

## Financial Stability and Competitiveness of Commercial Banks in Pakistan: An Empirical Analysis

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### Abstract

*This empirical investigation is aiming to examine the factors predicting the financial stability of leading scheduled commercial banks in Pakistan from 2006 to 2017. Secondary data were analyzed by applying the static panel Fixed Effect (FE) estimator as well as dynamic panel regression analyses using the Generalized Method of Moments (GMM) estimator. The results based on the GMM estimator suggest that capital adequacy, profitability, liquidity risk, bank lending behavior, and bank size are significantly predicting the banks' financial stability among its internal factors, whereas, the credit risk and management quality are insignificant in the model. The industry-specific variable namely, market concentration proxied by the Herfindahl-Hirschman Index (HHI) is also showing a significant impact on the financial stability of banks significantly. Another interesting finding of this research is the insignificant impact of the financial crisis of 2007-2008 on the stability of commercial banks in Pakistan.*

**Keywords:** commercial banks, concentration ratio, dynamic panel estimation, generalized method of moments

### Introduction

Bank stability refers to a position in which a bank functions effectively and efficiently despite the shocks faced by the banking sector due to the occurrence of systematic and unsystematic risks during financial intermediation. The State Bank of Pakistan (SBP) emphasizes that a stable banking system depends on several factors like effective financial intermediation, economic growth in the country, community interest, trends in investment, and the degree of competition in the industry.

Quintyn and Hoelscher (2003) define commercial banks' monetary stability as a “steady condition where commercial banks effectively perform their major economic roles of allocating resources, spreading risk and settling debts and payments”, while, Segoviano and Goodhart (2009) emphasize that commercial banks' financial volatility could emerge from idiosyncratic factors correlated to lack of proper banking practices which could adversely influence bank's solvency or

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through systematic factors kicked off by macro shocks leading to monetary strains for commercial banks.

### Review of Literature

The ‘Safety First’ principle was introduced by Roy (1952) as his displeasure over an easy policy of making the most of his return in addition to his traumatic time of war experience. The implementation of the ‘Safety First’ rules acknowledges possessing wide-spectrum of probable actions, like catastrophe is the case, the gross profit ought not to be lower than a certain quantity. The expansion of the ‘Safety First’ policy resulted in Z-score. A Z-score is inversely proportional to the possibility of the bank’s liquidation, which shows a possibility of a bank’s asset value becoming lesser than the debt worth that leads to a huge Z-score corresponding to minimal insolvency risk (Rajhi & Hassairi, 2013). Diamond and Dybvig (1983) evaluated the reasons for bank instability, to find out that it is due to wrong matching of asset liquidity from the banking sector alongside with liability of the financial institutions as bank lending resources tends towards illiquid than client’s deposit or bank’s legal responsibility, leading to financial asset becoming uncertain.

The determinants of financial stability were studied in UK banks and building societies before and after the crisis period. The result reveals that both institutes had different determinants before and after the crisis. Furthermore, they concluded that both micro-level and macro-level indicators are significantly determining financial stability (Madi, 2016). Ali, Sohail, Khan, and Pua (2019) found that corruption, bank size, funding risk, and liquidity risk have a positive association with banks’ financial stability, whereas, credit risk was negatively associated with the financial stability of banks in Pakistan.

### Methodology

Secondary data for twenty-four scheduled commercial banks has been extracted from the annual accounts of scheduled banks incorporated in Pakistan from the publications of State Bank of Pakistan. The description of variables, their mean, and standard deviation are presented in Table 1.

*Table 1- Description of Variables*

Variable	Acronym	Measurement	H <sub>a</sub>	Mean	S.D.
Dependent variable					
Banks’ Financial Stability	Z-Score	(ROA+ETA)/ σROA, where ROA represents the return on assets, EQTA is		15.94	11.36

			the ratio of total equity to total assets, and $\sigma$ ROA is the standard deviation of return on assets.			
Independent variables						
<i>Bank-specific variables</i>						
Bank Size	SIZE		The natural log of total assets	+/-	18.15	1.50
Capital Adequacy	CAP		The ratio of total equity to total assets	+	0.24	0.98
Credit Risk	NPL		The ratio of non-performing loans to the total loans	-	0.13	0.15
Efficiency of Bank Management	NIM		Interest income - interest expenses/ total assets	-	0.03	0.01
Profitability	ROA		Returns on Assets	+	0.003	0.019
Bank Lending Behavior	BLB		The ratio of net loans to total assets	+/-	0.432	.107
Liquidity Risk	LIQ		The ratio of net liquid assets to total assets	+	0.094	0.43
<i>Industry-specific variable</i>						
Market Structure	HHI		Sum of Square of the market share of each bank	-	0.318	0.279

**Model Specification**

To empirically test the determinants of banks’ financial stability, the following model is formulated:

$$Z_{it} = \alpha_0 + \alpha_1 Z_{it-1} + \beta_1 SIZE_{it} + \beta_2 CAP_{it} + \beta_3 NPL_{it} + \beta_4 NIM_{it} + \beta_5 ROA_{it} + \beta_6 BLB_{it} + \beta_7 LIQ_{it} + \beta_8 HHI_t + \beta_9 DUMMY + \mu_i + \varepsilon_{it} \quad (1)$$

Where  $Z_{it}$  denotes the banks’ financial stability for bank ‘i’ in year ‘t’ and  $Z_{it-1}$  represents the first lagged value of the criterion variable.  $\alpha_0$  denotes the intercept term, while  $\alpha_1$  and  $\beta_k$  represents partial slope coefficients of the predictors used in the study; bank-specific variables include bank size (SIZE), capital adequacy (CAP), credit risk (NPL), management quality (NIM), profitability (ROA), bank lending behavior (BLB), and liquidity risk (LIQ). The dynamic panel model also contains HHI as a proxy for market concentration categorized as an industry-specific variable and finally a dummy variable (DUMMY) to proxy financial crises of 2007-08.  $\mu_i$  denotes the unobservable bank-specific effects, while  $\varepsilon_{it}$  expresses the error term.

### *Estimation Approach*

Equation (1) is estimated by applying the static panel Fixed Effect (FE) estimator and the dynamic panel-data GMM estimator developed by Arellano and Bond (1991).

### *Dependent Variable*

The bank risk index from the Hannan and Hanweck (1988) accounting model which is also widely known as the Z-score is taken as the outcome variable in the study to proxy banks' financial stability following previous empirical works (Bourkhis & Nabi, 2013; Čihák & Hesse, 2010; Madi, 2016; Rahim, Rohaya, & Zakaria, 2013; Rajhi & Hassairi, 2013; Sakarya, 2016; Tan & Floros, 2013; Uhde & Heimeshoff, 2009; Wahid & Dar, 2016).

### *Explanatory Variables*

#### *Bank Size*

Bank size has a positive association with banks' financial stability (Beck, De Jonghe, & Schepens, 2013; Beck, Demirgüç-Kunt, & Merrouche, 2013; Boot & Thakor, 2000; Lee & Hsieh, 2013; Rahim et al., 2013; Uhde & Heimeshoff, 2009). On the contrary, studies have also found a negative association (Köhler, 2015; Madi, 2016; Sakarya, 2016; Tan & Floros, 2013; Wahid & Dar, 2016).

#### *Capital Adequacy*

A mandatory regulatory capital is kept by all banks to protect banks and depositor's interest by the central bank of the country. Uhde and Heimeshoff (2009), in their cross country empirical analysis of banks in Europe, while Tan and Floros (2013) and Wahid and Dar (2016) found a positive relationship between capital ratio and banks' financial stability.

#### *Credit Risk*

The ratio of non-performing loans (NPLs) to total loans has been taken as a proxy is used to measure credit risk following previous empirical works (Ali et al., 2019; Chiaramonte, Poli, & Oriani, 2015; Wahid & Dar, 2016). According to Watanabe (2010), the net worth of a firm reduces due to the increase in non-performing loans. Credit risk may adversely influence bank stability because higher the NPL greater the risk faced by banks (Chiaramonte et al., 2015).

#### *Efficiency of Bank Management*

The efficiency of bank management significantly adds to the financial stability of banks. Beck, Demirgüç-Kunt, et al. (2013) and Chiaramonte et al. (2015) found a positive association of bank efficiency with bank stability, whereas, studies also found a negative relationship (Madi, 2016; Wahid & Dar, 2016).

#### *Profitability*

Profitability is examined robustly by investors and shareholders while they take their investment decisions. Shareholders link the future earnings of the firm to the profitability of a firm, as Chen and Hammes (2004) argued that shareholders give importance to the firm's profitability since profitability predicts firms' future earnings. Wahid and Dar (2016) found a positive relationship of profitability with banks' financial stability.

#### *Bank Lending Behavior*

Bank loans are considered as a vital element of the banking sector, although they are seen as the most uncertain aspect of the banking resource collection (Lanine & Vander Vennet, 2006). Previous empirical works found banks' lending behavior to be negatively correlated with the banks' financial stability (Beck, Demirgüç-Kunt, et al., 2013; Rahim et al., 2013; Sakarya, 2016), while several authors also found a positive relationship of the banks' lending behavior with the banks' financial stability in their empirical works (Altaee, Talo, & Adam, 2013; Wahid & Dar, 2016).

#### *Liquidity Risk*

For the present empirical work, liquidity risk is added to the empirical model following the previous empirical works (Adusei, 2015; Ali et al., 2019; Fiordelisi & Mare, 2014; Kiemo, Olweny, Muturi, & Mwangi, 2018; Molyneux & Thornton, 1992; Tan, Floros, & Anchor, 2017). Ali et al. (2019), in their empirical study, found a positive association of liquidity risk with banks' financial stability.

#### *Market Concentration*

The Herfindahl-Hirschman Index (HHI) is taken as a proxy of market concentration of banks which can also depict the drift in the competitive structure of the banking industry. In this study, the HHI is calculated by summing the squares of the market share in terms of banking assets of each bank competing in the market. In a previous study, Uhde and Heimeshoff

(2009) concluded that HHI significantly predicts banks' financial stability negatively.

#### *Financial Crisis Dummy*

This study also employed a dummy variable to measure the effect of the financial crisis (2007-08) on the financial stability of commercial banks operating in Pakistan in the dynamic panel model.

### **Empirical Results and Discussion**

The result of the Lagrange multiplier test proposed by Breusch and Pagan (1980) indicates a chi-square test statistic value of 806.67 and a  $p$ -value 0.000, indicating the existence of a panel effect and making it a consistent estimator for the present study compared to Ordinary Least Square estimator.

The Hausman specification test is applied to the sample data to decide between the preference for fixed effect (FE) or Random Effect (RE) estimation method. The test result indicates that the FE method is appropriate for the current study [ $Chi-sq(9) = 32.61$ ;  $p$ -value = .000]. Therefore, the FE estimator is applied to control for time-invariant unobservable characteristics across banks.

#### *AB GMM Estimation Results*

The baseline results derived from the FE and GMM estimator are reported in columns 2 and 3 of Table 2 respectively. Table 2 reveals the Wald chi-square, the first [AR (1)] and second [AR (2)] difference for the Autoregressive (AR) model. The Wald chi-square value validates the overall model fit of GMM ( $Wald\ chi-square\ statistic = 2884.77$ ;  $p$ -value <.01).

Moreover, the assumption of no autocorrelation in the errors in the levels is tested and the results reveal that the null hypothesis of no autocorrelation of order 2 cannot be rejected [ $p = 0.6244$ ] for AR (2), and it is evident that the Arellano–Bond model assumptions are satisfied and the application of a dynamic panel model is validated by the results.

The results in Table 2 depict that the lagged Z-score is positively related to banks' financial stability and statistically significant at a 10% significance level ( $\beta = 0.104$ ;  $p$ -value = .0063) implying that the current financial stability is affected by the previous financial stability confirming the validity of the dynamic model specification.

Among the bank-specific predictors of the study, bank size has a negative association with banks' financial stability for the Pakistani commercial banks during the sample period 2006-2017 at a 5% level of significance ( $\beta = -1.810$ ;  $p$ -value = .048) which is in line with previous

empirical works (Köhler, 2015; Madi, 2016; Sakarya, 2016; Tan & Floros, 2013; Wahid & Dar, 2016).

The capital adequacy of banks is predicting banks’ financial stability positively during the sample period at a 1% significance level ( $\beta = 95.343$ ;  $p$ -value = .000). The result is consistent with previous empirical studies (Tan & Floros, 2013; Uhde & Heimeshoff, 2009; Wahid & Dar, 2016).

*Table 2- Estimation Results*

Independent Variables	FE (2)	GMM (3)
$Z_{it-1}$	-	0.10* (1.86)
SIZE	-1.51 (-1.17)	-1.81** (-1.97)
CAP	96.083*** (6.37)	95.343*** (9.03)
NPL	-2.784 (-0.42)	-1.939 (-0.39)
NIM	-147.464** (-2.22)	-53.457 (-1.16)
ROA	70.137** (2.23)	47.103*** (3.74)
BLB	11.536** (2.33)	8.701** (2.58)
LIQ	34.412* (1.76)	24.566*** (3.64)
HHI	-5.614* (-1.82)	-6.876*** (-2.63)
DUMMY	0.966 (1.52)	0.813 (1.15)
Number of observations	288	240
<i>F</i> -statistic	8.070***	
R-square within ( <i>p</i> -value)	[0.869]	
Hausman test (FE vs. RE)	32.61***	
<i>Wald Chi-square statistic</i>		2884.77***
AR 1 ( <i>p</i> -value)		[0.1304]
AR 2 ( <i>p</i> -value)		[0.6244]
Number of Instruments	-	65

Note:  $Z$  is the dependent variable;  $Z_{it-1}$  is the lagged criterion variable; \*\*\*, \*\* and \* are statistically significant at 1%, 5%, and 10%, respectively; Arellano–Bond proposes to take the second lags of the criterion variable and every feasible lag after that, the study employed 12 time periods, which yield 65 instruments (55 GMM-type instruments for the dependent variable, 10 standard instruments are given by the first difference of the predictors and the constant); AR 1 (2) test for first (second) order serial correlation ( $H_0$ : no autocorrelation);  $t$ -statistics of the FE estimator while  $Z$ -statistics of GMM model are reported in parentheses.

The bank profitability is statistically significant ( $\beta = 47.103$ ;  $p$ -value = .000) at a 1% level having a positive association with banks’ financial stability implying that higher profits will lead to higher bank stability (Chen & Hammes, 2004). The result is consistent with the empirical results of Wahid and Dar (2016).

The bank lending behavior has a positive relationship with banks' financial stability at a 5% level of significance ( $\beta = 8.701$ ;  $p$ -value = 0.01). The finding of the present study is in line with previous empirical works (Altaee et al., 2013; Wahid & Dar, 2016). The liquidity risk of banks has a positive significant relationship with the banks' financial stability ( $\beta = 24.566$ ;  $p$ -value = .000) and confirms the result of Ali et al. (2019). The industry-specific variable, HHI has a negative association with banks' financial stability at a 1% level of significance ( $\beta = -6.876$ ;  $p$ -value = .009). The result is consistent with the work of Uhde and Heimeshoff (2009). The efficiency of bank management quality, credit risk, and the dummy variable for the financial crisis 2007-2008 are found insignificant with banks' financial stability in the present study.

#### *Conclusions and Recommendations*

The salient contribution of this study in the literature is to the use of the HHI to measure the competitiveness among banks as an industry-specific predictor of banks' financial stability in the context of Pakistan for the first time. This study applied the Arellano-Bond (AB) linear dynamic panel-data GMM estimator for the first time in the Pakistani context to empirically examine the factors predicting banks' financial stability of leading scheduled commercial banks in Pakistan.

The AB GMM estimation results reveal that capital adequacy, profitability, liquidity risk, bank lending behavior, and bank size are significantly predicting the banks' financial stability among its internal factors, whereas, the credit risk and management quality are insignificant in the model. The industry-specific variable namely, market concentration proxied by the Herfindahl-Hirschman Index (HHI) is also showing a significant impact on the financial stability of banks significantly.

Single country-specific empirical studies in the future may be focused on the banking sectors in the Asian context. In Pakistan, the macroeconomic side may be focused to explore the factors affecting the financial stability of banks. The financial sector of Pakistan comprises several groups of actors that jointly constitute the Pakistani financial sector. The author recommends that future studies may be directed towards empirically analyzing the factors affecting the financial stability of Microfinance banks, Development Finance Institutions, Microfinance banks, Investment banks, Leasing Companies, House Finance, and Venture capital companies working in Pakistan.

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