Antecedents of Financial Stability of Banks

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Abstract
This study examines the factors that affect the financial stability of banks in Pakistan. Based on CAMELS' framework of checking financial stability of banks, this study seeks to highlight the bank specific factors that influence the financial stability of banks. By using Z Score for measuring financial stability of banks, this study examined the impact of bank specific factors on the financial stability of banks. Based on data from 2007 to 2021 of 21 commercial banks of Pakistan, this study used GMM technique for estimation. The results indicate that capital adequacy, asset quality, earnings and liquidity significantly affect the financial stability of banks. The policy implications of this study called for establishing vigilant mechanism for monitoring the financial stability of banks.

Introduction:
The banking system has become a central pillar of the global economic system. The flow of funds in the form of deposits, advances and investments through banking channels has transformed the structure and format of economic transactions across the world. Due to the key role of the banking system, the stability and growth of the banks has become a significant factor for achieving financial stability in a country. The financial stability of banks has become a key barometer of the economic and financial development of a nation as most individuals and firms use banks for deposits making, loans and investments. A financially stable banking system is very important for economic development and growth of a country as banks link the suppliers and borrowers of funds for the economic transactions.

Many researchers have conducted studies on the nature and structure of financial stability considering the crucial role banks play in the economic system. An earlier work by Kindleberger (1978) and Minsky (1992) stated that the financial instability of banks results in negatively affecting the economic growth and development. They advised on developing a strong and vigilant financial system for encouraging depositors and borrowers to utilize the banking transactions for the efficient conduct of the financial operations. In any country, an unstable banking system may result in damaging the trust of depositors leading to bank runs and tumbling of share

prices of banks in the capital markets. A study by Schinai (2004) recommended keeping a strong check on multiple aspects of financial stability as a stable financial system responds to market vulnerabilities and challenges in an effective manner resulting in efficient resource allocation. Financial instability may significantly increase the risks of insolvency, bank failures etc. These outcomes of financial instability may affect the other sectors of the economy leading to multiple types of market risks.

The World Bank (2004) has defined financial stability in the following words;

"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 describes the financial stability of a financial system which requires the management of risks and continuity of operations by a financial institution. Further narrowing down the concept of financial stability with reference to the banks requires understanding the risks and return paradox for banks in an economy. The concept of financial stability of banks refers to the ability of banks to withstand the financial shocks and risks in the markets and continually providing services to the customers. A financially stable bank maintains its core functions of providing credit, liquidity and managing market risks without disruption. A financially stable bank keeps a strong level of capital and seeks to manage the interest rate risk, credit risk, operational risk and foreign exchange risk. The financial stability of banks is actively monitored by the regulatory bodies to manage the risk of bank default. The financial stability of banks has got significant attention of the policy makers after the financial crises of 2008 which resulted in default of many banks in USA and Europe.

The financial stability of banks is affected by bank specific and macroeconomic factors in a country. The researchers have explored the concept of financial stability is explored in different contexts. The aggregate level of financial stability is measured and reported by the IMF who has developed the Financial Soundness Indicators (FSIs) in 1999 to measure the different dimensions of financial stability of the financial institutions working in a country. Similarly, the European System of Central Banks (ESCB) in 1999 assessed the EU Banking Stability through Macro Prudential Indicators (MPIs). Many other researchers such as Illing and Liu (2003) worked in this area and developed a financial stress index by including the different dimensions of financial instability. This trend of developing financial stability indices were further carried on by different

central banks across the world to assess the financial stability of their banking systems.

There are many macroeconomic and bank specific factors that affect the financial stability of banks. This study seeks to understand the bank specific factors that might affect the financial stability of banks in Pakistan. For this purpose, this study used the Z Score model for measuring the financial stability of banks and the CAMELS research framework for understanding the impact of bank specific factors on the financial stability of banks. The CAMELS framework refers to factors such as capital adequacy, asset quality, management quality, earnings, liquidity and sensitivity to market risk. The CAMELS research framework is widely used by the regulatory bodies and research firms across the world for measuring the financial stability of banks and identifying the factors where improvement is needed to maintain a healthy level of financial stability.

Literature Review:

There are several researchers who have worked on exploring the impact of bank specific factors on the financial stability of banks. For example, Berger, Herring, and Szegö (1995) reported that the adequate level of capital adequacy plays significant role in absorbing business losses and protecting funds of depositors of a bank in case of operational losses. They recommended keeping a strong capital adequacy level to adjust unexpected losses that might affect the financial stability of banks. In a study by Berger and Bouwman (2013), it was reported that the relationship between capital adequacy and bank performance in the period of financial crises was significant. The study found that banks with higher levels of capital performed better during financial crises by carefully maintaining a balance of deposits and advances leading to the reduce probability of financial distress. A study by Kashyap, Tsomocos, and Vardoulakis (2020) developed a theoretical model to examine the effect of capital buffers on financial stability of banks. A recent work by Berger and Roman (2022) examined the effectiveness of maintaining strong capital adequacy ratios in the post global financial crisis period and recommended that higher capital adequacy levels the capacity of banks to face the financial distress in resilient manner.

H_1: The higher level of capital adequacy positively affect the financial stability of banks.

The second important factor that affects the financial stability of banks is the asset quality which refers to the higher quality of loans and advances of a bank. There have been many studies on exploring the effect of asset quality on the financial stability of banks such as Ezeoha (2011), De Bock and Demyanets (2012), Swamy (2012). These studies reported that banks with good asset quality have a higher level of financial stability. A study by Alhassan et al. (2014) examined the bank specific factors that negatively impact the asset quality of a bank and reported that a decrease in the asset quality level has a significant impact on the financial stability of banks. A

similar study by Mirza et al. (2015) examined the relationship between the asset quality and financial stability and stated that financial stability is significantly affected by changes in the level of asset quality of a bank. A further study by Arrawatia et al. (2019) also observed the impact of asset quality on the financial stability of banks and concluded that asset quality strongly affects the financial stability of banks.

H_2: Higher level of asset quality positively affects the financial stability of banks.

The impact of the management quality on the financial stability of a bank is also explored by many studies. For example, a research by Fiordelisi, Ricci, and Lopes (2014) checked the relationship between management quality and bank performance based on the data of European banks and reported that a bank with a superior management quality leads to better financial performance. A study by Cornett, McNutt, and Tehranian (2016) reported that the data of large USA banks and found that higher management quality carefully manage the risk taking behavior of banks and enhances the level of financial stability of banks. Similarly, Pathan & Faff (2019) examined the impact of management quality on the financial stability of banks and reported that good management practices significantly affect the financial stability of banks. Another work by Vallascas & Hagendorff (2020) stressed the role of management quality in the enhancing the financial stability of global banks and recommended to adopt a good quality management team for the financial stability of banks. A recent study by Ferreira & Matos (2021) checked the effect of management quality on the financial stability of banks in Latin America and concluded that the quality of management in a bank has significant positive impact on the financial stability of banks.

H_3: A higher management quality positively affects the financial stability of banks.

The fourth important factor in the CAMELS framework is earnings which plays an important role in shaping the financial stability of banks. The role of earnings is studied by Dietrich and Wanzenried (2014) who observed that the bank profitability during the financial crisis is the most important factor affecting the level of financial stability of banks. Contextualizing the role of financial stability and earnings within the European banking industry, Bikker & Vervliet (2018) stated that higher earnings are positively correlated with financial stability implying that higher profitability levels increases fa bank's financial capacity to absorb unexpected market shocks. A similar study by Zhu & Chen (2019) studied the effect of earnings on the financial stability of Chinese banks and concluded that banks with higher return on assets and return on equity exhibit greater financial resilience during economic crises. A recent study by Hossain & Ali (2020) examine the impact of earnings on financial stability of banks. The results of this study recommended that profitable banks tend to be more stable to face the financial shocks. In a similar study, Rahman & Uddin (2021) studied the role

of earnings in shaping the financial stability of banks in Bangladesh and concluded that banks with higher earnings are more financial more stable.

H_4: Earnings positively affects the financial stability of banks.

The fifth factor is the liquidity that has significant effects on the level of financial stability of banks. A study by Cornett et al. (2011) examined the effects of liquidity management on bank performance and financial stability during the financial crisis and reported that banks with higher liquidity levels were able to withstand the shocks during the financial crisis resulting in fewer financial losses. This argument was further refined by Acharya and Naqvi (2012) who stressed the impact of higher liquidity levels in enhancing the financial stability of banks. They reported that excessive liquidity levels in banks can result in enhanced risk-taking behaviours that negatively affects the financial stability of banks. A research by DeYoung, Distinguin, and Tarazi (2015) stated that higher liquidity level in banks positively affects the financial stability of banks but it might results in lowering the profitability of banks due to excessive risk exposure. A similar work by Berger & Bouwman (2019) stated that banks with higher levels of liquidity were more financially stable and have lesser exposure to financial crises. Acharya , & Mora (2020) conducted a study on examining the relationship between the liquidity and financial stability of European banks and concluded that banks with higher liquidity levels exhibited better financial performance than the banks with lower liquidity during the financial crisis. A recent study by Chiaramonte, Croc, & Poli (2021) checked the effects of liquidity levels on the financial stability of Italian banks and reported that banks with higher liquidity levels also experience higher levels of financial stability.

H_5: The higher liquidity level positively affects the financial stability of banks.

The last factor in the CAMLES' research framework is the sensitivity to market risk that plays a key role in shaping the financial stability of banks. Research on this relationship was conducted by Berger and Bouwman (2013) who examined how market risk exposure affects the financial stability of banks during financial crises. They emphasized the need for effective risk management policies and practices to mitigate the adverse impacts of different market risks on financial stability of banks. A research study by Demirgüç-Kunt and Huizinga (2013) evaluated the effects of interest rate changes on financial stability of banks and recommended that effective risk management tools regarding interest rates risk exposure are important for maintaining financial stability of banks. In the same way, Acharya and Steffen (2014) studied the relationship between bank exposure to sovereign risk and financial stability of banks and recommended banks to diversify their sovereign risk exposures to keep a high level of the financial stability in the times of economic crises. In another study, Brunnermeier & Koby (2020) investigated the relationship between the sensitivity to market risks and its effect on financial stability of European banks. The results of

this study concluded that banks with higher level of sensitivity to market risks have higher vulnerability to financial instability. In a recent study, Recently, Zhao & Tan (2021) examined the factors dealing with the sensitivity of Chinese banks to market risks and suggested that effective risk management policies in banks leads to the higher levels of financial stability of banks.

H_6: Sensitivity to market risk negatively affects the financial stability of banks.

Research Methodology:

Following variables are used in this study along with measurement proxies;

Variables	Status	Measurement Proxy	Reference
Financial Stability (FSB)	DV	(ROA+Equity/Assets)/Std. ROA	Laeven & Levine, (2009)
Capital Adequacy (CAD)	IV	Equity/Assets x 100	Berger & Bouwman (2013)
Asset Quality (AQL)	IV	NPL/Gross Advances x 100	Louzis, Vouldis, & Metaxas (2012)
Management Quality (MQL)	IV	Admin. Expenses/Net profit x 100	Li & Zhang (2013)
Earnings (ERN)	IV	Total income/total assets x 100	Dietrich & Wanzenried (2011)
Liquidity (LQD)	IV	Cash & cash equivalents/total assets x 100	Vodova (2011)
Sensitivity to Market Risk (SMR)	IV	Net interest income/total assets x 100	Saunders & Schumacher (2000)

Accordingly, the econometric model for this study is following;

$$\boldsymbol{FSB_{it} = \alpha + \beta_1(CAD_{it}) + \beta_2(AQL_{it}) + \beta_3(MQL_{it}) + \beta_4(ERN_{it}) + \beta_5(LQD_{it}) + \beta_6(SMR_{,it}) + \mu_{i,t}}$$

Here, FSS stands for Financial Stability as dependent variable and independent variables includes, CAD for Capital Adequacy, MQL for management Quality, ERN for Earnings, LQD for liquidity, SMR for Sensitivity to Market Risk.

This study used a panel data approach for studying the impact of bank specific factors on the financial stability of banks. Within the overall banking sector of Pakistan, a sample of 21 commercial banks was selected as the commercial banks dominate the banking system of Pakistan. The data of 21 Pakistani commercial banks was obtained from the State Bank of Pakistan for the period 2007 to 2021. The econometric model was developed based on the variables explained above and the data was refined and arranged as per the measurement proxies mentioned in the above table. The data of 21 banks for 17 years captured for seven variables described above resulted int

he formation of panel data. The unit roots of the variables were checked, and all variables were found to be stationary at level. Further, as panel data generally have endogeneity issue, therefore, the GMM estimation technique was used in the regression analysis. The GMM technique use the lag values of the variables to avoid the problem of endogeneity in the panel data. The GMM technique also addresses the heteroskedasticity issue in the data. The data was analysed in E-Views software and the results was obtained for descriptive statistics, correlation analysis and the regression analysis.

Results & Findings:

Descriptive Statistics:

	FSB	CAD	AQL	MQL	ERN	LQD	SMR
Mean	11.70	0.09	0.11	2.34	0.01	0.10	0.03
Median	11.50	0.07	0.08	1.36	0.01	0.08	0.03
Maximum	85.50	0.90	0.66	95.00	0.24	0.46	0.78
Minimum	-7.00	-0.17	0.00	-18.00	-0.09	0.02	-0.10
Std. Dev.	8.75	0.10	0.10	6.11	0.02	0.06	0.08
Observations	336	336	336	336	336	336	336

The mean value of financial stability (FSB) is 11.70 suggesting that most banks have moderate financial stability level. However, there is a significant variation in values of the financial stability as the mean values range from -7.00 to 85.50 with a standard deviation of 8.75. This variation indicates that while some banks are facing financial instability others bank may have very high financial stability levels. The capital adequacy has a mean value of 0.09 with a range from -0.17 to 0.90 along with the standard deviation of 0.10 that shows moderate variability across the banks. The negative minimum value of capital adequacy signals to under-capitalization in some banks which may lead them to bigger financial risks. The second variable is the asset quality which has a mean score of 0.11 and ranges from 0 to 0.66 along with the standard deviation of 0.10 which exhibits that majority of banks maintain good asset quality with lesser quantity of non-performing loans portfolios. The third independent variable is the management quality that has a mean value of 2.34, data range from -18.0 to 95.0 along with the high standard deviation of 6.11 which indicate that while some sampled banks have efficient management practices, other banks may suffer from significant management issues affecting their financial operations. The fourth factor is the earnings that has a mean score of 0.01, data range from -0.01 to 0.24 long with the standard deviation of 0.02 signalling that majority of banks are profitable, a few are operating at a losses. The fifth variable in this model is the liquidity which has a mean value of 0.01 that shows the most banks maintain adequate level of liquidity. The data range is from 0.02 to 0.50 with a standard deviation of 0.06 showing relatively mild variability

in how banks manage their liquidity positions across the period. The last factor is the sensitivity to market risk with mean of 0.03, the data range from -0.10 to 0.78 along with the standard deviation of 0.08. It shows the diversity in the risk profiles of sampled banks with some banks managing their risk exposure effectively while other banks are more susceptible to sudden market changes.

Correlation Analysis:

Variables	FSB	CAD	AQL	MQL	ERN	LQD	SMR
FSB	1.000						
CAD	0.280	1.000					
AQL	-0.330	-0.140	1.000				
MQL	0.100	0.290	-0.110	1.000			
ERN	0.270	0.010	-0.530	0.060	1.000		
LQD	0.100	0.130	0.180	-0.080	-0.130	1.000	
SMR	0.230	0.120	-0.040	0.020	0.150	0.440	1.000

The correlation analysis in the above table shows the direction of relationship among variables which can move from +1 to -1. Based on the results above, a moderate positive correlation (0.280) between financial stability and capital adequacy indicates that banks with higher capital levels are financially more stable. In case of asset quality, the negative correlation coefficient of -0.330 suggests that banks with poorer asset quality experience lower levels of financial stability. This inverse relationship is between asset quality and financial stability is indicator of the fact that non-performing assets weaken a bank's financial position and profitability resulting in increased risk exposure of financial instability. The positive correlation coefficient of 0.10 between financial stability and management quality indicates that good management practices contribute to the financial stability of a bank, the two variables are not strongly correlated. The table above also indicates there is a positive correlation (0.270) between financial stability and earnings suggesting that banks with higher profitability are generally more stable. The correlation coefficient between financial stability and liquidity is (0.10) representing that banks with higher liquidity tend to be slightly more financially stable. The positive correlation coefficient of (0.230) between financial stability and sensitivity to market risk suggests that banks with higher market exposure tend to be more financially stable. This may be due to the fact that banks with significant market exposure often have more robust risk management policies to mitigate the market risks.

Regression Analysis:

Method: Panel Generalized Method of Moments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FSB(-1)	0.24	0.00	71.79	0.00
CAD	0.26	0.04	6.18	0.00
AQL	0.08	0.03	2.70	0.01
MQL	0.00	0.00	-1.32	0.19
ERN	0.99	0.19	5.24	0.00
LQD	0.03	0.03	1.28	0.20
SMR	0.26	0.17	1.55	0.12
Mean dependent var.	-0.005	S.D. dependent var.		0.07
S.E. of regression	0.079	Sum squared resid.		1.77
J-statistic	16.2	Instrument rank		21
Prob(J-statistic)	0.29			

The table here presents the results of the Generalized Method of Moments (GMM) regression analysis. The Financial Stability (FSB) is the dependent variable and the CAMLES factors are the independent variables. The econometric model described above is sued with GMM technique that uses first differences in data and addresses potential endogeneity issues in the model by using a white period instrument weighting matrix and the cross-section fixed effects. The coefficient for the lagged financial stability (FSB-1) is 0.24 with a highly significant t-statistic of 71.79 and p-value = 0.000. This indicates that the financial stability of a bank in the previous period significantly affects its current level of stability. This feature highlights the critical role of maintaining a stable financial history across different periods as past financial stability directly affects the level of current financial stability. The capital adequacy has a significant positive impact on financial stability of banks with a coefficient of 0.26 and a t-statistic of 6.18 and p-value 0.000. This output suggests that banks with higher capital levels are financially more stable leasing to accept the H1 that the capital adequacy positively affects the financial stability of banks. This result supports the prediction of 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 0.08, with a significant t-statistic of 2.78 and p-value of 0.007. This result indicates a significant positive relationship suggesting that improvements in asset quality such as decreasing non-performing loans enhance financial stability of banks and the weak asset

quality increases the default risk of a bank. These results are supported by the earlier work of Ezeoha (2011), De Bock and Demyanets (2012), Swamy (2012) and Arrawatia et al. (2019). Therefore, based on these results, the H2 is accepted that asset quality positively affects the financial stability of banks. The regression coefficient for management quality is 0.000 with a t-statistic of -1.32 with p-value of 0.19. This result depicts that management quality does not have a significant direct effect on financial stability of banks. This result can be explained in as effective management is critical for bank operations, its effect on financial stability is likely mediated through other bank specific and macroeconomic factors Accordingly, the H3 is rejected since management quality does not positively affects the financial stability of banks. This result needs to be further contextualized in the light of studies such as Ferreira & Matos (2021) and Huang & Lee (2022).

The table above shows the earnings have a significant positive impact on financial stability with a coefficient of 0.99, t-statistic of 5.24 and p-value of 0.000. This result shows that profitable banks are financially more stable leading banks to absorb financial shocks in the times of financial distress. Accordingly, the H4 is accepted since earnings positively affects the financial stability of banks. These regression results are supported with the earlier studies by Bikker & Vervliet (2018) and Zhu & Chen (2019)**.** The coefficient for liquidity is 0.03, with a t-statistic of 1.30 and p-value of 0.200. This regression result shows that liquidity does not have a significant direct effect on financial stability in this model. While maintaining sufficient liquidity is critical for meeting short-term demands, it is likely that liquidity alone does not affect significantly the financial stability when compared to other bank specific and macroeconomic factors. Based on these results, the H5 is rejected since liquidity does not positively affects the financial stability of banks. These results are contextualized in the light of the earlier work by Ratnovski (2013) and DeYoung, Distinguin, and Tarazi (2015).

The coefficient for sensitivity to market risk is 0.26 with a t-statistic of 1.55 and p-value of 0.12. This result suggests that while banks with higher sensitivity to market risk may face greater risk exposure to external financial shocks, this factor alone does not play a critical role in shaping financial stability. Accordingly, the H6 is rejected since the higher level of sensitivity to market risk does not negatively affects the financial stability of banks. These results are to be further explored through the earlier work by Jiang, Levine, and Lin (2018) and Al-Tamimi, & Al-Mazrooei (2018) who called for establishing regulatory controls for market risk exposure.

Arellano-Bond Serial Correlation Test:

Arellano-Bond Serial Correlation Test				
Test	m-stat	rho	S.E.(rho)	Probability
AR(1)	-0.79	-0.78	0.98	0.43
AR(2)	-0.18	-0.09	0.49	0.86

The results of this tests indicate that AR(1) test with the m-statistic is -0.78 with a p-value of 0.43 suggesting no significant first-order autocorrelation as the p-value is higher than 0.05. The AR(2) test depicts that the m-statistic is -0.18 with a p-value of 0.86 showing the absence of second-order autocorrelation.

Conclusion:

This study examined the impact of capital adequacy, asset quality, management quality, earnings, liquidity and sensitivity to market risk on the financial stability of banks. Based on the data of Pakistan banks, this study confirmed the significant impact of capital adequacy, asset quality and earnings on the financial stability of banks. The results of this study indicate that a bank should pay close attention to the level of capital adequacy for maintaining financial stability. Similarly, the asset quality is also important as the recovery of loans and interest also affects the financial stability of banks. Likewise, earnings play a significant role in maintaining the financial stability of banks as a bank facing losses cannot sustain the financial stability in the long term. In the same way, liquidity is very important as banks must deal with customers through cash inflows and outflows on daily basis. A bank without sufficient liquidity will directly affect the financial stability of banks. The result of this study recommends the development of dynamic monitoring mechanism for the banks to detect and report the early signs of factors that might affect the financial stability of banks.

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