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DETERMINANTS OF BANK-SPECIFIC, BANK-RISK AND BANK STABILITY OF THE BANGLADESHI CONVENTIONAL BANKS

Md. Mahbub Alam^{1*}, Wan Sallha Yusuf²

¹ Faculty of Business and Communication, University Malaysia Perlis, Malaysia
Email: mdmahbub@studentmail.unimap.edu.my

² Faculty of Business and Communication, University Malaysia Perlis, Malaysia
Email: wansallha@unimap.edu.my

* Corresponding Author

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Abstract:

The primary objective of this research is to analyze the effect of bank-specific and risk determinants on conventional banks' z-scores in Bangladesh from 2011 to 2021. This study used panel linear regression and panel corrected standard error (PCSEs) to estimate the model. Capital adequacy, asset quality, income diversification, bank competition, managerial efficiency, and profitability (return on equity) are used as proxies for bank-specific and liquidity risk; Sensitivity to marketing risk is used as a proxy for bank risk, while the bank size is used as a control variable and Z-scores are used as a proxy for measurement of bank stability. The main results indicate that capital adequacy, bank competition, and managerial efficiency are negative, but asset quality, income diversification, and profitability (ROE) are positively related to the Z-score. The results further indicate that determinants of bank risk, such as liquidity risk and marketing risk, negatively impact the Z-score. The control variable bank size has a positive impact on the Z-score. Based on our results, authorities in Bangladesh may develop rules for managing operations and ensuring bank stability.

Keywords:

Bank-Specific, Bank-Risk, Bank Stability, Z-Score

Introduction

Financial institutions are for economic development by providing financial services and allocating their savings to business developers, individuals, competitive firms, entrepreneurs, and the government to speed up profitability and capital accumulation (Kashif et al., 2016;

Menicucci & Paolucci, 2016). Globally, participants in the financial markets have realized the value of the financial sector, whose critical activities promote growth and improve the strengthened infrastructural development and long-term livelihood sustainability. However, the economic environment in which banks operate continuously changes and has diversified with new development opportunities (Almaqтари et al., 2019). The last two decades have seen the bank's financial activities undergo significant changes, globally and locally, through the increase in the volume of resources and investments to achieve higher profitability and improved economic value added.

The banking industry's stability is quantified using the Z-score, a historical data-based statistic. The Z-score measures stability; a higher number indicates a stable banking sector, whereas a lower value indicates instability and a greater propensity towards insolvency (Schaeck & Cihák, 2014; Cihák & Hesse, 2008). The stability index shows little movement in the majority of Bangladeshi banks. Addressing financial instability to the maximum extent possible and guaranteeing significant financial and economic growth are part of the efforts and suggestions of professionals and empirical scientists (Almarzoqi, Ben Naceur, et al., 2015).

The incredible concept of stability is intertwined with many areas of contemporary life, including education, energy, transitional development, banking, and many more. Money and employment stability depend on a system that can allocate resources wisely, assess and manage financial risks, and maintain low inflation and interest rates to maintain unemployment rates close to the economy's natural rate (Damak et al., 2020; Roubini, 2008; World Bank, 2019).

In banking firms, stability is measured more precisely in financial terms through various tools and techniques. However, multiple proxies are under observation by the banking sector authorities, academic professionals, and business analysts to explain the concept of financial stability (Kochubey & Kowalczyk, 2014; Martin & Hesse, 2010; Services, 2015). Both macro and micro factors significantly influence Islamic and conventional bank stability. For a banking firm, bank stability is based on the various guidelines defined by compliance and regulatory divisions (Ahamed & Mallick, 2019). To properly implement and evaluate the administration in banks, the role of regulations from the central bank, standardized operating procedures (SOPs), and international regulations are very significant (Raza Bilal et al., 2013).

Financial intermediation effectiveness in Bangladesh depends on the banking industry's soundness and stability (ADB, 2021). The financial sector's stability considerably impacts the monetary policy's efficacy and conduct (Dey, 2019). It indicated the banking system's role as a go-between, moving money from one industry to another to keep the finance system running smoothly. The composite financial stability index (CFSI) evaluates financial system stability and structural stress. It indicates financial system volatility (Bangladesh Bank, 2021). However, the bank soundness index gives Bangladesh's banking sector a scenario. Banks' soundness is determined by several factors, including increased default loans, insufficient monitoring, weak governance, repayment capacity, balance sheets, and funds availability (CPD, 2018). The Global Competitive Report 2021 scored Bangladesh 38.3 out of 100, and bank soundness ranked 130th out of 141 countries (Foro Económico Mundial, 2021).

Especially in commercial banks during the 2008–2009 global financial crisis, the banking system's stability became an important issue (Al-Kharusi et al., 2020). The developing Bangladeshi economy depends on its rich agricultural soils, enormous human resources,

foreign remittance, and garments industry. Much over 80% of the country's total exports are textiles, the most prominent sector (World Bank, 2019). Simultaneously, it is also financed mainly by the banking industry for substantial investments in the real estate sector, export-import business, and natural resources (Alam et al., 2020). The decline in bank deposit growth rates and credit shows that the nations are vulnerable to financial instability. Financial changes being sought, a drop in overseas remittances, and a slowdown in the export of clothes might all be to blame for the current state of affairs (Nasreen & Anwar, 2020). Bangladesh's banking industry has struggled for some time due to the lack of stability in the sector. The primary goal of this research is to analyze the effect of bank-specific and risk determinants on conventional banks' z-scores in Bangladesh from 2011 to 2021.

The study is quantitative in nature and 35 conventional banks are selected from Bangladesh. For this study, the sample was collected from 6 state commercial banks and 29 private commercial banks from Bangladesh from 2011 to 2021. The data was collected from the secondary sources such as Fitch Connect, Bloomberg, annual reports of each bank from their websites.

Literature Review

A robust financial system is crucial for efficient resource allocation and resilience against shocks, as underscored by the 2008/2009 global financial crisis, which highlighted the severity of insolvency and liquidity risk and their ripple effects (Ashcraft, 2005; Babecký et al., 2013; Benoit et al., 2017; Kandrac, 2014). Analyzing bank stability is often done through metrics like capital adequacy and the Z-score (Ghosh, 2014a; Steinbacher & Steinbacher, 2015). The Z-score measures a bank's liquidity against earnings variability, with a higher score indicating resilience.

Extensive research has been conducted on factors affecting banking stability. Liu et al. (2012) considered bank size, non-interest profits, and economic growth in South Asian countries, while Horváth et al. (2014) focused on the stability of state-owned banks versus their foreign-owned counterparts. Notably, Djebali & Zaghdoudi (2020) revealed non-linear relationships between stability, credit risk, and liquidity risk in the MENA region. On the subject of capital adequacy, there are contrasting viewpoints. While some studies emphasize its importance in managing disturbances (Berger & Bouwman, 2013; Ghosh, 2014), others highlight its potential to introduce uncertainty (Moussa, 2015; Tabak et al., 2015). The role of capital in bank growth and risk mitigation remains a debated topic (Yusgiantoro et al., 2019).

The signalling hypothesis offers insights into the bank loan loss reserves, shedding light on loan quality and potential operational threats. However, there's no consensus on the relationship between bank loan quality and stability, with various studies providing different perspectives (Beck, De Jonghe et al., 2013a; Zhang et al., 2016). The cost-to-income ratio reflects that operational efficiency has been linked to stability, but the relationship varies across studies (Abedifar et al., 2018; Mat Rahim & Zakaria, 2013; Ozili, 2018).

Bank diversification has been an essential strategy in recent times. Diversification, bolstered by regulatory shifts such as the GLB Act and FSM, has allowed banks to venture into various financial services (Lepetit et al., 2008; Lown et al., 2000; Rime & Stroh, 2003). However, the outcome of such diversification on stability remains debated (Meng et al., 2018; Bustaman et al., 2017). Bank competition has also been a focal point in recent studies, exploring its influence on stability, especially in emerging markets (Agoraki et al., 2011a; Amidu & Wolfe, 2013a).

The role of bank profitability in ensuring financial stability is widely acknowledged. While some studies underline a positive relationship between profitability and stability (Adusei, 2015; Mirzaei et al., 2013), others offer a more nuanced view (Pessarossi et al., 2020). The interplay of various bank risk factors, especially credit and liquidity risks, is fundamental to stability. As examined through sensitivity analysis, the significance of market risk sensitivities in its impact on stability, with different studies offering mixed outcomes.

Lastly, liquidity risk remains a core concern for banks. The dynamic between bank liquidity and insolvency risk is complex. Some studies indicate that higher liquidity supports stability but might eventually encourage risk-taking, while others suggest that well-liquidated banks enhance liquidity during crises (Hassan et al., 2019; Cornett et al., 2011; Wagner, 2007). The strategies banks adopt in the face of these risks, alongside regulatory considerations, will define their stability trajectories in the future. Here is the summary of all variables for the present study:

Author	Objective	Variables	findings
Schaeck & Cihák, 2014; Cihák & Hesse, 2008	Explored the bank stability	Capital Adequacy	Positive relation with bank stability
Almarzoqi et al., 2015	Investigated the bank stability	Capital Adequacy	Positive relation with bank stability
Liu et al. (2012)	Examined the bank stability	bank size, non-interest profits, and economic growth	Positive relation with bank stability
Djebali & Zaghdoudi (2020)	Determining factors affecting banking stability	credit risk, and liquidity risk	Positive relation with bank stability
Katuka et al. (2023)	industry's stability and economic performance	Z-score, NPL, changes in gross loans (credit availability, GDP	the positive impact on risk-adjusted capitalization
Albaity, 2019	investigates the impact of competition on bank stability	Ln Z-score, ROA, ROE, Boone indicator, Diversification, GDP	Z-score has a -ve with bank size +ve relationship with managerial efficiency.
Kaasman, 2015	the impact of competition and concentration on bank stability in the Turkish banking industry over the period 2002–2012	Z-score, NPL Lerner, E-learner, Boone. HHI (total assets), C5 (total assets), HHI(total loans), C5(total loans), HHI(total deposits), C5 (total deposits)	Bank concentration has a significantly positive relation with Bank stability indicator NPL

Methodology

The statistical program STATA was utilized to analyze data in this scientific study, and panel linear regression was used. The panel corrected the standard error (PCSEs) to estimate the model. Regarding timeline, this study focuses on Bangladeshi data from 2011 through 2021. As the dependent variable in this research, a z-score proxy for bank stability was utilized. In this study bank specific variables like capital adequacy (capital), asset quality (assq), managerial efficiency (me), income diversification (indiv), bank competition (bankc), profitability (roe) and bank risk variables like Liquidity Risk (lr), Sensitivity to Market risk (smr) used as independent variables. In this study, bank size is the control variable. For this study, the sample was collected from 6 state commercial banks and 29 private commercial banks from Bangladesh. The data was collected from the secondary sources such as fitch solution, blooberg, Central bank website, and annual reports of each bank from their websites from 2011 to 2021.

Model

Bank Stability = Bank specific + Bank risk + Bank size

Z-score = Bank Specific (*capital+Asset+Man.Effi+IncDiv+BankC+ROE*) + Bank Risk (*Liq+SMr*) + Control Variable (*Bsize*)

Z-score = *capital + Asset+ Man.Effi + IncDiv + BankC + ROE + Lr + SMr + Bsize*

$Z\text{-score}_{it} = \beta_0 + \beta_1 Cap_{it} + \beta_2 Asset_{it} + \beta_3 Man\ Effi_{it} + \beta_4 In\ Div_{it} + \beta_5 BankC_{it} + \beta_6 Roe_{it} + \beta_7 lr_{it} + \beta_8 SMr_{it} + \beta_9 Bsize + \varepsilon_{it}$

Results

The findings shown in the tables below justify the empirical analysis completed by the panel analysis. Table 1 shows the analysis of descriptive statistics for the conventional banks. This table shows the average Z-score value of 3.612, and the standard deviation value is 1.153 for the conventional banks in Bangladesh. The mean value of bank-specific variables capital, assq, indiv and bankc shows 0.335, 0.056, 0.4, and 0.009, respectively. This table also shows the mean value of bank risk variables lr and mr, which are 0.188 and 0.002, respectively. The mean value of the control variable bank size is 5.287. Table 2 shows the correlation analysis between the variables.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
z-score	339	3.612	1.153	-2.605	6.099
capital	339	.335	1.763	-.281	18.23
assq	339	.056	.121	.005	2.15
indiv	339	.4	.668	-6.462	7.252
bankc	339	.009	.003	.007	.019
me	339	.599	.477	.247	7.796
roe	339	.042	.647	-11.211	.963
lr	339	.188	.534	.019	9.785
smr	339	.002	.002	0	.014
banksize	339	5.287	.375	4.24	6.214

A pairwise correlation matrix has been performed to examine the relationship between the selected variables of the sampled commercial banks in Bangladesh (Table 2). The results in Table 2 show the correlation of all selected variables. The multicollinearity problem exists when the variable's correlation coefficient exceeds 0.80 (Pervez & Ali, 2022). This study is free from multicollinearity as no strong relation exists between the variables. However, all selected variables capital, assq, bankc, me, lr and smr negatively correlated with the z-score on the other hand indiv, roe and banksize positively correlated with the Z-score of the sampled commercial banks in Bangladesh. The following outcomes show that all other variables except Assq, indiv and roe positively correlate with capital adequacy. The subsequent findings show that all other selected variables except indiv, roe and lr are negatively correlated with assq variable. Indiv has a positive correlate with all variables except me variables are negatively correlated with indiv.

Table 2: Matrix of Correlations

Variables	z-score	capital	assq	indiv	bankc	me	roe	lr	smr	banksize
z-score	1.000									
capital	-0.032	1.000								
assq	-0.099	0.353	1.000							
indiv	0.161	0.001	-0.042	1.000						
bankc	-0.352	-0.067	0.163	0.101	1.000					
me	-0.336	-0.018	0.116	-0.427	0.252	1.000				
roe	0.303	0.018	-0.079	0.112	-0.105	-0.283	1.000			
lr	-0.026	-0.018	-0.000	0.007	0.066	-0.019	0.011	1.000		
smr	-0.031	-0.096	0.071	0.123	0.288	0.069	0.015	0.032	1.000	
banksize	0.032	-0.138	0.023	0.137	0.142	0.015	0.032	0.010	0.839	1.000

Table 3 shows the results of PCSEs linear regression of the model. In this table, capital shows the inverse and significantly negative association with the z-score. It means that when the bank's capital adequacy increases, the bank's stability decreases by -0.046%. A bank's capital acts as a safety net, protecting it from failure in the event of poor loans or economic downturns. Capital-adequate banks have more of a safety net against insolvency since they can weather greater losses. Capitalized banks are less likely to fail or need a bailout since their assets are larger than their liabilities, making them resilient to economic downturns (Berger & Bouwman, 2013; Ghosh, 2014; Hamdi et al., 2017; Tabak et al., 2015; Yusgiantoro et al., 2019).

There is a positive association between asset quality and z-score in Bangladesh. As asset quality rises, credit risk falls, provisioning requirements drop, profits rise, the institution's image in the market improves, it remains in compliance with regulations, and it is better able to weather economic storms. When used together, they raise the bank's z-score, which is indicative of higher financial stability (Abedifar et.al., 2018; Ozli, 2018; Rumler & Waschiczek, 2016; Wahid & Dar, 2016).

A positive connection exists between income diversification and banks' stability z-scores in Bangladesh. Banks are more likely to be financially stable (as shown by a high z-score) when

they have several sources of income. Diversification reduces reliance on particular operations, offers more consistent income sources, supports risk management, increases flexibility to market situations, maintains regulatory compliance, and improves the overall risk-return profile. These features lead to higher z-scores, suggesting improved financial stability for the bank (Wang & Lin, 2021; López-Penabad et al., 2021; Hunjra et al., 2020; Lee et al., 2020; Moudud-Ul-Huq, 2019).

According to the results, there is a z-score that has a significant negative correlation between bank competitiveness and bank stability. Therefore, more competition in the banking business is associated with less stability. Intense competition may result in greater risk-taking, smaller profit margins, fee pressure, short-term concentration, diminished pricing power, market share conflicts, and regulatory issues, which can harm a bank's stability (M. N. Kabir & Worthington, 2017; Kouki & Al-Nasser, 2017; Tabak, Gomes, & da Silva Medeiros Jr, 2015; Amidu & Wolfe, 2013).

According to these findings, the z-score measures of bank stability negatively correlate with management efficiency. It means that inefficient management can threaten the stability of financial institutions. Ineffective management can cause resource allocation, risk management, cost control, innovation, asset quality, capital planning, governance, compliance, and strategic vision issues. These elements can harm a bank's stability (Ozili, 2018; Bustaman et al., 2017; Abedifar et al., 2013; Altunbas et al., 2007).

According to the data, Bank profitability, as assessed by return on equity (ROE), is positively related to bank stability, as demonstrated by the z-score. Banks tend to be more stable when they are more productive. Higher profitability results in improved capitalization, better asset quality, increased risk absorption capacity, a sustainable business model, market confidence, regulatory compliance, growth potential, investor appeal, and the capacity to save earnings for unforeseen events. The bank's higher levels of financial stability result from all these components (Pessarossi et al., 2020; Tan et al., 2020; Ali & Puah, 2019).

The outcomes in Table 3 show a negative relationship between liquidity risk and bank stability. It indicates that larger levels of liquidity risk might be linked to lower levels of bank stability. Liquidity risk, from over-reliance on short-term funding, asset-liability gaps, market image, limited funding accessibility, influence on profits, regulatory compliance, and lower risk absorption capacity, can weaken a bank's security. Effective liquidity risk management is critical for financial stability (Almarzoqi, Naceur, et al., 2015; Beck, Demirgüç-Kunt et al., 2013; Cornett et al., 2011).

Another finding is an inverse connection between marketing risk and bank viability. As a result, larger levels of marketing risk are related to lower levels of bank stability. Marketing risk refers to a bank's potential losses due to adverse changes in market conditions, customer preferences, or competitive pressures. Factors such as market volatility, sensitivity to economic cycles, competitive pressures, changes in customer preferences, regulatory shifts, reputational risks, and strategic misalignment can all contribute to marketing risk. Effective marketing risk management is essential to ensuring the continued health of the banking industry (Bashatweh & EY Ahmed, 2021; Karim et al., 2018; Aspal et al., 2016).

The final row in the table shows a positive connection between bank size and stability. This indicates that bigger banks are more likely to be stable than their smaller counterparts. Larger

banks have more risk diversification, economies of scale, access to finance, risk management expertise, market credibility, regulatory monitoring, and shock absorption capability. These factors collectively contribute to higher levels of financial stability for larger banks in the country (Cubillas & González, 2014; Srairi, 2013; Soedarmono et al., 2011; Houston et al., 2010).

Table 3: Linear Regression, Correlated Panels Corrected Standard Error (PCSEs)

z-score	Coef.	St.Err.	z	p> z	[95% Conf	Interval]
capital	-.0463843	.0200162	-2.32	0.020	-.0856152	-.0071533
assq	.0060185	.4469139	0.01	0.989	-.8699167	.8819537
indiv	.1072656	.1782601	0.60	0.547	-.2421178	.456649
bankc	-33.04812	35.91509	-0.92	0.357	-103.4404	37.34417
me	-.5750448	.2462298	-2.34	0.020	-1.057646	-.0924433
roe	.4463198	.1697979	2.63	0.009	.1135219	.7791176
lr	-.0258856	.0218315	1.19	0.236	-.0169034	.0686745
smr	-190.669	57.67043	-3.31	0.001	-303.7009	-77.63698
banksize	.8204555	.0782433	10.49	0.000	.6671013	.9738096
Number of observations		338		R-squared		0.9391
Number of groups		33		Wald chi		1518.10
				Prob> chi		0.0000

Conclusion

This study used the z-score ratio for bank stability. For the measurement of bank-specific, this study used six indicators: capital adequacy (capital), asset quality (assq), managerial efficiency (me), income diversification (indiv), bank competition (bankc) and profitability (roe). Bank risk variables like Liquidity Risk (lr) and sensitivity to Market risk (smr) were used for the measure. This study's results show that three bank-specific indicators show a significant impact, and three have an insignificant impact on the z-score. The finding shows that increased asset quality, income diversification, and profitability promote bank stability. Conversely, outcomes show that increased capital adequacy, bank competition, and managerial efficiency decrease bank stability. The study's results on bank risk demonstrate that an increase in liquidity risk and sensitivity to market risk lowers bank stability. Overall, the findings of this study contribute to the existing literature by analyzing the impact of bank-specific and bank risk on conventional bank stability in Bangladesh.

Implication:

In light of the findings, several policy implications emerge. Firstly, regulatory authorities may need to reevaluate the current capital adequacy norms, given the inverse relationship between increased capital adequacy and bank stability. It could hint at potential over-regulation or inefficient capital allocation within the banking sector. Encouraging banks to diversify their income streams can be another strategic move, as the study reveals a positive correlation between income diversification and bank stability. The potential for increased resilience through diversified income streams should not be overlooked despite its statistical insignificance. The observed inverse impact of managerial efficiency on bank stability is surprising, warranting a deeper dive into the metrics and processes used to gauge managerial

efficiency. The current measures may not be effectively linked with long-term stability aims. Because increased bank rivalry tends to reduce stability, authorities may want to take precautions to prevent excessive risk-taking among financial institutions due to the need to keep up.

The significant adverse effect of market risk on bank stability further highlights the need to maintain constant vigilance over the market. Banks should be encouraged, if not mandated, to develop and implement robust risk mitigation strategies, especially given the adverse relationship of both liquidity and market risk with stability. As competition intensifies and market dynamics shift, striking the right balance between fostering growth and ensuring systemic stability becomes crucial, calling for agile and informed policy interventions.

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