely researched and many studies and institutions have developed various measures of banking and financial stability. International monetary fund (IMF) has developed financials soundness indicators (FSIs), and the European system of central banks issued the EU banking stability report in 1999. Researchers including Martin Illing and Ying Liu (2003), Van den End and J.W. (2006), Geršl (2006), Kočišová and Stavárek (2015), and Babar et al. (2019) also proposed various financial stress and stability indices to assess banking sector health across different countries.

Stability of the banking sector is driven by both bank -specific and macroeconomic factors. Bank specific factors include profitability, size, assets quality, non-performing loans, capital adequacy, and risk management (Morales and Estrada, 2010; Vo et al., 2019; Pham et al., 2021; Kharabsheh and Gharaibeh, 2022; Ozili, 2019; Gupta and Kashiramka, 2020). Van den End and JW (2006) are of the view that stable banks maintain sustainable profits, better assets quality and controlled risk levels. Macroeconomic factors that influence banking stability includes inflation, GDP growth, exchange rates, remittances, money supply, fiscal deficit, interest rates, unemployment, credit growth (Morris, 2010; Bader et al., 2013; Kozaric & Dzelihodzic, 2020; Viphindrartin et al., 2021).

Although considerable literature exists, limited studies have examined banking sector stability in Pakistan using by ranking the banks based on financial stability score and then studying the overall trend in the financial stability of the banking sector over the years. Therefore, the current study analyses 21 Pakistani banks over the period 2007–2022 by ranking them on the basis of Z-scores and categorizing them into green, grey, and red zones according to their stability levels.

Literature Review

The foundation of this study is laid on the financial fragility theory which stated that limitations in the financial system leads to the financial distress and vulnerabilities. Banks and financial institutions have increased exposure to the risk and uncertainties due to their inherent operational structure which involves leverage and liquidity transformations. The roots of the financial fragility theory are traced back to the Financial Instability Hypothesis proposed by Minsky (1977) which states that the period of economic stability enables bank and firms to borrow excessively and take more risks. Over time, due to excessive leverage the financial system becomes unstable and lead to financial crisis. As a step further, Douglas W. Diamond and Philip H. Dybvig (1983) argued that financial institutions engage in maturity conversion through short-duration funding and long-duration financing, making them vulnerable to liquidity shortages and depositor panics. Another dimension to this discussion was added by Bernanke and Gertler (1989), who stated that sudden economic shocks make the bank balance sheet weak and intensify the economic fluctuations. Furthermore, Allen and Gale (2000) examined how systematic risk is aggravated by market liquidity and asset price bubbles. Acharya and Viswanathan (2011) attributed financial instability to the excessive leverage and forced assets sales.

Theory of financial fragility is further strengthened by the recent studies which proposed among the key causes of financial fragility includes excessive leverage, overdependence on short term fundings and interconnectedness among the institutions. Resultantly, banks are exposed to liquidity constraints, asset price fluctuations, and insolvency risk and untimely due to contagion effects failure in one institution spread instability to the other institution and then the entire system becomes vulnerable (Adrian et al., 2020; Benmelech and Bergman, 2021). Financial fragility theory provides important justifications for understanding the volatilities in financial system and help banks to design policies to which withstand the financial shocks. Banks are strongly recommended to maintain capital buffers against potential shocks and maintain high proportion of liquid assets to minimize financial fragility (Adrian et al., 2020; Laeven et al., 2022)

The phenomenon of financial stability attracted more attention after the Great Depression of the 1930s when the need for a sound banking system and strong banking regulation was raised due to widespread bank failures. In response to that, government and regulatory authorities developed various regulatory, legal and supervisory frameworks. Glass-Steagall Act of 1933 was introduced which requires separation of commercial and investment banking activities and requires monitoring and surveillance of capital adequacy, liquidity, leverage, asset quality, and risk management practices by the regulators. Banking supervision and regulatory framework was further strengthened after World War II and savings and loan crisis of 1980s. This led to the development of the Basel Accords in 1988. Basel I and Basel II developed international standards for banking supervision and capital adequacy requirements. Global financial crisis in 2008 led to the development of Basel III which provides more comprehensive guidelines related to liquidity management, capital adequacy and leveraging to help banks sustain financial shocks.

As a part of institutional efforts to develop measures of financial stability International Monetary Fund (IMF) in 1999 developed Financial Soundness Indicators (FSIs) which includes indicators related to capital adequacy, liquidity, profitability, asset quality. European System of Central banks also introduced macro-prudential indicator

through EU Banking Stability Report in 1999 providing a broader framework that categorized indicators bank-specific, monetary and development indicators. Researcher also developed indices to measure financial stability and are of the view that financial stability should not be measured solely through capital adequacy. They suggested that broader indicators can effectively capture financial stress within the banking system. Illing and Liu (2003) created a financial stress index for the Canadian financial sector by incorporating indicators from equity markets, foreign exchange markets, banking variables, and macroeconomic data. Goodhart (2006) used measures such as liquidity and other dynamic indicators to measure stability.

Researchers in different countries have developed their own financial stability indices. The main objective of these indices was to provide a benchmark for evaluating and ranking the stability and resilience of financial institutions. The Central Bank of the republic of Turkiye introduced a financial soundness indicator in 2006. Jan Willem van den End (2006), Ales Gersl (2006), Claudia-Maria Albuлесcu (2010), Marco Morales and Dario Estrada (2010), as well as Kristina Kocisova and Daniel Stavarek (2015). constructed financial soundness indices for Netherlands, Czech, Romania, Colombia, and ten European Union member countries respectively. Similarly, Babar et al. (2019) constructed a banking stability index by incorporating variables such as liquidity, profitability, capital adequacy, asset quality, banking spread, and interbank linkages. Furthermore, Financial stability is considered to be the driver of the economic growth (Jokipii and Monnin, 2013; Nasreen and Anwar, 2018; Ozili, 2018; Ozili, 2019).

Material and Methods

Sample and Data Sources

The study employs data of 21 commercial banks ranging from the period 2007 to 2022. The data was obtained from the data and publication department of state bank of Pakistan. The time period was chosen based on data availability and to capture variations in the variables over time. Population of the study includes all the banks operating in Pakistan. As commercial banks account for nearly 76% of the financial sector's total assets of Pakistan, the study is exclusively focused on them. Microfinance institutions, investment banks, foreign banks, specialized banks, and DFIs were omitted because of their comparatively smaller scale and limited role in Pakistan's financial system.

Measurement of Financial Stability

Consistent with the previous literature, the study used Z-score to measure financial Stability as suggested by John H. Boyd and David E. Runkle (1993), followed by the work of Luc Laeven and Ross Levine (2009), as well as Martin Cihak and Heiko Hesse (2010) and measured as;

$$Z\text{-Score} = \frac{k + \mu}{\sigma}$$

This study measure financial stability following Hannan and Hanweck (1988) and Boyd and Runkle (1993) using the following formula.

$$Z\text{ Score} = \frac{ROA + (Equity/Assets)}{\sigma (ROA)}$$

Bank are classified into three categories based on the z-score values i.e. safe zone, grey zone, and distress zone. Z-score remains a widely used financial stability measure across different jurisdictions due to its simplicity and adaptability.

Results and Discussion

This study examines the financial stability of the sampled banks using the Z-score measure then they are categorized into different zone. The financial stability scores are further classified into different categories and then year wise financial stability of all the sample banks is calculated.

Financial Stability Ranking

Table 1 reports for all sampled banks with their Z-score. Results show that with the increase in the Z-score levels, financial stability increases and vice versa. Banks having higher Z-score indicate stronger financial stability whereas banks having lower Z-score values demonstrate weaker level of financial stability

Table 1
Financial Stability Rankings

Sampled Banks	Z-scores
Green Zone Banks	
HMB	28.1308
UBL	19.5661
Grey Zone Banks	
FBL	18.3864
MBL	17.9206
DIBPL	16.5943
MCB	14.9828
NBP	14.9409
BOK	14.7976
HBL	14.4593
SBL	13.9615
BAHL	13.3906
BAL	12.1259
BIPL	9.8824
JSBL	9.5211
Samba	7.5768
SCBPL	5.7445
Silk	5.7422
AKBL	5.6483
Red Zone Banks	
ABL	1.7229
BOP	0.9803
SMBL	0.2823

HMB = Habib Metropolitan Bank, UBL = United Bank Limited, FBL = Faysal Bank Limited, MBL = Meezan Bank Limited, DIBPL = Dubai Islamic Bank Pakistan Limited, MCB = MCB Bank, NBP = National Bank of Pakistan, BOK = Bank of Khyber, HBL = Habib Bank Limited, SBL = Soneri Bank Limited, BAHL = Bank Al-Habib Limited, BAL = Bank Alfalah Limited, BIPL = Bank Islami Pakistan Limited, JSBL = JS Bank Limited, Samba = Samba Bank Limited, SCBPL = Standard Chartered Bank (Pakistan) Ltd., Silk = Silk Bank Limited, AKBL = Askari Bank Limited, ABL = Allied Bank Limited, BOP = Bank of Punjab, and SMBL = Summit Bank Limited.

Zones Categorisation

As a next step further, the categorization of sampled banks into different zone is made based on the financial stability scores. The three categories include banks in Green Zone (Highly Stable), Grey Zone (moderately stable), and Red Zone (Weakly Stable). Mean (μ) and Standard deviation (σ) of the Z-score values used as a basis for the classification with the values being 11.633 and 6.94 respectively.

Bank are categorized into three zones and banks in each category have following stability scores;

- i. **Green Zone Banks:** Institutions with score exceeding 18.67
- ii. **Grey Zone Banks:** Institutions with values between 4.79 and 18.67
- iii. **Red Zone Banks:** Institutions with scores below 4.79

This classification helps in the comparison of the bank's relative financial stability over the sample period.

Green Zone Banks

Banks in this category have financial stability score above 18.67. Banks categorized in this zone have stronger financial soundness reflecting their ability to manage risk effectively and their banking operations remains undisrupted due to these volatilities. They are comparatively less vulnerable to the shocks and enjoy a sound financial standing across the entire banking sector.

Table 1 presents the financial stability ranking of all the sampled banks. Results show that there are just two banks Habib Metropolitan Bank Limited and United Bank Limited in this zone. Habib Metropolitan Bank Limited with the Z-score of 28.13 is ranker first among all the banks which indicates its stronger financial stability, effective risk management and solid capital structure. United Bank Limited is ranked second with the Z-score value of 19.56 which shows stable financial standing and better capacity to withstand financial volatilities.

Grey Zone Banks

Banks that are classified as the grey zone have financial stability scores ranging between 67 to 4.79 which reflects moderate level of financial stability. These banks are financially stable and effectively managing market volatilities, but they remained exposed to market and operational risk which if not managed effectively may affect their future performance. These banks need to improve their financial standing through stronger capital adequacy, profitability and risk management to prevent financial distress.

With the Z-Score of 18.38 Faysal Bank Limited occupies the highest position in the grey zone which shows the banks resilience in meeting the capital adequacy requirements and effective risk management. Meezan Bank Limited with the Z-score value of 17.92 and Dubai Islamic Bank Pakistan Limited with the Z-score value of 16.59 shows their strongest commitment towards Islamic banking principles which are helping them in withstanding the financials vulnerabilities. Next in the Grey Zone following banks are included MCB Bank Limited (14.98), National Bank of Pakistan (14.94), Bank

of Khyber (14.79), and Habib Bank Limited (14.45), Soneri Bank Limited (13.96), Bank AL Habib Limited (13.39), and Bank Alfalah Limited (12.12). These banks indicate moderate level of financial stability and stable operational performance. These banks are employing risk mitigating tools and maintaining capital reserves to sustain unexpected losses and maintain the sufficient profitability for smooth financial performance.

Next in the Grey Zone are the banks such as Bank Islami Pakistan Limited and JS Bank Limited with the Z-score values of 9.88 and 9.52 respectively. These values show moderate level of financial stability and show a need for improvement in adopting risk management techniques, and capital adequacy to withstand financial volatilities.

At the lower level of the Grey Zone banks such as Samba Bank Limited, Standard Chartered Bank (Pakistan) Limited, Silk Bank Limited, Askari Bank Limited are present with the Z-score values of 7.57, 5.74, 5.74, 5.64. These banks have relatively lower levels of financial stability which indicate that stronger strategic measures to adopt better risk management, capital adequacy to avoid these financial volatilities to affect the financial performance. banks are required to improve these capital base to improve financial stability. Overall, majority of the sampled banks fall within the Grey Zone, indicating the need for improvements in the financial resilience, profitability and operational efficiency.

Red Zone Banks

Banks in the Red Zone have the Z-score values below 4.79 indicating the lower level of financial stability and more exposure to the financial shocks associated with weak risk management, capital adequacy and financial performance. These values indicate increased risk of financial distress which require strategic corrective measures to restore financial stability. The banks in this Zone are the Allied Bank Limited, Bank of Punjab, and Summit Bank Limited with the Z-score values of 1.72, 0.98, and 0.28. these values reflect extreme financial vulnerabilities and urge the need to for regulatory intervention, restructuring, or additional capital support to prevent further deterioration.

The classification of the sampled banks into different categories on the basis of their Z-score values offers a clear insight of the financial stability of each sampled bank operating within Pakistan banking sector. Green Zone banks demonstrate the highest level of financial stability score with shows stronger financial soundness and effective risk management. Banks in Grey Zone requires improvements in the capital base risk management, and operational efficiency to withstand the financial volatilities. On the contrary, banks in Red Zone are facing higher financial vulnerabilities for which immediate corrective measures are required. Overall, the analysis shows how much vital role does proactive strategies and effective risk management plays in maintaining the financial stability of the banks and the entire financial system.

Year- Wise financial stability

Table 2 represents average stability score of the sampled banks year-wise from the period 2007 to 2022. the analysis shows the changing dynamic of the financial stability of the banking sector over the years. Noticeable fluctuations in the financial stability across the time periods has been observed. The highest level of the Z-score being in the year 2012 with the value of 16.22368 which shows highest stability year. Beginning years of the sample periods 2007 and 2008 with the Z-score of 15.09236 and 14.51975 reflects relatively higher level of financial stability suggesting higher banks resilience during the early phase of the global financial crisis.

Table 2
Banks' Annual Financial Stability

Year	Annual Fin Stability
2007	15.09
2008	14.51
2009	12.46
2010	12.51
2011	14.37
2012	16.22
2013	12.02
2014	12.20
2015	12.19
2016	11.50
2017	9.90
2018	9.76
2019	9.85
2020	8.90
2021	8.22
2022	7.92

Financial stability shows a declining trend starting from 12.51402 in year 2010 to 11.50 in 2016. This downward trend in financial stability is associated with the lasting effects of global financial vulnerabilities along with domestic economic challenges. Sharp decline has been observed from 9.90 in year 2017 to 7.92 in year 2022 indicating the instability of the banking sector in adopting effective risk management. There are many factors associated with the decline which includes inflation, currency depreciation, political uncertainty, and rising competition.

The average level of Z-score in year 2020, 2021 recorded relatively lower level due to the outbreak COVID-19 pandemic worldwide affecting entire social and economic activities ultimately impacting the banking and financial services. The lowest score of financial stability was observed in year 2022 with the value being 7.92 indicating elevated financial distress and persistent economic volatilities.

Overall, findings suggest relatively strong financial stability during the early years of the sample time period. Post 2017 indicates weaker financial standings of banking sector and requires the need for stronger regulatory intervention, effective risk management practices and enhance capital based to help the banks to withstand economic vulnerabilities.

Conclusion

This study examines the stability of the banks in Pakistan for the data of 21 commercial banks over the period 2007-2022 using Z-score as the measure of the financial soundness. The banks are ranked according to their financial stability scores as measured by the Z-score. In the next step based on these rankings banks are classified into three categories green, grey and red zone banks to measure the relative levels of risk and stability within the banking sector. The year-wise average of the financial stability of the entire banking sector is calculated to study the financial stability of the entire sample over the year.

By categorizing banks into three zones help in understanding stability and risk of each bank operating in Pakistan. Banks having the financial stability score above 18.67 are included in green zone i.e. Habib Metropolitan Bank Limited and United Bank Limited. The results reflect stronger ability of these banks to manage the risk effectively and withstand the financial shocks. They are comparatively less vulnerable to the shocks

and enjoy a sound financial standing across the entire banking sector. Next, the banks having financial stability scores ranging between 6.7 to 4.79 are categorized into grey zone have which reflects moderate level of financial stability. These banks are financially stable and effectively managing market volatilities but they are remained exposed to market and operational risk which if not managed effectively may affect their future performance. These banks need to improve their financial standing through stronger capital adequacy, profitability and risk management to prevent financial distress.

In the red zone banks with the Z-score values below 4.79 are classified indicating the lower level of financial stability and more exposure to the financial shocks associated with weak risk management, capital adequacy and financial performance. It includes banks such as Allied Bank Limited, Bank of Punjab, and Summit Bank Limited. The results of year wise average indicate significant variations in the financial stability of banks across different years. The banking sector demonstrated relatively high financial stability during the earlier years of the study, particularly between 2007 and 2012, reflecting stronger capital positions and resilience against external shocks. However, the findings also reveal a gradual decline in financial stability in later years, especially after 2017, indicating increasing financial vulnerabilities within the banking sector.

Recommendations

These finding are significant as they can assist the regulatory authorities in monitoring financial risk, identify the systematic risk and take the precautionary measure to protect the banking sector from the external shocks. The study also provides useful insights for investors, depositors, and bank managers regarding the financial health and risk profile of banks. It suggested the policymakers to strengthen the regulatory framework that would enable banks to undertake effective risk management and maintain adequate capital reserves to remain resilient and withstand the external vulnerabilities.

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