Stability Analysis of the Financial System of Pakistan

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Abstract

This is a five steps study starting from developing an empirical model to estimate NPL Ratio of all sample banks, identify unstable banks by comparing the estimated NPL ratios with its respective equity ratios, and then ascertain the state of stability of overall banking system during the period 1998-2014. In the next step, stress testing and scenario analyses were conducted to assess the Pakistani commercial banks and overall banking systems for its potential to withstand macroeconomic shocks. Scenarios were developed on the basis of extreme values of macroeconomic and industry specific indicators during sample period. Results of the study suggest that during 1998-2000, three to four banks possessing 33- 45% assets of the financial system were unstable. During 2001, the situation improved. During this year, two banks controlling 18% assets of the financial sectors are adjudged unstable. The system is evaluated stable since 2002. Stress testing results suggest that during the period 2002-2014, Pakistani financial system was capable to remain stable in all economic conditions.

Key words: NPL, Bank specific factors, Industry specific indicators, Backtesting, Stress testing

JEL Classification: G21

Introduction

Financial stability is a situation in which the financial system is able to absorb shocks without any significant disruption in its key functions of financial intermediation (Alawode & Al Sadek, 2008). During the last 16 years, world economies have observed ten significant financial system crises (Reinhart & Rogoff, 2013) causing disruption in the key functions of financial intermediation. Financial crises have acted as a wakeup call for economic and financial managers at all level. International financial institutions like IMF and World Bank have initiated a number of programs for surveillance, monitoring and guidance of financial regulators of member countries (Borio, Drehmann & Tsatsaronis, 2014). Macro-prudential analysis, stress testing, scenario analysis, sensitivity analysis etc are various tools introduced by financial regulators to detect any weaknesses in advance (Galati & Moessner, 2013; Schmieder, Hasan & Puhr, 2011).

Macroprudential analysis and application of stress testing techniques have some significant issues (Glasserman, Paul & Gowtham, 2015). The processes are complicated,

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difficult to understand and require extensive and up to date data (Greenlaw, Kashyap, Schoenholtz & Shin, 2012). Under Article VIII of the IMF agreement with member states, it is not obligatory for member countries to share data of an institution or sector with anyone including IMF. In some cases, the member states simply refuse to provide data (Jobst, Ong & Schmieder, 2013). In such cases, IMF staff has no option but to use only the publicly available data given in the annual accounts and financial statements of respective banks. Moreover, IMF cannot make the results of the stress test public, until the concerned member country agrees (Matthias, 2013). Conflict of interest is another issue compelling supervisors and regulators of a financial system to withhold information. If a stress test is likely to predict financial crisis, the supervisor shall have strong interest to withhold information or 'engineer' it with a view to conclude that financial system assessed is resilient (Goldstein & Sapra, 2014). Due to these constraints, the approach of macro financial analysis and stress testing is used by financial institutions and regulators and are almost 'out of bound' for independent researchers and financial analysts (Borio *et al*., 2014). Independent analysts therefore use available data of macroeconomic indicators (Ahmad & Bashir, 2013; Badar & Javid, 2013), industry specific variables and bank level data (Hassan, Ilyas & Rehman, 2015) and assess its empirical influence on credit risk (NPL ratio etc) of financial institutions using statistical techniques. The issue with such types of analysis is that this approach studies just one aspect of multifaceted problem. These studies have overlooked the analysis of the potential of banks or banking systems to absorb shocks ((Henry *et al*., 2013).

Financial system of Pakistan has not been analyzed by any independent analysts for its potential to absorb shocks. Banking system controls 74 percent assets of the overall financial system of Pakistan (SBP Financial Stability Review, 2016). The aim of this study is to scrutinize the Financial System of Pakistan (surrogated by banking system of Pakistan) for its tenacity to absorb macroeconomic shocks.

Literature Review

Analysis by IMF and Central Bank

International Financial Institutions (IFIs) and financial regulators have evolved various techniques for analyzing stability of financial institutions and overall financial systems. Stress testing (Glasserman, Paul & Gowtham, 2015) and scenario analyses (Borio *et al*., 2014) are the most popular techniques introduced to examine the financial entity for its resilience against various extreme but plausible external and internal shocks. IFIs, financial regulators and bank management assess financial health of financial institutions as well as overall financial sectors. Being market sensitive, findings of these studies are however, not made public (Matthias, 2013).

Process of Stress Testing – Framework

The origin of stress test (also called torture test) is in engineering, where the process was introduced to assess the ability of a product like computer, vehicle, engine etc to maintain a predefined level of effectiveness under adverse conditions of various intensity (Cihak, 2014). In finance, its utilization was started to evaluate performance of individual portfolio, institution (micro stress test) in some predefined adverse conditions. Financial regulators have, however, started using the technique for testing the stability of group of financial entities (macro stress test) in any plausible unfavorable conditions (Borio *et al*., 2014). In finance, a typical macro stress testing is a multistage process (Amini, Cont & Minca, 2012). As a first step, possible stress events are identified in the environment (Henry *et al*., 2013). The nature and clout of stressors is different in different economies (Stein, 2012). For example sudden significant oil price hike in international market has positive influence on economic indicators of oil exporting countries but negative on those of oil importing economies. In second step, empirical model is developed for estimating the sway of stress events (shocks) on macroeconomic indicators (Kapinos & Mitnik, 2016). In step three, a 'satellite model' is developed to link the changes in macroeconomic variables in each scenario (of shock situation) with asset quality of the financial institutions and expected credit losses estimated (Drehmann, Borio & Tsatsaronis, 2011). The impact of shocks on banks' asset quality is conducted via credit risk as well as market risk (Schuermann, 2014). Credit risk means influence of adverse movement in economic indicators on NPL of the financial institutions, while market risk refers to downward swing in asset prices of loan portfolio i.e. bonds, investment in foreign currencies (Stein, 2012). The estimated losses for each shock situation are then compared to profit and capital (used as buffer against shock) and thus stability of the financial institution and system ascertained under the influence of various shocks (Drehmann *et al*., 2011).

Independent analysts have contributed in the shaping of the processes of micro and macro-prudential analyses, stress testing and scenario analysis etc (Borio *et al*., 2014). However their share in practically applying these techniques to determine a financial institution sagacity to absorb shock is almost zero. As discussed in the introduction section, reason of this indifferent behaviour is that the processes are complicated, difficult to understand and require extensive and up to date data (Greenlaw *et al*., 2012).

Analysis by Independent Analysts

As discussed above, the process of stress testing and scenario analysis is avoided by independent research analysts due to a number of practical issues present in it. Stress testing of credit risk is requirement of Bank of International Settlement (BIS) as Basel II

framework which entails incorporating various recession scenarios of trade cycle (Drehmann *et al*., 2011), as well as other macroeconomic background of stressors. Incorporating these factors in the test makes it cumbersome and challenging. Owing to these constraints, independent research analysts have evolved an oversimplified strategy (Greenlaw *et al*., 2012). They focus on factors directly influencing asset quality and nonperforming loans of financial institution especially of banks.

Using annual time series data for the period 1990-2011, Ahmad & Bashir (2013) explored macroeconomic variables for its sway on NPL in Pakistani banks. In unison with the results of other studies, GDP growth, industrial production and exports were found to have a robust negative impact while CPI was found to have strong positive association with NPL. Interest and inflation rates were found to have negative bearing on NPL. Hussain, Khalil, & Nawaz, (2013) employed time series data for the period 1990-2013, concluded that exchange rate and energy have positive, while GDP growth has negative clout on NPL of Pakistani banks. NPL itself was found to have a robust positive lagged effect on itself. Hassan *et al*. (2015) empirically analyzed the impact of bank level and social factors on bad debts of Pakistani banks and found rapid credit growth positively influencing NPL. Employing quarterly data for the period 2002- 2011, Badar & Javid (2013) evaluated macroeconomic factors for its sway on NPL of Pakistani banks. Results of Johansen & Juselius multivariate cointegration test suggests that money supply and interest rate have long term while inflation and exchange rates have a weak short term relationship with NPL of Pakistani commercial banks. Farhan, Sattar, Chaudhry & Khalil (2012) carried out perception analysis about the influence of macroeconomic variables for its impact on NPL of Pakistani commercial banks. The study concluded that energy crisis, lending rates, unemployment and inflation are perceived to have positive while GDP growth was thought to have negative influence on NPL. Ng'etich (2011) studied the clout of interest rate spread (IRS) on nonperforming assets of Kenyan commercial banks and concluded that IRS has positive (contemporary and lag) influence on NPL of Kenyan banks.

All these studies have restricted its scope to the determinants of NPL. Stability of a financial institution (and financial sector) does not hinge on its NPL ratio only but also on its robustness to absorb internal and external shocks (Henry *et al*., 2013). Like any other business, a financial institution remains solvent and stable till the time it has positive value of shareholders' equity. Shareholder's equity plays a vital function to act as buffer against endogenous and exogenous shocks. Studies which have reviewed stability of financial sector of Pakistan have so far overlooked this function of shareholders' equity.

Research Methodology

Research Design

Our design of study is a mix of the designs used by independent analysts and regulators (Jobst *et al*., 2011). Determinants of asset quality of commercial banks are detected and its influence on NPL ratio explored empirically (Badar & Javed, 2013). The model used in stress testing and scenario analysis (Rodolfo & Kalin, 2012) are employed but in a simplified form. Pakistan has not experienced financial crisis due to some shock/contagion, therefore stress events and its impact on macroeconomic indicators are not included in the design. However, scenarios are developed for stress testing on the basis of extreme values of macroeconomic variables during sample period (Greenlaw *et al*., 2012) and its influence on the stability of individual financial institutions and whole banking system explored.

Steps of Research

Banking system is appraised in five steps. In step one, using data of six variables (three bank specific, two macroeconomic and one industry specific indicators) as regressors, an empirical model is developed for estimation of NPL/advance ratio. Detail of the variables is given in table 1.

$$\text{NPL/advance} = \alpha_0+\alpha_1(\text{NPLADV})_{i,t} + \alpha_2(\text{NII})_{i,t} + \alpha_3 (\text{ADVBRW})_{i,t} + \alpha_4(\text{IRS})_{i,t} + \alpha_5(\text{GDPDEFL})_{i,t} + \alpha_6(\text{GDP})_{i,t} + \alpha_7(\text{XCH})_{i,t} \xi_{i,t} \ldots\ldots \text{(Model 1)}$$

In second step, the robustness and validity of the model is checked by 'back testing'. It is done by examining that whether the model has correctly identified the financially fragile banks (already known) and whether the symbols of coefficients are in unison with those of the past studies.

In step three, the empirical model is employed to evaluate the stability of all the banks sample period. Past studies do not provide any insight for terming a bank stable or unstable on the basis of NPL ratio. An operational definition is therefore introduced for this study. A bank is considered unstable during a year if it's estimated NPL/advance exceeded its equity/advance by significant margin. The negative value of NPL/advance minus its equity/advance is considered significant if it is less than the average (average of values of all banks during a year) by more than one standard deviation.

In step four, using empirical model, stress testing of all the sample banks is carried out under various scenarios. Scenarios are developed on the basis of extreme values of macroeconomic and industry specific indicators during sample period. Average values of these indicators (values during sample period) were used to represent normal/non-stressed economic condition (scenario 1). Worst values of these indicators

(during sample period) were used to represent worst economic condition (scenario 3). Mean values of average (scenario 1) and worst (scenario 2) were used to represent bad economic condition (scenario 2).

In step five, stability of overall banking sector is determined in all the sample years under various scenarios. Past studies also do not provide any definition for terming a financial system stable or unstable on the basis of ratio of unstable banks. In this study a banking sector is termed unstable, less stable or stable during a year if total assets of all banks assessed as unstable respectively were more than 20%, 10-20% or less than 10% of total assets of all the sample banks.

Variables of Study

List of independent variables is given in table 1.

Table 1: *List of Independent Variables*

Variable	Formula	Past Studies	Sign
Net Interest Income / Total Assets (NII)	Net Interest Income/Total Assets	Farhan *et al*. (2012)	(+)
NPL to Gross Advances (NPLADV) - lag effect	NPL/Gross Advances	Hussain *et al*. (2013)	(+)
Gross advances / borrowing & deposits (ADVBRW)	(Gross Advances / Borrowing & deposits)*100	Hassan *et al*. (2015)	(+)
Interest Rate Spread (IRS) – lag effect	WAIRA – WAIRD	Ng'etich (2011)	(+)
Rate of Inflation - GDP Deflator (GDPDEFL)	(Nominal GDP/Real GDP) x 100	Badar & Javid (2013)	(-)
GDP	$(GDP_n - GDP_{n-1})/GDP_n$	Farhan *et al*. (2012)	(-)
Exchange Rate (XCH)	$(XCH_n-XCH_{n-1})/XCH_n$	Ahmad & Bashir (2013)	(+)

Population and Sample

Population of this study is the whole banking sector of Pakistan. To get balanced panel data, only those commercial banks are included in the study, which were found continuously operating during the sample period. Another consideration for selecting the sample banks is its size. Big banks are in control of big share in terms of assets as a percentage of the total assets of whole banking system and have therefore more clout on the (in)stability of the financial system. Therefore, 18 biggest banks continuously operating during the sample period i.e. 1998-2014 were selected for this study.

Data Analysis

Results Diagnostic Tests

Diagnostic tests of the data were carried out. Results of descriptive statistics, multicollinearity, Serial Correlation, Autocorrelation - Correlogram Square Residual tests are reported below.

Table 2**:** *Descriptive Statistic*

	NPLADV	NII	ADVBRW	IRS	GDP	GDPDEFL	XCH
Mean	0.115825	0.029169	0.4999	0.054	0.038613	0.10591	0.010
Median	0.099410	0.027633	0.4986	0.055	0.03507	0.076602	0.010
Std. Dev.	0.085781	0.017098	0.1307	0.009	0.018232	0.063526	0.000
Skewness	1.481532	-1.07690	-0.2026	-0.69	0.684497	0.960065	-0.47
Kurtosis	5.625717	14.67256	2.6196	3.308	2.635363	2.613038	2.848

The values of skewness and kurtosis indicate that data of NPL/ advance and Net interest income / total assets (NII) is not normally distributed.

Table 3: *Multicollinearity Test*

	R Square	**VIF**	**TOL**
NPL/Advance(-1)	0.159	1.189061	0.841
Net Interest Income/Total Assets	0.063	1.067236	0.937
Adv/Borrowing & Deposit	0.200	1.250000	0.800
IRS(-1)	0.140	1.162791	0.860
GDP	0.270	1.369863	0.730
GDP Deflator (-2)	0.223	1.287001	0.777
Exchange Rate	0.033	1.034126	0.967

Maximum value of VIF is 1.36. Tolerance level is also high, which means there is no significant multicollinearity problem (*O'Brien, 2007).*

Table 4: *Breusch-Godfrey Serial Correlation LM Test*

F-statistic	Obs*R-squared	Prob. F(2,294)	Prob. Chi-Square(2)
0.568551	1.171249	0.567	0.5568

Low value of F-statistic (0.5685) and high value of prob. Chi-Square (>0.05), indicate that null hypothesis of no serial correlation cannot be rejected.

Table 5**:** *Correlogram Square Residual*

Autocorrelation	Partial Correlation		AC	PAC	Prob
.|. |	.|. |	1	0.057	0.057	0.316
.|. |	.|. |	2	0.054	0.051	0.387
.|. |	.|. |	3	-0.025	-0.031	0.553
.|. |	.|. |	4	-0.027	-0.027	0.678
.|. |	.|. |	5	-0.016	-0.01	0.792
.|. |	.|. |	6	0.025	0.029	0.858
.|. |	.|. |	7	-0.02	-0.023	0.910
.|. |	.|. |	8	0.02	0.019	0.944
.|. |	.|. |	9	-0.021	-0.02	0.965
.|. |	.|. |	10	-0.035	-0.035	0.971
.|. |	.|. |	11	-0.025	-0.019	0.981
.|. |	.|. |	12	-0.003	0.002	0.910

The values of auto and partial correlation are near zero. The probability values are high (>.05), validating the null of no autocorrelation of residuals. No autocorrelation

of residuals means that there is no similarity between observations as a function of the time lag between them.

Regression Results

Results of regression analysis are provided below.

Table 6: *Regression Results*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.20608	0.073705	-2.79599	0.005
NPL/Advance(-1)	0.729437	0.035195	20.7255	0.000
Net Interest Income/Total Assets	-0.59036	0.167231	-3.53023	0.000
Advance/Borrowing & Deposit	-0.04867	0.023672	-2.05615	0.040
IRS(-1)	1.355571	0.325926	4.15913	0.000
GDP	-0.84636	0.178155	-4.75071	0.000
GDP Deflator (-2)	-0.19074	0.049532	-3.85085	0.000
Exchange Rate	25.80203	6.837070	3.77384	0.000
Adjusted R-squared	0.684739	Durbin-Watson stat		2.088
F-statistic	95.01538	Prob (F-statistic)		0.000

The values of F-stat, probability F-stat suggest a good model fit. All independent variables are significant with Confidence Interval (CI) = 0.01 except Advance/Borrowing & Deposit for which CI is 0.05.

Checking Robustness and Validity of the Model – Back Testing

A test of the robustness of the model is carried out by first estimating the values of NPL/advance of the sample banks during sample period 1998-2014. The values of equity/advance of the banks in that year were then deducted from the respective banks' estimated NPL/advance. A bank is considered unstable during a year if it's estimated NPL/advance exceeded its equity/advance by significant margin i.e. negative value of NPL/advance minus its equity/advance is less than the average (average of values of all banks during a year) by more than one standard deviation. The model accurately identified KASB bank which was financially unstable since 2007, had to face a six months moratorium by Federal Government on recommendations of State Bank of Pakistan in 2014 and forced merger with BankIslami in April 2015. The model also identified Bank of Punjab, passing through a period of financial instability since 2008 and being rejuvenated by Punjab Government through continual money injections**.**

Another evidence of the robustness of the model is that the signs of the coefficients are in tandem with those of the past studies on the subject. Negative sign of inflation represented by GDP deflator is also not unanticipated but confirms the findings of Ahmad & Bashir (2013), for Pakistani commercial banks.

Results and Discussion

Results of the Stability of Pakistani Banks and Overall Banking System

Results of the stability of banks and overall banking system are given in Table 7 & 8. Mark 'U' means that the bank has been assessed unstable during the year under review. As discussed in the methodology section, in this study a bank is considered unstable during a year if it's estimated NPL/advance exceeded its equity/advance by significant margin. Similarly a banking sector is termed unstable, less stable or stable during a year if total assets of all banks assessed as unstable respectively were more than 20%, 10-20% or less than 10% of total assets of all the sample banks.

Table 7: *Results of Stability Assessment of Pakistani Banks 1998-2014*

Bank		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
KASB Bank	KASB																	U
CitiBank	Citi																	
Deutsche Bank	Deutsche																	
National Bank	NBP																	
Habib Bank	HBL	U	U	U														
United Bank	UBL		U	U	U													
MCB Bank	MCB																	
Allied Bank	Allied	U		U	U	U	U											
Bank Alfalah	Alfalah	U																
Bank AlHabib	AlHabib																	
Standard Chartered	Stdchtd																	
Askari Bank	Askari																	
Faysal Bank	Faysal																	
Habib Metropolitan	Hbbmet																	
Bank of Punjab	BoP												U	U	U	U		
Soneri Bank	Soneri	U	U															
Bank of Khyber	BoK																	
1st Women Bank	Women																	
Number of unstable Banks		4	3	3	2	1	1	0	0	0	0	0	1	1	1	1	0	1

Table 8: *Results of Stability Assessment of Pakistani Banking System 1998-2014*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of unstable banks	4	3	3	2	1	1	0	0	0	0	0	1	1	1	1	0	1
%age assets of unstable banks	33	36	45	18	6	6	0	0	0	0	0	3	4	4	5	0	0.7
Stability of banking system	Unstable			Less stable	Stable												

Results of the study suggest that during 1998-2000, three to four banks possessing 33- 45% assets of the financial system were unstable. During 2001, the situation improved. During this year, two banks controlling 18% assets of the financial sectors are adjudged unstable. The system is evaluated stable since 2002. As far as stability of individual banks is concerned, one bank (Bank of Punjab) is assessed unstable during 2009-2012 and then one bank (KASB) during 2014.

Results of Stress Testing

Results of Stress Testing of Banks: Results of stress testing are given in Table 9. Mark 'N' means that the bank is assessed unstable even in normal (non-stressed) economic conditions (and thus unstable in bad and worst economic conditions). Similarly mark 'B' means that the bank is assessed unstable in bad (and worst) economic conditions. Mark 'W' means that the bank is assessed unstable only in worst economic conditions.

Table 9: *Results of stress testing of stability of banks*

Bank	Category of Bank	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Standard chartered	Foreign		B															
Citibank	"																	
Deutsche bank	"																	
NBP	Public																	
Bank of Punjab	"												B	B	N	N	N	B
Bank of Khyber	"		B	W														
1st Women Bank	"		W															
HBL	Private	B	N	N	B													
UBL	"		B	B	B													
MCB	"	W	W	W														
Allied Bank	"	N	N	N	N	B	N	B										
Alfalah Bank	"	W																
Bank AlHabib	"		B															
KASB Bank	"																	N
Askari Bank	"																	
Faysal Bank	"																	
Habib Meteropolitan	"		B															
Soneri Bank	"	N	N															

Results of Stress Testing of Overall Banking System

Results of stress testing of overall banking system under different scenarios, are given in Table 10, 11 and 12 below.

Table 10: *Stability of overall banking system - scenario 1(non stressed economic conditions)*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of unstable banks	2	3	2	1	0	1	0	0	0	0	0	0	0	1	1	1	1
%age assets of unstable banks	8	33	35	6	0	6	0	0	0	0	0	0	0	4	4	4	0.7
Status of stability of banking system	Stable	Unstable		Stable													

Results of stress testing indicate that in non-stressed economic conditions (scenario 1), the banking system would have remained stable during 1998, unstable during 1999 - 2000 and then stable throughout our sample period. Results of the study are in complete agreement with State Bank of Pakistan's assessment of financial sector of Pakistan (State Bank of Pakistan, Financial Stability Review, 2014).

Table 11: *Stability of overall banking system in bad economic conditions - scenario 2*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of unstable banks	3	8	3	3	1	1	1	0	0	0	0	1	1	1	1	1	2
%age assets of unstable banks	32	50	45	45	6	6	6	0	0	0	0	4	4	4	4	4	4.7
Status of stability of banking system	Unstable				Stable												

Results of stress testing (scenario 2) suggest, that even in bad economic conditions, Pakistani financial sector would have maintained its stability after 2001. Two banks i.e. Bank of Punjab and KASB bank are evaluated unstable during 2014. However, these banks were in possession of less than 5% assets of the whole financial sector and therefore, had no significant negative clout on the stability of overall financial sector.

Table 12: *Stability of overall banking system in worst economic conditions - scenario 3*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of unstable Banks	5	10	5	3	1	1	1	0	0	0	0	1	1	1	1	1	2
%age assets of unstable banks	45	62	55	45	6	6	6	0	0	0	0	4	4	4	4	4	4.7
Status of stability of banking system	Unstable				Stable												

Results of the stress testing (scenario 3), discerns that Pakistani financial sector was robust enough to withstand even the worst economic conditions during 2002 and onward during sample period.

Summary of the Results

To summarize the results, the financial system of Pakistan has shown a positive trend during the period 1998 -2014. Overall financial system is evaluated 'unstable' during 1998 -2001. The state of stability has improved and the system is assessed stable after 2001. Stress testing results suggest that during the period 2002-2014, Pakistani financial system was capable to remain stable in all economic conditions.

Some Interesting Conclusions of the Study

- During 1999-2004, big banks like HBL, MCB, ABL and UBL were assessed unstable. After 2004, these banks have shown considerable improvement and are evaluated stable throughout the period under review.
- All foreign banks, i.e. Citibank, Deutsche and Standard Chartered are adjudged stable throughout the period 1998 – 2014.

Recommendations

Based on the findings of our study, following suggestions and recommendations are made:

- Financial system regulators specially the State Bank of Pakistan should strengthen its regulatory regime and persuade the financially fragile banks to improve its risk management techniques and bolster its equity position.
- The regulator should also make its disclosure requirement more stringent and ensure that financial institutions share their annual reports and financial statements with general public within three months after the end of financial/banking year.
- Regulators and international financial institutions should revisit its policy of withholding information about fragile financial entities.
- Independent researchers should start using techniques of stress testing and scenario analyzing and come up with new techniques for stress testing and scenario analyzing.

Implications for Future Research

This study has opened a new area of research for independent analysts. It is expected that it will stimulate a series of studies by independent researchers.

Limitations of the Study

- ✓ Pakistan has not experienced financial crisis due to some shock/contagion, therefore stress events and its impact on macroeconomic indicators are not included in the design.

- ✓ Past studies do not provide any insight for terming a bank stable or unstable on the basis of NPL ratio. Past studies also do not provide any definition for terming a banking system stable or unstable on the basis of ratio of unstable banks (Central Bank of Bahrain, 2008). Operational definitions were therefore introduced for this study.

Directions for Future Research

Independent analysts are requested to start applying different techniques of stress testing along with varying the scenarios for assessing the stability of financial institutions and overall banking sectors.

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