Bangladesh Bank

Head Office
Motijheel, Dhaka-1000
Bangladesh. **Financial Stability Department**
Website: www.bb.org.bd

FSD Circular No. 01

Date: 30 December, 2024
15 Poush, 1431

Managing Director/Chief Executives
All Scheduled Banks in Bangladesh

Dear Sir,

Revised Guidelines on Stress Testing

Please refer to the DOS Circular No-01 of 23 February 2011 on the captioned subject.

2. In view of burgeoning importance and evolving role of stress testing, changes in the importance of different risk factors, insights gained from the application of existing stress testing framework, and international best practices, Bangladesh Bank has revisited stress testing guidelines. It has been decided that henceforth banks shall carry out stress testing exercise and submit the report in line with the revised guidelines on quarterly basis, effective from December 2024.

3. Additionally, banks are advised to simultaneously exercise and report stress test based on previous and revised templates only for the quarters ends on December 2024 and March 2025.

4. Financial Stability Department (FSD) of Bangladesh Bank shall make the required reporting template available to the banks in due course. Banks are advised to submit their stress testing reports to FSD within the last business day of the following month of each quarter-end using specified MS Excel template (soft copy only) until further instructions.

5. Instructions given in DOS Circular No-01/2011 will be superseded by this circular.

6. This directive is issued in exercise of the power vested in the Section 45 of the Bank Companies Act, 1991 (amended up to 2023).

Yours Faithfully,

(Dipti Rani Hazra)
Director (FSD)
Phone: 57165905

Guidelines on Stress Testing

December, 2024

Financial Stability Department

Bangladesh Bank

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Acronyms

BB	Bangladesh Bank
BIS	Bank for International Settlements
BL	Bad and Loss
BoD	Board of Directors
CRAR	Capital to Risk-weighted Assets Ratio
CRR	Cash Reserve Ratio
CVI	Climate Vulnerability Index
DF	Doubtful
DSIBs	Domestic Systemically Important Banks
HQLA	High-Quality Liquid Assets
LCR	Liquidity Coverage Ratio
MATs	Management Action Triggers
NPLs	Non-performing Loans
NPLIR	NPL Inflow Ratio
RMC	Risk Management Committee
RSA	Rate Sensitive Assets
RSL	Rate Sensitive Liabilities
SLR	Statutory Liquidity Ratio
SS	Sub-Standard
ST	Stress Testing

Section 1: Overview

1. Introduction

1.1 These stress testing guidelines have been issued by Bangladesh Bank (BB) under section 45 of the 'Bank Company Act, 1991 (amended up to 2023)' and extended a structured way of assessing the vulnerabilities of scheduled banks to extreme but plausible economic and financial conditions. These guidelines would enable banks to accurately identify, and measure key risks as well as define their 'risk appetite' and also provide critical information to senior management for decisions regarding capital allocation and contingency planning.

1.2 Stress testing is an essential risk management tool used to assess a bank's potential vulnerabilities during stressed economic and financial conditions. According to Bank for International Settlements (BIS), stress test is a forward-looking exercise that aims to evaluate the impact of severe but plausible adverse scenarios on the resilience of financial institutions. It involves the use of models and data at the individual financial institution level or system-wide level and may rely on historical or hypothetical scenarios. Through forward looking assessment of risks, it enables a bank to overcome the limitations of statistical models-based risk measures that consider historical data and assumptions. It helps senior management to understand the condition of a bank in the stressed situation and facilitates internal and external communication regarding banks' financial condition.

2. Background

Considering the importance and complexity of the methodology of stress testing, BB issued the first guidelines on stress testing in 2010, which were mandatory for banks and finance companies. Later, the revised guidelines were issued in February 2011, which were solely applicable for schedule banks operationalizing in Bangladesh. The later guidelines were mainly designed to align with Basel III capital framework and also to address key weaknesses in stress testing practices that were highlighted after the global financial crisis. Since then, the role of stress testing has rapidly evolved and grown in importance in many jurisdictions including systemic risk and liquidity risk management. Now-a-days, stress testing is a critical element of risk management for financial institutions and a core tool to identify the vulnerabilities for macro-prudential authorities and banking supervisors. Moreover, the climate change related physical and transition risks have also been increased in recent times, which may affect the safety and soundness of individual banks as well as the banking system and

could have broader implications on financial stability. In light of the above developments as well as the insights gained from the application of existing framework, BB has prepared a revised suite of stress testing guidelines and rationalized the shock scenarios to strengthen the existing stress testing framework in line with contemporary domestic and global developments.

3. Applicability

3.1 These guidelines shall be applicable to all scheduled banks in accordance with the following:

(a) On an individual bank level, referring to the global operations of the bank (i.e. including its overseas branch operations) on a solo basis; and

(b) On a consolidated level which includes entities covered under the entity level requirement, and the consolidation of all financial and non-financial subsidiaries.

3.2 Scheduled banks shall perform the stress testing exercises in line with the revised stress testing guidelines on quarterly basis.

4. Objectives

4.1 The stress testing exercise shall be a forward-looking exercise and a primary tool of risk identification and monitoring at the individual financial institution level. Stress tests should complement the existing complex and quantitative models-based risk management approaches that are using historical data and estimated statistical relationships.

4.2 The stress test results shall be reported to and discussed in the Risk Management Committee (RMC) and Board of Directors (BoD) on regular basis and shall be used as a crucial input in formulating strategic objectives and decisions. Banks shall use the stress testing results to calibrate risk appetite, capital planning, liquidity and funding risk assessment, contingency planning, and recovery/resolution planning. The results shall also be used to support internal capital and liquidity adequacy assessments, portfolio management and new product/trade approval processes.

4.3 From the risk management perspective, the stress test analysis generally considers certain indicators, e.g. CRAR and liquidity ratios, to quantify the impact of relevant risks. These indicators should be compared to regulatory requirements in order to identify vulnerabilities. Other risk indicators may include change in level of profit,

regulatory capital, risk-weighted assets, asset values, cash flows, loan loss provisions and level of non-performing loans. These would help in gauging the level and severity of emerging vulnerabilities and formulating suitable plans to address these potential weaknesses.

5. Scope and Coverage

5.1 The revised guidelines cover the significant activities undertaken by a bank and consider almost all material risks affecting the bank. Material risks refer to the risks that potentially have a significant adverse impact on any significant activity and overall financial condition of a bank. The shocks covered in this stress testing exercise could arise mainly due to credit, market, operational and liquidity risks.

5.2 Although, the banks are encouraged to assess their business portfolios under stressed scenario(s) considering a range of relevant risk factors, they are required to conduct sensitivity analysis taking into account credit, market, operational and liquidity risks. The impact of shocks would be translated to the solvency through profitability and capital position of the bank. For assessment and inference, the after-shock capital adequacy ratio would be gauged against the relevant regulatory benchmarks.

5.3 Macro-prudential stress test would cover some large and Domestic Systemically Important Banks (DSIBs), which shall be conducted by Bangladesh Bank. It aims to assess the impact of extreme but plausible macroeconomic scenarios on the bank's risk profile using econometric modeling techniques.

5.4 The risk identification and assessment process should cover every aspect of banks' risk profile including sector, borrower and depositor specific risk, on- and off-balance sheet exposures, etc.

5.5 Beside regular iterations of ST analysis prescribed by these guidelines, these are flexible enough to facilitate banks to conduct ad-hoc stress tests for situational or institutional specific demand. Banks are encouraged to conduct ad-hoc and more frequent stress tests on specific risk areas in response to emerging risks and during periods of heightened market volatility and economic uncertainty.

Section 2: Stress-testing Framework

6. General

6.1 Every schedule bank shall establish a rigorous and forward-looking stress testing framework that is commensurate with the nature, size and complexity of its business operations and risk profile.

6.2 Stress testing should be integral part of a bank's internal risk management and capital adequacy assessment process. The quality and comprehensiveness of data being used for stress tests, the robustness of methodologies, involvement of business lines, control and compliance functions in the design and implementation of the stress test program, and the use of stress test results to inform business and risk strategies are some essentials to ensure this process.

6.3 Specific uses of stress testing include:

(a) Providing an impact assessment of risk exposures under stressed situations and enabling the development of appropriate management actions and contingency plans (including recovery and resolution arrangements) across a range of stressed scenarios or sensitivity analyses;

(b) Setting as an input in the banks' risk appetite and determining whether its risk exposures are within the stated risk appetite under stressed conditions;

(c) Complementing risk assessments by capturing potential extreme losses (tail risk) beyond those calculated by risk measurement models that rely on historical data and assumptions;

(d) Assessing the appropriateness of the bank's capital management plans;

(e) Identifying, measuring and controlling risk concentrations;

(f) Strategic planning and forecasting;

(g) Managing portfolio in a proactive procedure;

(h) Management of assets and liabilities considering their maturity profiles; and

(i) Supporting internal and external communications regarding the bank's financial and liquidity condition, particularly during the periods of heightened market volatility and economic uncertainty.

7. Policies, Procedures and Documentation

7.1 The stress testing program shall be supported by appropriately documented internal policies and procedures.

7.2 A bank shall establish following policies and procedures to govern its stress testing program:

(a) Types of stress testing and the major objectives of each component of the stress testing program;

(b) Oversight arrangements including the roles and responsibilities of the board, senior management and relevant department heads including risk management, treasury, compliance and internal audit departments;

(c) Frequency of stress testing exercises consistent with the size and nature of the business, and the types of stress testing and their purpose;

(d) Methodologies used for stress testing incorporating different types of risk and development of relevant scenarios; and

(e) A range of Management Action Triggers (MATs) and remedial actions envisaged corresponding to the purpose, type and results of stress test.

7.3 A bank shall retain accurate, and up-to-date documentation on all aspects of its stress testing program, including:

(a) Description of the underlying assumptions and fundamental elements of each stress testing scenario. These include the reasoning and judgments behind the chosen scenarios and their degree of severity;

(b) Results of stress testing exercises according to different level of shock scenarios; and

(c) Board and senior management's deliberations and decisions on the appropriate management actions to address the risks and vulnerabilities identified from the stress testing exercise.

8. Governance

8.1 The ultimate responsibility for overall stress testing program rests with the board of directors of the bank and with the Chief Executive Officer/Country Head in case of foreign banks. Senior management shall be accountable for the ST program's implementation, management and oversight.

8.2 The board should actively participate and contribute in setting objectives of stress testing, defining scenarios, discussing the results of stress tests in the context of bank's risk profile, assessing potential actions and decision making.

8.3 Senior management should make the BoD aware about the methodologies used and the limitations of underlying assumptions of stress testing program, and the impact of stress tests. It is thus important that senior management participates in the review and identification of potential stress scenarios and contributes to risk mitigating strategies.

8.4 To promote risk identification and control, stress testing should be included in risk management activities of a bank at various levels of aggregation or complexity. This includes the use of stress testing for the risk management of individual or group of borrowers, portfolio risk management, as well as risk management of business lines or business strategy. In summary, it should be used to address both existing and potential enterprise-wide risk exposures and concentrations.

8.5 Stress tests should be used as an input for setting the risk appetite of the bank or setting exposure limits and to support the evaluation of strategic choices when undertaking and discussing longer term business planning. Importantly, stress tests should be integral part of the capital and liquidity planning process.

9. Infrastructure

9.1 The data utilized in stress testing should be accurate, complete and accessible in a timely manner. The granularity level of data depends on the types and frequency of ST exercise. The data infrastructure should be flexible enough to support targeted and customized stress tests. Banks should regularly assess the quality and reliability of the data and IT infrastructure as part of continual review of their stress testing framework. The Board of Directors (BoD) shall ensure that effective policies, procedures and tools are in place to identify and address material information deficiencies.

9.2 The Risk Management Committee (RMC) should ensure that an appropriate organizational structure is in place to properly execute the ST framework on regular basis. Any observed shortcomings in the ST structure and framework should be brought to the attention of the BoD. Importantly, the ST staffs need to be adequately skilled and have the access to resources/tools needed to perform assigned tasks effectively. Especially, the ST team should have sound knowledge on risk

management, macroeconomic aspects, financial accounting, econometrics, and be conversant with rules and regulations issued by regulators. The delegation of tasks and responsibilities should be well documented and conveyed to the entire team.

10. Stress Testing Approaches and Methodologies

10.1 Stress testing exercise must cover a wide range of scenarios, including foreseeable changes in the bank's portfolio composition, new information, developments in operating conditions, and emerging risks that are not necessarily covered by historical events.

10.2 The stressed parameters must be conservative and up-to date in order to prevent underestimation of risk. For instance, a bank's risk profile may become more vulnerable due to entering into new markets or high-risk segments. Macro-financial trends (for example, rising policy rate over time) may abruptly increase the risk profile of a bank's credit portfolio in the future, which may not be adequately captured by prior shock scenarios.

10.3 The identification of significant stress events, the use of sound modelling techniques, and the proper implementation of stress testing results necessitate the participation of several senior experts inside a bank. The unit in charge of implementing the stress testing program should organize appropriate dialogue among those experts, challenge their opinions, check them for consistency (e.g., with other relevant stress tests), and make decisions on the ST framework design and implementation, ensuring a balance of usefulness, accuracy, comprehensiveness, and tractability.

10.4 The stress testing framework is generally based on quantitative measurement approach. A bank shall develop quantitative techniques to risk measurement that accurately reflect industry-accepted methodologies and standards. Risk and loss estimates should be based on accurate data.

10.5 Banks must ensure that the data utilized for stress testing is reflective of and contains risk characteristics of the bank's unique products or risk profile. Proxy estimates can be utilized when there is insufficient or limited data. However, the bank shall apply a margin of conservatism based on expert judgment to the proxy estimates.

10.6 These revised ST guidelines cover two strands of methodologies: Sensitivity Analysis and Scenario Analysis. Usually, however, macroprudential stress testing framework of Bangladesh Bank will apply the scenario analysis.

10.7 Sensitivity analysis is used to provide an initial assessment of a portfolio's vulnerability to a single risk factor or a group of closely related risks. The risk factors are subjected to varying degrees of severity to better understand the bank's true weaknesses and the non-linear influence of events on loss profiles of the institution. The severity is either assumed hypothetically or calculated from historical maximums or minimums.

10.8 Sensitivity analysis assesses the effect of predefined changes in a single risk factor, such as NPL Inflow Ratio (NPLIR), interest rates, exchange rates, or equity prices, on a bank's financial condition. In most sensitivity analyses, the source of the shock on risk variables is not identified, and the underlying relationship or correlation between different risk factors is either not considered or discarded. For instance, the adverse impacts of changes in interest rates and exchange rates on bank's profitability are considered independently, disregarding their interconnection, to simplify the stress testing process. These tests are relatively quick to execute and provide an approximation of the bank's vulnerability to predefined changes in specific risk factors or combination of risk factors.

10.9 Banks should identify relevant risk drivers in particular: credit risk drivers (e.g. impact of credit concentration in specific sector or single borrower, a significant increase or shift in NPLIR, etc.), market risk drivers (e.g. increasing volatility in interest rates, foreign exchange rates and stock markets, etc.), liquidity risk drivers (e.g. deposit withdrawal by top depositors or in excess of normal withdrawal, etc.) and operational risk drivers (e.g. natural disaster, cyber-attack, failure of communication systems across the entire region/country, etc.).

10.10 Banks should then assess the impact of identified risk drivers in adverse condition with varying degrees of severities: minor, moderate, and major.

10.11 The banks should evaluate the levels of after-shock CRAR. If the after-shock CRAR found to be below the regulatory limits under minor credit, market and operational scenarios, banks may consider taking risk management actions to improve their risk profiles. Likewise, if the after-shock level of liquid assets becomes negative, and/or the Liquidity Coverage Ratio (LCR) falls below their regulatory minimums in liquidity scenarios, banks should take risk mitigation actions to strengthen their liquidity profiles.

11. Use of Stress-testing results in Formulating Management Actions

11.1 The stress testing results must be discussed in the Risk Management Committee (RMC). Apart from discussions in the RMC, the bank must present detailed findings along with methodologies to the Board of Directors (BoD), following the preparation and reporting of the stress testing results.

11.2 The senior management of the bank must assess the impact of stress testing on accounting profit and loss, regulatory capital and risk weighted assets, liquidity and funding positions.

11.3 Banks shall set triggers and formulate realistic management actions based on stress testing results, having concerns to:

(a) Types of actions and specific circumstances, such as external factors, that make management actions difficult to materialize;

(b) Whether the actions would be aligned with the risk appetite or risk tolerance level set by the board;

(c) Whether the bank has sufficient financial resources and operational capabilities to undertake such management actions; and

(d) Supervisory or regulatory obligations, as well as market limits, might impose constraints.

11.4 Management actions of banks should be based on careful analyses and deliberation by the board and senior management. The range of management actions/interventions may vary depending on the extent of impact and likelihood of stressed scenarios/events. Management actions should be proportionate to the severity of the stress tests' impact, and they may include:

(a) Reviewing the risk appetite or risk tolerance limits and business strategies;

(b) Restructuring, liquidating, unwinding or hedging exposures;

(c) Seeking additional collateral, reducing risk exposures to specific sectors, borrowers and regions;

(d) Reorganizing the asset and liability composition;

(e) Building additional capital or liquidity buffers;

(f) Re-sourcing to central bank funding facilities; and

(g) Implementing contingency plans (including recovery or resolution arrangements).

11.5 Management actions must be approved by the board and senior management, and properly documented. Senior management must ensure effective monitoring mechanisms are in place to promptly activate management actions based on predetermined Management Action Triggers (MATs). Roles and responsibilities must be clearly defined and assigned to ensure prompt reporting to the board and senior management upon the occurrence of any trigger event. RMC will perform periodic reviews of management action activation protocols/procedures to ensure that such management actions are carried out in a timely and orderly manner.

12. Reporting, Communication and Control of Stress-testing results

12.1 The scheduled banks must conduct stress testing at least on quarterly basis i.e. on March 31, June 30, September 30 and December 31. Banks must submit their stress testing reports within the last business day of the following month of each quarter-end by using the specified excel format provided by Bangladesh Bank. The report must include the name, designation, and contact information (preferably cell number) of two concerned officials in case further inquiries arise.

12.2 Banks should properly disseminate the ST framework and findings within the institution to seek feedback from appropriate levels of the hierarchy. Banks should also ensure that the interpretation of ST findings is easily understandable and transparent at all levels.

12.3 Banks are encouraged to include the stress test results, at least those in regard to market risk, in their annual reports to demonstrate their sensitivity and resilience to various types and levels of shocks.

12.4 Banks are advised to keep proper records regarding data used for stress testing and their outcomes, RMC and/or BoD meeting minutes, measures taken to resolve material vulnerabilities, and so on for random verification by Bangladesh Bank inspection teams.

Section 3: Sensitivity Analysis

13. Credit Risk

13.1 The purpose of stress test for the credit risk is to evaluate how both macroeconomic and bank-specific factors affect the bank's financial performance, including capital adequacy and profitability. During an economic downturn, banks face increased risk from several factors such as increase in repayment risk, decline in asset quality, and reduction in collateral value. Conversely, in an economic upturn, there may be a tendency toward underpricing of risks, leading to rapid credit growth in certain high-risk sectors. To manage these, banks should consider adjusting provisions or increasing risk weights on exposures in these sensitive sectors, particularly to account for heightened sectoral credit growth during economic upturns. Given this context, banks should, at a minimum, conduct the following stress tests on their credit portfolios to evaluate resilience against these potential risks.

13.2 Steps for Addressing Credit Risk Shocks by Banks

1. For each shock scenario, determine the additional provisioning requirements, taking into account any eligible collateral that may offset the defaulted portfolio.
2. Apply provisioning rates by classification category in adherence to the regulatory requirements set by Bangladesh Bank from time to time.
3. Compute after-shock Capital to Risk-weighted Assets Ratio (CRAR).

Shock 1: Increase in NPLs

This shock estimates the impact of downgrading a portion of the total performing loans directly to bad and loss category by applying the following three levels of hypothetical shocks:

(i) Minor shock: Increase in Non-performing Loans (NPLs) by either '03 percent' or 'an average of the latest five (05) quarters NPL inflow ratio (NPLIR) of the respective bank', whichever is higher;

(ii) Moderate shock: Increase in NPLs by two times of the percentage determined in the subsection (i) of Shock 1; and

(iii) Major shock: Increase in NPLs by three times of the percentage determined in the subsection (i) of Shock 1.

Following formula should be used to calculate NPL inflow ratio (NPLIR) of each quarter:

$$NPLIR_t = \frac{NPLI_t}{Loans_{t-1} - NPLs_{t-1}}$$

Here,

$NPLI_t$ = NPL inflow or new NPLs during the quarter t

$Loans_{t-1}$ = Total outstanding loans at the end of previous quarter (t-1)

$NPLs_{t-1}$ = Total NPLs at the end of previous quarter (t-1)

Shock 2: Increase in NPLs in top 02 sectors

This shock is applied to the concentration risk particularly in top two (02) sectors, where the bank has the highest investment or exposure. The scenarios of this shock are constituted assuming that a certain portion of performing loans of the top 02 sectors directly downgraded to bad and loss category by applying the following three levels of hypothetical shocks:

(i) Increase in Non-performing Loans (NPLs) by either '03 percent' or 'an average of the latest five (05) quarters' NPLIR of the respective bank', whichever is higher (Minor);

(ii) Increase in NPLs by two times of the percentage determined in the subsection (i) of Shock 2 (Moderate); and

(iii) Increase in NPLs by three times of the percentage determined in the subsection (i) of Shock 2 (Major).

Shock 3: Increase in NPLs due to default of top borrowers

This shock intends to ascertain the risk of credit concentration by assuming that a number of top borrowers of a bank may default due to various reasons creating a shocking event to the bank. Banks should estimate the additional provisioning against the default of their top 2 (Minor), top 3 (Moderate), and top 5 (Major) performing borrowers, selected based on the amount of on- and off-balance sheet exposure. Bank shall calculate the exposure of top borrowers by applying the conversion factors stated in BRPD Circular No.01 dated January 16, 2022. In all cases the performing loans of the respective borrowers are assumed to be directly downgraded to bad and loss category.

Shock 4: Depletion in collateral

This includes three (03) standard scenarios assuming different levels of shocks i.e. depletion in the value of eligible collateral creating shock events to the bank. The standard levels of shocks are 30% (Minor), 40% (Moderate), and 50% (Major) decrease in the value of eligible collateral.

Shock 5: Negative shift in the NPLs categories

The scenarios of this shock are constituted assuming that negative shifts in existing NPLs categories i.e. Sub-Standard (SS) to Doubtful (DF), and DF to Bad and Loss (BL) take place due to some unfavorable domestic and/or cross border incident creating shocking events for the bank which results in some more provision requirements. Three (03) standard shocks are 10% (Minor), 15% (Moderate), and 20% (Major) downward shift in the NPLs' categories.

Shock 6: Negative shift in rating categories

In a downturn, a bank's counterparties may suffer credit rating downgrade awarded by an external credit rating agency or internal credit officers. Banks should estimate the additional provisioning against the negative shift in the rating categories of on- and off-balance sheet exposure by 10% (Minor), 20% (Moderate), and 30% (Major).

14. Market Risk

The stress test for market risk aims to assess the impact of adverse market conditions on the banks' income statement.

Shock 1: Changes in interest rate

Interest rate risk is the potential that the value of the on-balance sheet and the off-balance sheet positions of the bank would be negatively affected by the change in the interest rates. The vulnerability of the bank towards the adverse movements of the interest rate can be gauged by using 2% (Minor), 3% (Moderate), and 4% (Major) changes in interest rate. Banks shall consider only Held-for-Trading (HFT) portion of the securities while calculating the re-pricing impact.

The banks should follow the steps mentioned below in carrying out the interest rate stress tests:

- Calculate all Rate Sensitive Assets (RSA) and Rate Sensitive Liabilities (RSL);
- Plot the RSA and RSL into different time buckets on the basis of maturity;
- Calculate maturity GAP by deducting RSL from RSA (GAP= RSA - RSL); and
- Calculate the impact of interest rate change (Δi) on net interest income (NII) by using the formula of ΔNII =Δi(GAP).

Shock 2: Exchange Rate Shock

The stress test for exchange rate assesses the impact of change in the exchange rate on bank's balance sheet. To assess foreign exchange risk, the overall net exchange position of the bank, including the on-balance sheet and off-balance sheet exposures, shall be charged by 20%, 30% and 40% for minor, moderate and major levels respectively. The overall net exchange position shall be the 'total of the net long positions' or the 'total of the net short positions' whichever is higher following the FE Circular No.03 dated February 07, 2022. The impact of the respective shocks shall be calibrated in terms of the CRAR.

Shock 3: Equity Price Shock

The stress test for equity price risk assesses the impact of a decline in the stock market index on a bank's balance sheet. For this assessment, shocks are applied to all securities listed on stock exchanges, including shares, bills/bonds/debentures, mutual funds, and other similar instruments, whether on-balance sheet or off-balance sheet. The shocks assume a decrease in current market value by 30%, 40%, and 50% for minor, moderate, and major stress levels, respectively. The impact of resultant loss shall be calibrated in the CRAR.

Combined Shock

Banks shall assess the combined shock by aggregating the results of all credit risk and market risk-related shocks. Different weights shall be applied on the changes in CRAR due to different types of shocks. Weights for Increase in NPLs, Increase in NPLs in top 02 sectors, Default of top borrowers, Depletion in collateral, Negative shift in the NPLs categories and Negative shift in rating categories shall be 25%, 0%, 45%, 10%, 10% and 10%, respectively. 100% weight shall be applied for each market risk-related shocks.

15. Operational Risk

Operational risk usually arises from four different sources: people, processes, systems, or external events. In many cases, operational risk occurs outside the banking company (e.g. natural disasters for climate change). Operational risk can never be fully eliminated, and bank management must identify the tolerable level of operational risk. These guidelines, for the time being, kept the adverse impact from such risk beyond consideration of calibration in the CRAR.

Shock 1: Impact of Climate Shock

Bangladesh is one of the most vulnerable countries to the adverse impacts of climate change. Natural disasters like floods may adversely impact the loan portfolio of the banks if they invest in flood-prone areas without taking into account mitigation strategies. This shock assumes that 3% (Minor), 6% (Moderate), and 9% (Major) of climate-vulnerable loans are directly downgraded to bad and loss category.

The banks should follow the steps mentioned below in carrying out the climate risk stress tests:

i) Calculate the total amount of climate vulnerable loans by applying district-wise climate vulnerability index (CVI) mentioned in annexure-1. All the performing loans in a district should be considered to apply the CVI using the following formula:

Bank loans vulnerable to Climate Change = CVI x Total outstanding of performing loans and advances in the respective district

ii) Apply different levels of shocks to determine the amount of additional provision requirement.

16. Liquidity Risk

A bank's liquidity adequacy largely depends on its ability to fulfill obligations during a funding crisis. Therefore, in addition to conducting cash-flow projections to monitor net funding requirements under normal business conditions, banks should perform stress tests regularly by conducting projections based on “what if” scenarios on their liquidity positions to ensure that current liquidity risk exposures remain in accordance with the established liquidity risk tolerance and identify sources of potential liquidity strain.

Shock 1: Withdrawal of deposits over a given period

This shock delineates how many days a bank would be able to withstand a liquidity drain without resorting to liquidity support from outside (other banks or the central bank). The considerable terms for liquidity stress test are as follows:

- Chronic withdrawal of demand and time deposits both in local and foreign currency.
- A bank would be considered as a liquid bank if it could survive consecutive five working days under the stressed situation.

The shock assumes withdrawal of the deposits (both demand and time deposits) in addition to bank's normal withdrawal[1] for consecutive five working days as per the following:

- Additional 2% withdrawal of remaining deposits on Day 1;
- Additional 3% withdrawal of remaining deposits on Day 2;
- Additional 4% withdrawal of remaining deposits on Day 3;
- Additional 5% withdrawal of remaining deposits on Day 4; and
- Additional 6% withdrawal of remaining deposits on Day 5.

The deposit withdrawal amount (cash outflows) should be deducted from the liquid assets (cash inflow), net of CRR and SLR. The remaining level of liquid assets needs to be calculated at the end of each day to assess the bank's liquidity position.

Shock 2: Withdrawal by top depositors

This scenario estimates the impact of deposit concentration on the resilience of a bank by assuming a withdrawal by top depositors. Three different levels of shocks assume complete withdrawals by top 10 (Minor), top 15 (Moderate), and top 20 (Major) depositors respectively. In order to meet the assumed withdrawals, liquid assets would be utilized, and after-shock liquid assets to total assets ratio shall be calculated to assess bank’s ability to withstand the shock.

[1]Normal withdrawal refers to average daily withdrawal of demand and time deposits during the reporting quarter.

Shock 3: Shock to Liquidity Coverage Ratio

The LCR is defined as

$$LCR = \frac{\textit{High-Quality Liquid Assets (HQLA)}}{\textit{Total Net Cash Outflows over the next 30 Calendar Days}}$$

Banks should calculate after-shock LCR by using each of the following three scenarios:

(i) Applying 5% haircut to the value of investments in Government Securities while calculating HQLA and increasing the amount of 'Total Net Cash Outflows' by 5% (Minor);

(ii) Applying 10% haircut to the value of investments in Government Securities while calculating HQLA and increasing the amount of 'Total Net Cash Outflows' by 10% (Moderate); and

(iii) Applying 15% haircut to the value of investments in Government Securities while calculating HQLA and increasing the amount of 'Total Net Cash Outflows' by 15% (Major).

Annexure

Annexure 1: District level CVI from highest vulnerability to lowest vulnerability

Serial No.	District	CVI	Serial No.	District	CVI
1	Patuakhali	0.44	33	Lakshmipur	0.51
2	Bandarban	0.46	34	Narail	0.47
3	Barishal	0.52	35	Pabna	0.51
4	Bhola	0.44	36	Rajshahi	0.51
5	Gaibandha	0.47	37	Manikganj	0.50
6	Rangamati	0.53	38	Jashore	0.50
7	Khulna	0.51	39	Chandpur	0.49
8	Bagerhat	0.43	40	Habiganj	0.44
9	Cox's Bazar	0.53	41	Meherpur	0.47
10	Khagrachari	0.48	42	Rajbari	0.46
11	Netrokona	0.49	43	Magura	0.47
12	Nilphamari	0.46	44	Natore	0.49
13	Barguna	0.48	45	Gopalganj	0.52
14	Dinajpur	0.51	46	Chattogram	0.48
15	Jamalpur	0.51	47	Shariatpur	0.48
16	Kurigram	0.50	48	Kushtia	0.49
17	Mymensingh	0.47	49	Lalmonirhat	0.44
18	Rangpur	0.53	50	Cumilla	0.47
19	Satkhira	0.45	51	Jhenaidah	0.48
20	Sunamganj	0.53	52	Chuadanga	0.52
21	Naogaon	0.55	53	Faridpur	0.47
22	Pirojpur	0.52	54	Joypurhat	0.47
23	Sherpur	0.51	55	Dhaka	0.46
24	Tangail	0.50	56	Sylhet	0.47
25	Thakurgaon	0.43	57	Moulvibazar	0.46
26	Bogura	0.52	58	Feni	0.46
27	Kishoreganj	0.57	59	Narsingdi	0.52
28	Noakhali	0.44	60	Gazipur	0.46
29	Panchagarh	0.49	61	Madaripur	0.46
30	Sirajgonj	0.51	62	Brahmanbaria	0.44
31	Chapainawabganj	0.50	63	Narayanganj	0.42
32	Jhalakathi	0.47	64	Munshiganj	0.41

Source: Climate Vulnerability Index (CVI) for Bangladesh, United Nations Development Program.