



STRESS TESTING MODULE



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MODULE	ST:	Stress Testing
CHAPTER	ST-A:	Introduction

ST-A.1 Purpose

Executive Summary

ST-A.1.1 This Module sets out the Central Bank of Bahrain's ('CBB's') directives and guidance to conventional bank licensees operating in Bahrain on the key requirements of an effective stress testing programme, and describes the CBB's approach to assessing the adequacy of bank stress testing practices. The contents of this Module apply to all conventional banks, except where noted in individual Chapters.

ST-A.1.2 This Module should be read in conjunction with other parts of the Rulebook, mainly:

- (a) Principles of Business;
- (b) High-level Controls;
- (c) Risk Management (credit risk, market risk, operational risk, reputational risk, liquidity risk and interest rate risk in banking book);
- (d) Internal Capital Adequacy Assessment Process (ICAAP); and
- (e) Capital Adequacy.

Legal Basis

ST-A.1.3 This Module contains the CBB's Directive (as amended from time-to-time) relating to Stress Testing and is issued under the powers available to the CBB under Article 38 of the Central Bank of Bahrain and Financial Institutions Law 2006 ('CBB Law'). The Directive in this Module is applicable to all conventional bank licensees (including their approved persons).

ST-A.1.4 The requirements for stress-testing covered in this Module for the purpose of capital adequacy, ICAAP, recovery planning and reverse stress testing apply to Bahraini conventional bank licensees only. Branches of foreign bank licensees should apply the requirements of this Module for risks that are material and to the extent appropriate.

ST-A.1.5 For an explanation of the CBB's rule-making powers and different regulatory instruments, see Section UG-1.1.



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ST-A.2 Module History

Evolution of the Module

ST-A.2.1 This Module is issued in July 2018 as part of Volume One of the CBB Rulebook. The requirements in this Module become effective from the date of issuance. Any material changes that have subsequently been made to this Module are annotated with the calendar quarter date in which the change was made; Chapter UG-3 provides further details on Rulebook maintenance and version control.

ST-A.2.2 The changes made to this Module are detailed in the table below:

Summary of Changes

Module Ref.	Change Date	Description of Changes



MODULE	ST: Stress Testing
CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.1 Overview

ST-1.1.1 This Chapter provides guidance and directives for stress testing and sets out the CBB's expectations and requirements with regards to the governance, coverage of risks, design and implementation of banks' stress testing programmes. The document provides input for supervisory assessment to ensure comprehensive and sound stress testing practice at banks.

ST-1.1.2 Stress testing is an essential risk management tool used to assess a bank's potential vulnerabilities to stressed business conditions. Stress testing involves the use of various techniques to assess a bank's existing and potential vulnerability (typically in terms of its profitability, liquidity and capital adequacy) to 'stressed' business and economic conditions and plays an important role in the management of risk by banks. Effective stress testing enables a bank to quantify adverse unexpected outcomes related to a variety of risks and facilitate the decision to put in place risk mitigation plans to safeguard its safety and soundness. This includes providing a sufficient amount of financial resources (including capital and liquidity) and implementing other risk mitigation strategies that are required to withstand losses arising from a particular stressed scenario.

ST-1.1.3 Stress testing can be used for multiple purposes within the bank. While this Directive is focused on the integrated firm-wide stress testing which serves to identify weaknesses and vulnerabilities in a bank's risk profile and in turn evaluate its capital adequacy and liquidity position under adverse scenarios stress testing should also be conducted for recovery planning and ICAAP. However, the underlying methodologies for scenario development and stress testing should be consistent regardless of whether they are used for firm-wide stress testing, ICAAP or recovery planning.



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CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.2 Developing an Appropriate Stress Testing Framework

General Requirements

ST-1.2.1

Conventional bank licensees must establish a rigorous and forward-looking (i.e. considers a minimum of 3-years projections) stress testing programme that is commensurate with the nature, size and complexity of its business operations, markets it operates in and its risk profile.

ST-1.2.2

The coverage of the stress testing programme must be comprehensive and include on- and off-balance sheet exposures, commitments, guarantees and contingent liabilities. Conventional bank licensees must factor in existing material risks and emerging risks relevant to its business and operating environment.

ST-1.2.3

Stress testing must form an integral part of a Bahraini conventional bank licensee's internal capital adequacy assessment and risk management process. Banks must be able to demonstrate the robustness of the stress testing methodologies used, the quality and comprehensiveness of the data underpinning the stress testing, involvement of relevant stakeholders across Board, senior management, business line, risk and finance control and oversight functions in the design and implementation of the stress test programme, and the use of stress test results by risk management.

ST-1.2.4

Stress testing must also feed into the conventional bank licensee's strategic and business plan.



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CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.2 Developing an Appropriate Stress Testing Framework (continued)

The Board of Directors and Senior Management Oversight

ST-1.2.5 The Board and senior management must ensure that a strong risk culture and governance policy underpins the effective use of stress testing.

ST-1.2.6 Responsibilities of the Board include:

- (a) Approving the policies and procedures governing the stress testing programme, and ensuring sufficient resources and expertise to effectively implement the programme;
- (b) Ensuring that the design of the stress testing programme is consistent with the bank's risk appetite and is appropriate to the nature, scale, complexity of its risk-taking activities and overall business strategy;
- (c) Ensuring that views and inputs from relevant functions and departments are considered in the stress testing programme;
- (d) Providing constructive challenge on the results of stress tests, scenarios, key assumptions and methodologies used in the stress tests;
- (e) Reviewing the appropriateness of management actions proposed by senior management to mitigate potential vulnerabilities, taking into consideration the factors set out in *Section ST-1.6*;
- (f) Approve management actions; and
- (g) Commissioning regular stress testing programme in accordance with *Section ST-1.7*.



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CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.2 Developing an Appropriate Stress Testing Framework (continued)

Senior Management

ST-1.2.7

Responsibilities of the senior management must include:

- (a) Ensuring implementation and monitoring of the stress testing programme;
- (b) Developing stress testing policies and procedures in accordance with Section ST-1.4;
- (c) Participating in the review and identification of appropriate stressed scenarios;
- (d) Ensuring that scenarios are coherent with the risk profile of the bank's business and the market it operates in;
- (e) Ensuring that stress testing methodology is proportional to the scale and complexity of the bank;
- (f) Providing the Board with key information which has a bearing on stress testing exercise. This includes information on assumptions, extent of judgment used and limitations of the stress tests including the quantitative models used;
- (g) Communicating the stress test results in a clear, concise and comprehensive manner for the Board to consider the impact on the bank's strategy, performance and financial condition;
- (h) Developing and recommending appropriate management action plans to the Board to address potential vulnerabilities identified during the stress test exercise; and
- (i) Ensuring there is timely and effective implementation of Board-approved management action plans.

ST-1.2.8

For branches of foreign bank licensees, where no local board of directors exists, all references in this Module to the board of directors should be interpreted as the authorised person(s) at the Head Office/ Regional Office.



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CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.3 Uses of Stress Testing

ST-1.3.1 In order to ensure effectiveness of stress testing, conventional bank licensees should leverage it for the following purposes:

- (a) Provide a forward-looking assessment of risk exposures under stressed conditions, enabling banks to develop appropriate risk-mitigating strategies (e.g. restructuring positions) and contingency plans across a range of stressed conditions;
- (b) Improve the bank's understanding of its own risk profile and facilitate the monitoring of changes in this profile over time;
- (c) Inform the Board and senior management on the setting of the bank's risk appetite or tolerance and the determination of whether its risk exposures are commensurate with the stated risk appetite or tolerance;
- (d) Supplement the use of statistical risk measures (e.g. value-at-risk or economic capital models) which are based mainly on historical data and assumptions, and contribute to the modelling of the risks associated with new products or activities where there is a lack of sufficient historical data. Stress-testing helps quantify "tail" risk (i.e. the risk of losses under extreme market conditions) and re-assessment of modelling assumptions (e.g. those in relation to volatility and correlation);
- (e) Evaluate the bank's existing and potential vulnerabilities on a firm-wide basis (e.g. emerging risk concentrations) and its capacity to withstand stressed situations in terms of profitability, liquidity and capital adequacy;
- (f) Improve the bank's strategic annual business plan, capital plan, liquidity plan and funding plan; and
- (g) Support internal and external communication regarding the bank's risk appetite or tolerance, risk exposures and risk-mitigating strategies.



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CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.4 Policies, Procedures and Documentation

ST-1.4.1

Conventional bank licensees must establish comprehensive policies and procedures governing its stress testing programme which address the following:

- (a) Principal objectives of the stress testing programme;
- (b) Governance including the roles and responsibilities of the Board, senior management, relevant business heads, Risk Management, Operations, Financial Control, Treasury, Compliance and Internal Audit;
- (c) Articulate the risk drivers (external and internal) in testing scenarios;
- (d) Pre-defined frequency for periodic stress testing. In case of ad hoc stress testing, establish criteria or trigger points.
- (e) Methodologies used for stress testing of each risk category and development of relevant scenarios;
- (f) Range of triggers and remedial management actions envisaged vis-à-vis different adverse events;
- (g) Frequency of review and update of the stress testing programme to reflect changing market conditions;
- (h) Reporting procedures; and
- (i) Guidelines on use of stress testing for broader risk management.

ST-1.4.2

Where a third-party model is used in stress testing, conventional bank licensees must demonstrate a thorough understanding of:

- (a) Methodology underpinning the external model;
- (b) The third party's approach to validating the model;
- (c) Approach to implementing the model;
- (d) Rationale behind any adjustments made to the external model's input data sets and output; and
- (e) Limitations of the external model.



MODULE	ST: Stress Testing
CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.5 Stress Testing Approaches and Methodologies

General Requirements

ST-1.5.1

Conventional bank licensees must adopt an integrated approach to stress testing and conduct stress tests on a firm-wide basis and on a consolidated basis where applicable, providing a spectrum of perspectives at product-, business- and entity-specific levels. Where the bank is part of a larger banking group, its stress tests must also take into account the potential spillover effects and inter-dependence among members of the group.

ST-1.5.2

Stress tests must be regularly conducted, at least on a biannual basis. Tests must consider the nature of the risks involved and the purpose of the stress tests. Stress scenarios must be coherently developed so that risks that are inherently linked (e.g. market risk and credit risk) can be assessed together across portfolios and across time. The bank may refer to Section ST-2.2 for any available guidance on stress testing for specific risks.

ST-1.5.3

The conventional bank licensee may also conduct ad hoc stress tests on specific areas whenever this is warranted. The situations which warrant ad hoc stress testing may include market volatility, changes to the risk profile of large counterparties, deteriorating economic conditions domestically or globally, political events, new product development or new market entry, significant changes in business operations and changes in applicable laws and regulations.

ST-1.5.4

The scope of a stress test exercise must reflect the significant activities undertaken by the conventional bank licensee and consider all material risks affecting the bank. The assessment of material risks must include the following major risk categories or activities:

- (a) Credit risk;
- (b) Market risk;
- (c) Interest rate risk in the banking book;
- (d) Liquidity risk, including funding liquidity risk;
- (e) Operational risk; and
- (f) Other material risks.



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ST-1.5 Stress Testing Approaches and Methodologies (Continued)

Methodologies and Techniques

ST-1.5.5

Conventional bank licensees must use a range of quantitative and qualitative stress testing techniques and perspectives, depending on the complexity of risk and adequacy of data.

ST-1.5.6

A quantitative measurement approach must provide the foundation of the stress testing framework. In measuring risks, a conventional bank licensee must establish quantitative approaches that appropriately reflect methodologies and standards that are well accepted in the industry. Quantification of risks and losses must be estimated based on credible data. However, quantitative techniques must be adequately enhanced with qualitative techniques and expert judgment to overcome limitations in data and systems. Meaningful qualitative techniques must be developed for stress testing risk factors that are not easily quantifiable.

ST-1.5.7

Conventional bank licensees must ensure that the data used for stress testing is representative of, and bears similar risk characteristics to, the specific products or risk profile of the bank. In cases where there are data limitations, proxy estimates can be used. However, banks must apply a margin of conservatism to proxy estimates.

ST-1.5.8

Conventional bank licensees must use, based on its risk profile, a suitable range of stress testing methodologies to ensure that its stress testing programme is comprehensive. In conducting scenario analysis, banks must assume a dynamic balance sheet rather than a static balance sheet. Banks must project growth (or decline) in balance sheet size under the chosen stressed conditions.

ST-1.5.9

A sensitivity analysis estimates the impact of a single risk factor or a small number of closely-related risk factors (e.g. interest rates, FX rates, real estate price, equity price etc.) on asset value, asset quality, earnings, capital or liquidity ratios. In most cases, sensitivity tests involve changing inputs or parameters without relating those changes to an underlying event or real-world outcome. While it is helpful to draw on extreme values from historical periods of stress, sensitivity tests should also include hypothetical extreme values to ensure that a wide range of possibilities are included.



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ST-1.5 Stress Testing Approaches and Methodologies (Continued)

ST-1.5.10 A scenario analysis simulates the impact of a combination of risk factors on the bank's profitability, capital adequacy and liquidity. The adverse movements of risk factors is usually driven by macroeconomic or political events, financial market movements, deterioration in industry fundamentals or a bank-specific event. These stress scenarios can be based on historical or hypothetical events (see Section ST-2.3).

ST-1.5.11 Stress tests should also account for interactions between credit, funding and asset market conditions in a stressed scenario. The following interactions may be considered:

- (a) Credit deterioration of obligors leading to a reduction in cash inflows;
- (b) Price shocks for specific asset categories (for example, fire sales and significant mark-to-market losses) resulting in the drying up of liquidity for such assets;
- (c) Reduction of eligible high quality liquid assets ('HQLA') due to issuer downgrades;
- (d) Increase in bank's liquidity needs as a consequence of higher drawdown of committed credit lines (for example, higher crystallisation of undrawn credit lines);
- (e) Additional posting of collateral or margin due to a downgrade of the bank's credit rating or adverse price movements; and
- (f) Restricted access to secured or unsecured funding markets due to a deterioration in the bank's financial strength and credit rating.

Reverse Stress Testing

ST-1.5.12

Apart from assessing and being prepared to respond to stressed conditions, **Bahraini conventional bank licensees** must also be aware of the scenarios that can render its business non-viable, due to severe financial or reputational damage. Banks must, therefore, implement a reverse stress testing program to identify the scenarios or events that can threaten the viability or solvency of the bank.

ST-1.5.13 Reverse stress tests start from a known stress testing outcome, such as a breach of regulatory capital ratios, illiquidity, insolvency, or the cancellation of banking licence, and then work backwards to identify the events that could lead to such an outcome for the bank.



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ST-1.5 Stress Testing Approaches and Methodologies (Continued)

ST-1.5.14

Reverse stress testing must serve as a starting point for determining the scenarios for recovery planning. Given that stress testing helps in understanding the quantum and the direction of impact of various scenarios on the Bahraini conventional bank licensee's critical risk metrics, the process of defining the recovery triggers must also be informed by stress testing

Expert Judgment

ST-1.5.15

Conventional bank licensees must ensure qualitative judgment and perspective from relevant experts such as risk controllers, economists, business managers and traders within the bank are incorporated into the stress testing programme to help supplement the mechanical analysis performed by models, assess the impact of extreme events which are difficult to model statistically because, by definition, they occur very rarely and analyse and respond to fast-changing market conditions.

ST-1.5.16

The designated unit responsible for managing and coordinating the stress testing programme should facilitate internal dialogue and debate among the relevant experts and take into account their opinions, as appropriate, in the design, implementation and use of the stress tests.

Alignment with Recovery Planning Program

ST-1.5.17

Bahraini conventional bank licensees must test their recovery plan against three types of scenario at a minimum:

- (a) Idiosyncratic scenario;
- (b) Market-wide scenario; and
- (c) Scenario with a combination of both components.

ST-1.5.18

Bahraini conventional bank licensees must adopt more than one scenario within each of the three scenario types.



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ST-1.6 Stress Testing Results and Management Actions

ST-1.6.1

Bahraini conventional bank licensees must evaluate the impact of stress tests against accounting profit and loss, impairment provisions, risk weighted assets ('RWA'), regulatory capital, liquidity and funding gaps.

ST-1.6.2

Bahraini conventional bank licensees may also use other measures to gauge the impact of stress tests depending on the purpose of the stress test, as well as the risks and portfolios being analysed including:

- (a) Asset values;
- (b) Economic or risk-adjusted profit and loss; and
- (c) Economic capital requirements.

ST-1.6.3

In response to the stress tests results, conventional bank licensees must formulate realistic management actions considering:

- (a) Type of actions and specific circumstances, including external conditions, under which the management actions are unlikely to be feasible. This includes a consideration of factors listed in Paragraph ST-1.6.6;
- (b) Whether the actions would be consistent with the risk appetite or tolerance level set by the Board;
- (c) Whether the bank has adequate financial resources and operational capabilities to undertake such management actions; and
- (d) Constraints by supervisory or regulatory requirements, or market restrictions.



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ST-1.6 Stress Testing Results and Management Actions (Continued)

ST-1.6.4 Management actions should be based on careful analysis and deliberation by the Board and senior management. The range of management actions may vary depending on the magnitude of impact and likelihood of stressed scenarios. Actions pursued should be proportionate to the severity of the impact of the stress tests and may include:

- (a) Reviewing the risk appetite or limits and business strategies;
- (b) Restructuring, liquidating, unwinding or hedging exposures;
- (c) Seeking additional collateral, buying credit protection or reducing risk exposures to specific sectors, countries and regions;
- (d) Tightening underwriting standards;
- (e) Adjusting the asset and liability composition;
- (f) Building additional capital or liquidity buffers;
- (g) Implementing recovery or contingency plans; and
- (h) Recourse to central bank funding facilities.

ST-1.6.5

Management actions must be approved by the Board and senior management and clearly documented. Senior management must ensure effective monitoring mechanisms are in place to promptly activate management actions based on established triggers. Clear roles and responsibilities must be assigned to ensure prompt escalation to the Board and senior management upon the occurrence of any trigger event. Reviews must be periodically conducted to ensure that such management actions are executed in a timely and orderly manner.



MODULE	ST: Stress Testing
CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.6 Stress Testing Results and Management Actions (Continued)

ST-1.6.6 The following are examples of factors that may be considered in formulating the management actions during stressed conditions:

- (a) Time required for full implementation, considering expected time for the management action to take effect, such as improvement of asset quality due to tightening of underwriting standards;
- (b) Legal restrictions and impediments that may affect financial resources to be relied upon, such as cross border transfers of capital to entities within the group;
- (c) Elevated cost associated with additional borrowings and risk of undersubscription when issuing debt or raising capital;
- (d) Limited access to funding markets and reduced market liquidity for assets to be disposed of as well as increased volatility which may further depress the price of these assets;
- (e) Loss of revenue and market share arising from any proposed reduction in lending activities;
- (f) Reputational risk and potential negative market reaction caused by ceasing discretionary coupons or exercising convertibility provisions of capital instruments; and
- (g) The potential response of other banks and market participants to a given scenario and the consequential impact on asset and funding markets.



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CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.7 Interpretation and Communication of Stress Testing Results

ST-1.7.1 Stress testing provides a more comprehensive view of risks and vulnerabilities that a Conventional bank licensee is exposed to. To ensure that the stakeholders within the bank and the CBB can interpret the results accurately, the bank should provide supporting information which includes scenario assumptions, model methodologies, model assumptions and limitations.

ST-1.7.2 Stress testing estimates the exposure to a specified stress event or scenario, but does not give the probability of such an event or scenario occurring. Moreover, stress testing is influenced by the judgment and experience of the experts designing the stress tests. The effectiveness of stress testing therefore, depends, in particular, on whether the bank has chosen the 'right' scenarios for stress testing, interpreted the results properly and taken the necessary steps to address the results.

ST-1.7.3 Conventional bank licensees must be aware of the limitations when interpreting the results of stress tests.

ST-1.7.4 Conventional bank licensees must submit the stress test results to the CBB biannually on 31st May and 30th November. The submission must include:

- (a) Description of the risks, exposures and entities covered;
- (b) Description of the scenarios and the rationale for it;
- (c) Prevailing and projected macro-economic conditions, as well as justifications for assumptions used;
- (d) Description of the methodologies used, including justifications for any material changes to the previous methodologies adopted;
- (e) Impact on the profitability, capital adequacy and liquidity, as well as on all material risk indicators; both absolute amounts and key financial ratios must be reported;
- (f) Description of management actions that have been considered and an assessment of their reasonableness;
- (g) Assessment on areas of vulnerability and the associated risk factors. The assessment must be at a sufficient level of granularity to provide a meaningful understanding of the vulnerable areas (for instance, business line, geographical sectors, economic sectors or sub-sectors, market segments, borrower groups) and the causes of stressed losses;
- (h) Extract of minutes of the Board and/or any other related sub-committee meetings on the deliberation on the stress tests and reverse stress test results; and
- (i) Assessment and results of independent reviews, where such a review has been conducted.



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CHAPTER	ST-1: General Guidance on Stress Testing

ST-1.7 Interpretation and Communication of Stress Testing Results (Continued)

ST-1.7.5

The reporting of stress test results by conventional bank licensees must, at minimum, cover a 3-year horizon based on the following scenarios:

- (a) One market-wide (systemic) stress scenarios;
- (b) One bank-specific (idiosyncratic) stress scenarios; and
- (c) A combination of systemic and idiosyncratic stress scenarios.

ST-1.7.6

In order to arrive at a comprehensive assessment of a conventional bank licensee's stress testing programme, the CBB will, where necessary, engage in discussion with the Board or senior management on the programme, particularly in respect of the following:

- (a) Their views on major macroeconomic and financial market vulnerabilities and relevant threats specific to the bank's operation and business model; and
- (b) Their justifications for various aspects of the stress testing programme and the methodology employed, such as the key assumptions driving the stress-testing results, the scope and severity of the firm-wide scenarios used, and how the stress-testing results are, in practice, being used.

ST-1.7.7

The CBB may also require the conventional bank licensees to conduct additional sensitivity analysis in respect of specific business lines, portfolios or positions which pose significant risk to the bank. Furthermore, the banks may be required to evaluate scenarios under which their viability is compromised (e.g. reverse stress testing scenarios), or to assess the plausibility of events that lead to significant strategic or reputational risk, particularly for significant business lines or products.

ST-1.7.8

Conventional bank licensees must provide a detailed plan of corrective actions and follow-up on its implementation, in the event that the CBB assessment reveals material shortcomings in the bank's stress testing programme (or that the results generated from the programme are not adequately attended to or acted upon).



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ST-1.8 Independent Review

ST-1.8.1

Conventional bank licensees must ensure that the stress testing framework is subject to independent review by a third party consultant, other than the external auditor upon first implementation of the requirements in this Module, and subsequently, when there are material changes in the relevant Rulebook requirements or to the business conducted by the bank and/or its risk profile.

ST-1.8.2

The independent reviews must cover the following:

- (a) Effectiveness of the stress testing programme in meeting its intended purposes, and the requirements of this Module;
- (b) Adequacy of management oversight and approval process;
- (c) Adequacy of documentation for the programme;
- (d) Comprehensiveness of risk exposures captured by the programme, and the methodologies, scenarios and assumptions used;
- (e) Verification of the quality of data sources used to run the stress tests (e.g. in terms of accuracy, consistency, timeliness, completeness and reliability);
- (f) Implementation of the programme, as well as subsequent authorization for, and implementation of, significant changes or development work (e.g. to take account of changes in bank's business strategies, risk characteristics or external environment);
- (g) Integration of stress testing into risk management and decision-making processes at appropriate management levels, including capital and liquidity planning;
- (h) Integrity of management information and reporting systems for the stress tests; and
- (i) Validation of stress testing results, such as through backtesting historical scenarios (e.g. the 2008/09 Global Financial Crisis and the 1997 Asian Financial Crisis) and their impact on a bank's portfolio, or benchmarking with other stress tests conducted within and outside the bank.



MODULE	ST: Stress Testing
CHAPTER	ST-2: Major Risks and Stress Scenarios

ST-2.1 Risks and Stress Scenarios

ST-2.1.1 This chapter outlines various risk factors and stress scenarios which the conventional bank licensees should take into account in their stress testing programme.

ST-2.1.2

Conventional bank licensees must identify stress scenarios and risk factors which are aligned to the nature and complexity of the business and markets they operate in. They must ensure that important risk factors or relationships between these factors are not omitted from the stress testing analysis. The risk factors identified will form the basis for developing stress scenarios. Banks must ensure that they have the capacity to conduct integrated stress tests by using a combination of the stress scenarios most relevant to their risk profiles and activities, covering the major types of risk to which they are exposed.



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CHAPTER	ST-2: Major Risks and Stress Scenarios

ST-2.2 Risk Factors

ST-2.2.1

A key step in the stress testing process is the identification of major risk factors that should be stressed. In drawing up the list of risk factors, conventional bank licensees must understand the risk characteristics of their exposures and analyse the relevant risk factors, as well as the correlation (and potential for change in correlation) between these factors.

ST-2.2.2 Highlighted below are some examples of risk factors that may be relevant to the conventional bank licensees:

- (a) Credit risk characterised by an increase in default probabilities (e.g. the rise in delinquencies and charge-offs); a decline in recovery rates or in the value of supporting collateral; a rating migration of counterparties, issuers or credit protection providers; and worsening of credit spreads. Banks should be aware of the major drivers of repayment ability (such as economic downturns and significant market shocks) that will affect all classes of counterparties or credits;
- (b) Concentration risk in terms of the large chunks of exposures to individual counterparties, products/-instruments, industries, market sectors, countries or regions which are driven by the same risk factors. Banks should also assess the contagion effects and possible linkages (and the potential changes in such interrelationships, both over time and in times of stress) which may lead to a disproportionate increase in risk exposure;
- (c) Interest rate risk arising from parallel shifts or twists in the yield curve and the increase in basis risk (i.e. changes in relationships between key market rates);
- (d) Market or price risk arising from adverse changes in the price or fair value of assets (e.g. currencies, equities, commodities or other financial instruments and their derivative positions) and their impact on relevant portfolios and markets;
- (e) Liquidity risk as a result of the tightening of credit lines, tightening of secured or unsecured funding markets, market liquidity for certain asset classes, the triggering of obligations to provide additional collateral or margin under credit support agreements or unexpected increase in drawdown of credit lines and deposits;
- (f) Operational risk (including legal risk) caused by various factors, such as internal or external fraud, system failure and security risks (e.g. in respect of transactional e-banking services), and litigation cases that may lead to material monetary loss or reputational impact on the bank concerned, if the outcome is not in its favour;
- (g) Strategic risk resulting from events or changes in the environment that could adversely alter the original assumptions made in the strategic plan and any potential threats to a bank's business, both financially and non-financially;



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CHAPTER	ST-2: Major Risks and Stress Scenarios

ST-2.2 Risk Factors (Continued)

- (h) Reputational risk stress testing in terms of identifying scenarios (may be due to misconduct, financial crime, market view about the stability of the bank) which will have a negative reputational impact and, in turn, result in increased credit risk (e.g. run on the bank), liquidity risk (tightened access to funding markets) or market risk (drop in equity value).
- (i) Product-specific risks, such as prepayment risk for mortgages, or securitized portfolios. Other potential risks may also arise from abnormal market movements and their impact on contingent credit exposures (e.g. derivatives) and complex products (e.g. structured products with embedded multiple risks);
- (j) System-wide interactions and feedback effects that reflect the impact of likely behavioural responses of other market participants and their counterparties on the broader market in times of stress, and how that impact will feed back to the bank's own positions;
- (k) Macroeconomic factors (e.g. gross domestic product ('GDP') growth, change in property prices, unemployment rate and inflation or deflation rate) and their impact on other risk factors; and
- (l) Political and economic factors pertaining to industries, regions and markets.



MODULE	ST: Stress Testing
CHAPTER	ST-2: Major Risks and Stress Scenarios

ST-2.3 Stress Scenarios

Credit and Counterparty Credit Risk

ST-2.3.1 The following are examples of stress scenarios relating to credit risk and counterparty credit risk:

- (a) Domestic economic downturn – this estimates the impact on a bank’s asset quality, impairment provisions, profitability and capital adequacy of adverse changes in selected macroeconomic variables (e.g. GDP growth, unemployment rate, interest rates, bankruptcy rates and asset prices etc.) that are relevant to the bank’s exposures;
- (b) Economic downturn in major economies affecting Bahrain (e.g. U.S., Saudi Arabia, UAE etc.) – this estimates the impact on a bank’s counterparty exposures (e.g. corporate loans, holdings in securities, interbank exposures etc.) as a result of economic downturn in major economies that have significant financial/commercial/trading links with Bahrain;
- (c) Decline in the real estate market – this estimates the impact of a decline in property prices on collateral coverage, default risk and provisioning needs for loans secured by properties;
- (d) Decline in the value and market liquidity of financial collateral – this estimates the impact of a decline in the valuation and market liquidity of financial collateral, which reduces the quality and quantity of the collateral, leading to lower collateral coverage and recovery rates and higher provisioning needs and capital charges;
- (e) Increases in non-performing loans (‘NPL’) and provisioning levels – this assesses the resilience of a bank’s loan portfolios in terms of the impact of such increases on its profitability and capital adequacy. In designing the scenario, the bank may apply different percentages of increase in classified loans and provisioning levels to its loan portfolios;
- (f) Rating migration of counterparties – a test based on the internal or external credit ratings of bank’s credit exposures, by migrating a certain percentage of the credit exposures of a specific rating grade (by one or more notches) to a lower rating grade, and assessing the resultant impact on a bank’s profitability and capital adequacy. The capital impact may include the effects of increases in credit losses and provisioning needs, as well as the application of higher risk-weights due to rating downgrades in the calculation of regulatory capital; and
- (g) Default of major counterparties – this estimates the impact of default of a bank’s major counterparties, including corporate, sovereign and bank counterparties, on its profitability, as well as liquidity and capital adequacy. The test can be extended to cover aggregate exposures to major industries, market sectors, countries and regions (e.g. by assuming that a significant number of defaults occur within such aggregate exposures).



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ST-2.3 Stress Scenarios (Continued)

ST-2.3.2 For the purpose of stressed expected loss, default probabilities should be point in time estimates. For a three year stress testing time horizon the bank should estimate the metric for 12th, 24th and the 36th month from the reporting date. This PDs should be cumulative.

Interest Rate Risk in Banking Book

ST-2.3.3 The following are examples of stress scenarios relating to interest rate risk in the banking book:

- (a) *'gap risk'* arises from the term structure of banking book instruments, and describes the risk arising from the timing of instruments' rate changes. The extent of gap risk depends on whether changes to the term structure of interest rates occur consistently across the yield curve (parallel risk) or differentially by period (non-parallel risk);
- (b) *'basis risk'* describes the impact of relative changes in interest rates for financial instruments that have similar tenors but are priced using different interest rate indices; and
- (c) *'option risk'* arises from option derivative positions or from optional elements embedded in the bank's assets, liabilities and off-balance sheet items, where the bank or its customer can alter the level and timing of their cash flows. Option risk can be further characterized into automatic option risk and behavioral option risk.

Liquidity Risks

ST-2.3.4 The following are examples of stress scenarios relating to liquidity risk:

- (a) Tightening of credit lines - the potential impact of liquidity stress on the solvency position arising from a higher cost of funding due to tightening of wholesale and deposit/funding markets, and loss in the value of marketable securities due to market illiquidity;
- (b) Funding concentration – this assesses the liquidity risk of significant business activities and concentration to a particular source of funding, such as large depositors/funding providers, investment account holders, wholesale market funding or holdings of a particular asset class; and
- (c) Withdrawal risk of investment account holders ('IAH')/deposit outflows – this assesses the liquidity risk arising from honouring redemptions by investment account holders of unrestricted investment accounts at the level of individual funds in case of Islamic windows.



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ST-2.3 Stress Scenarios (Continued)

Market Risks

ST-2.3.5 The following are examples of stress scenarios relating to market risk:

- (a) Increased volatility in key financial markets assesses the effects of increased volatility and adverse movements of market risk factors (i.e. interest rates, foreign exchange rates and equity or commodity prices) on a bank's market risk exposures;
- (b) Effect of key monetary decisions by the CBB, which might impact stock prices, FX rates and interest rates;
- (c) Effect on the bank arising from a rating downgrade of sovereign, leading to widening of credit spreads and a fall in equity prices; and
- (d) Structural changes to the economy of the main countries in which the bank operates.

Other Risks

ST-2.3.6 The following are examples of stress scenarios relating to other risks:

- (a) Decline in net interest income – this estimates the impact on the bank's net interest income due to negative loan growth or squeezes in pricing caused by competition for new business or market share;
- (b) Risk concentrations – this estimates the impact from changes in market conditions which could give rise to risk concentrations. Banks may identify and assess the impact of heightened correlations or hidden inter-dependencies within and across risk types/risk factors, and possible second-round effects under severe market shocks that may lead to an increase in bank's exposures; and
- (c) Operational risk events – this assesses the effects, on a bank's capital requirement for operational risk, or its ability to maintain critical operations and earning capabilities, of external events (e.g. external fraud, vendor failure, utility outage and service disruption) or internal events (e.g. internal fraud, business disruption or system failures, telecommunication problems and loss of key personnel).