



STRESS TESTING GUIDELINE

1. INTRODUCTION

The Central Bank of Barbados (Bank), in furtherance of its responsibility for the regulation and supervision of licensees under the Financial Institutions Act 1996-16 and the International Financial Services Act 2002-5, has developed this Guideline on stress testing to provide licensees with guidance on developing and incorporating stress testing into their overall risk management programs.

Changes in financial, macroeconomic or even political conditions may have an adverse impact on a licensee's profitability and capital adequacy. Stress testing can form an integral part of a licensee's risk management process. By estimating the exposure to stress events, both mild and extreme, and evaluating the capacity of capital to absorb potential large losses stemming from stressed conditions, licensees should improve their understanding of their risk profile and develop appropriate strategies to mitigate against risks.

Licensees are encouraged to supplement the use of statistical and other measures of risk used to quantify risk exposure by implementing rigorous and comprehensive stress testing programs appropriate to the nature and complexity of their business activities. While stress testing estimates the exposure to stress events, it does not yield the probability of the occurrence of such events. Moreover, testing is judgemental and licensees should recognise the limitations of the results.

2. APPLICATION

This Guideline applies to all entities licensed under the Financial Institutions Act 1996-16 and the International Financial Services Act 2002-5. Branches of foreign international banks that are not subjected to the capital adequacy framework are required to stress against earnings or other performance measures. Stress tests performed by a licensee's head office for the group may substitute for local stress tests if it can be demonstrated that the tests reflect the risk characteristics of the licensee's portfolio.

3. THE ROLE OF THE BOARD OF DIRECTORS AND SENIOR MANAGEMENT

The Board of Directors (Board) and senior management should exercise effective oversight of the stress-testing programme. As part of the licensee's risk management framework, the programme can help set and evaluate strategic plans as well as provide assistance in the setting of limits and the development of appropriate risk mitigating policies and contingency plans to address the various risk exposures of the licensee. Stress testing should be integrated into the risk management of the licensee.



3.1 Board of Directors

The Board of the licensee is ultimately responsible for its risk management framework and the policies and procedures put in place to mitigate against risk. The Board needs to provide adequate oversight of the stress-testing program implemented by senior management. At a minimum, the Board should:

- a. Review and approve the stress-testing policy/program;
- b. Monitor the results of the stress testing and assess the adequacy of remedial actions and contingency planning to mitigate or reduce the risk exposures;
- c. Utilize the results of the stress testing in the formulation of various operational policies; e.g. to determine the adequacy of counterparty limits or contingency planning; and
- d. Ensure that there is an independent review of the program. This review should include an assessment of the validity of the underlying assumptions used to develop the stress test and the adequacy of the test given the complexity of the business activity of the licensee.

3.2 Senior Management

Senior management is responsible for the daily management and control of the licensee's risk exposures and should be actively involved in developing the stress-testing program. Senior management is responsible for reviewing the licensee's activities to determine its risk profile and hence the underlying assumptions that will form the basis of the stress tests performed.

The size and complexity of a licensee's business activity may result in individual stress tests for various business functions. It may be necessary, therefore, to aggregate individual stress tests so as to assess the overall potential impact on capital and profitability. Stress-testing programs will differ for individual licensees, but management is responsible for:

- a. Compiling a list of major risk factors stemming from a review of the licensee's business activity and external environment;
- b. Documenting the assumptions underlying the stress tests and how these were derived;
- c. Designing stress tests that are institution-wide, that cater to major types of risk and that are appropriate to the licensee's business activity and risk profile;
- d. Conducting stress tests regularly and analyzing the results so as to identify potential vulnerabilities and risks. Stress tests should be conducted at suitable intervals having regard to the nature of the risks involved. This may result in some areas having more frequent stress tests due to their volatility;
- e. Determining and documenting appropriate remedial actions to be taken to address potential risks identified from the stress testing;
- f. Designating specific responsibility and levels of authority for the implementation of remedial actions. Levels of authority should be determined according to the risk and the potential impact on the licensee's financial stability;
- g. Implementing an adequate management information system that would support stress testing and that has the ability to aggregate individual stress tests;



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- h. Providing the Board with a summary report outlining the stress test results and the corrective actions taken;
 - i. Assessing on a regular basis the appropriateness of the current stress tests and assumptions used to ensure that they are still relevant to the licensee, based on its changing risk characteristics as well as those in the external environment. This assessment should cover, inter alia,
 - i. the adequacy of documentation;
 - ii. the scope of the exposures captured
 - iii. the integrity of the management information system;
 - iv. the accuracy and completeness of the position data; and
 - v. the consistency, timeliness and reliability of the data sources used in the stress testing.
 - j. Ensuring that any changes to the stress testing methodology and procedures due to its review are documented and approved; and
 - k. Ensuring that all documentation is retained in accordance with governing legislation or internal policies which ever is longer.

Additionally, management should employ the back testing of historical events as a method to validate the results garnered from its stress-testing program. This allows management to evaluate the results of the stress testing by allowing it to compare the level of risk exposure to an actual past event. It should be noted, however, that implicit in the use of back testing is the underlying assumption that the future will reflect the past and as such management will need to recognise that the past may not serve as a good predictor when interpreting and comparing the result of the stress testing and back testing.

4. STRESS TESTING PROGRAM

The actual stress-testing program at individual licensees will differ due to the complexity of their business activities, but a robust and comprehensive stress-testing program should entail:

- a. A review of the licensee's business activity and external environment. This process should result in the identification of the major risk factors that implicitly impact on the licensee and should cover, as far as possible, on and off-balance sheet positions of all major portfolios in the trading book and in the banking book. Examples of some risk factors to which most licensees are exposed are captured in Appendix 1.
- b. The design of appropriate stress tests, based on the identification of risk factors and the complexity of the portfolio. Stress tests should be both quantitative and qualitative in nature. An example of a quantitative test would include, inter alia, the identification of plausible stress scenarios, preferably with different levels of severity, to which licensees could be exposed. Qualitative tests should evaluate the capacity of the licensee's capital to absorb potential large losses and identify steps that could be taken to mitigate its risks and preserve capital.
- c. The documentation of the underlying assumptions used in the stress tests and how these were derived.



- d. The identification and documentation of appropriate types of remedial actions to be implemented to address potential risks highlighted from the stress tests. The licensee should consider the use of triggers to determine the type and extent of remedial actions given the risk exposure. The type of remedial action taken will vary depending on the nature and severity of the risk.
- e. An adequate management information system to accommodate the stress testing. This system should be capable of running stress tests on different portfolios and business units and have the ability to aggregate the stress tests for the licensee as a whole.

5. STRESS-TESTING TECHNIQUES

Licensees are expected to employ stress-testing techniques that are most appropriate to the size and complexity of their business activities. In general, the main stress testing techniques are sensitivity tests and scenario analysis.

5.1 Sensitivity Tests

These estimate the impact on a portfolio's value due to predefined movements in a single risk factor or a set of closely related risk factors (e.g. yield curve). These tests can be run relatively quickly and form an approximation of the impact on the licensee of a move in a financial variable.

5.2 Scenario Analysis

A scenario analysis measures the combined effect of adverse movements in a number of risk factors (e.g. equity prices, interest rates, foreign exchange rates). The aim of scenario analysis is to estimate the impact on the licensee financial position, for instance what is the impact in terms of profitability, capital, asset quality, liquidity etc.

In utilizing this technique, licensees must be mindful of the correlations between the various risk factors and ensure that these are taken into consideration when developing the underlying assumptions used in the stress scenarios. The stressed scenarios can either be based on historical or hypothetical events and should reflect the risks factors that are integral to the licensee's business activity. Additionally, these scenarios should reflect varying levels of adversity, for instance mild, medium and severe. In assessing the impact of these scenarios, the licensee should seek to compare these stressed outcomes with what is expected under normal conditions.

As noted, the stress testing performed will be dependent on the level of complexity of the business activity. The following are examples of various stress scenarios that may be applicable to the given licensee.



5.2.1 Credit Risk Stress Scenarios

The following are examples of stress scenarios related to credit risk.

- a. Decline in asset quality – this assesses the impact on the licensee’s profitability and capital due to increases in classified loans and provision. In designing this scenario, the licensee may seek to apply varying percentages of increase in its classified loans and provisioning level to its loan portfolio.
- b. Failure of major counterparties – this has implications for profitability, liquidity and solvency. In designing this scenario, the licensee may want to estimate the impact of one or more of the major counterparties defaulting.
- c. Large exposures and concentrations – this assesses the impact on the licensee’s profitability and liquidity due to losses resulting from default in large loans or default in aggregate exposures to major industries/markets, geographic locations or loan types. In designing this scenario, the licensee may want to assess the impact of one of its large loans or loans to a major sector defaulting.
- d. Domestic economic downturn – this estimates the impact of adverse changes in selected macroeconomic variables (e.g. GDP growth, unemployment rate etc.) on a licensee’s asset quality, profitability and capital adequacy.

5.2.2 Market Risk Stress Scenarios

The following are examples of stress scenarios related to market risk.

- a. Repricing risk – this assesses the effects on a licensee’s profitability due to timing differences in interest rate changes and cash flows related to fixed and floating rate assets, liabilities and off-balance sheet instruments.
- b. Basis risk – this assesses the effect on a licensee’s profitability due to unfavourable differential changes in key market rates.
- c. Yield curve risk – this assesses the effects on a licensee’s profitability due to parallel yield curve shifts (up and steepening or flattening of the yield curve).
- d. Option risk – this assesses the effects of changes in the value of both stand-alone option instruments (e.g. bond options) and embedded options (e.g. bonds with call or put provisions and loans which give borrowers the right to prepay outstandings) due to adverse interest rate movements.
- e. Adverse changes in exchange rates between major currencies – this estimates the impact on a licensee’s net open positions in major currencies.
- f. Decline in market value of financial instruments – this estimates the impact of adverse changes in market prices (e.g. exchange rates or interest rates) and liquidity conditions on the market values of financial instruments (e.g. corporate bonds and derivatives).



5.2.3 Liquidity Stress Scenarios

The following are examples of stress scenarios related to liquidity.

- a. Significant changes in client behavior – this analyses the adequacy of the licensee’s short-term liquidity to meet large withdrawals of deposits or increased drawdown of commitment lines. The licensee may want to adopt behavioral assumptions for borrowers and depositors.
- b. Downgrade in the licensee’s credit rating – this estimates the impact on earnings due to increased cost of funds.

5.2.4 Other Stress Scenarios

The following are examples of other stress scenarios that could be performed.

- a. Decline in net interest income – this estimates the impact on licensee’s net interest income due to negative loan growth or squeezes in pricing caused by competition for new business.
- b. Business disruption or system failures – this assesses the effects of such disruptions or failures (e.g. hardware and software failures, telecommunication problems and utility outages).

Appendix 2 provides an illustration of some typical stress scenarios that would arise from some of the main risk areas of licensees. It should be noted that the scenarios are for illustrative purposes only, and each licensee is expected to develop its own stress scenarios based on the specific characteristics of its business activities.

6. ROLE OF THE REGULATOR

Licensees are expected to develop stress-testing programmes that are appropriate to the nature and complexity of their business activity. As regulator, the Bank will periodically evaluate the appropriateness and effectiveness of the stress test conducted by licensees. In reviewing a licensee’s stress-testing program, the Bank will pay attention to:

- a. The level of oversight exercised by the Board and senior management over the stress-testing program and the results generated;
- b. The complexity and level of risks of the licensee’s business activities and the adequacy and sophistication of the corresponding stress tests employed;
- c. Suitability of the underlying assumptions used in the stress tests;
- d. Capacity of the licensee’s capital and earnings to absorb potential losses under stressed situations and the strategic plans to close any highlighted gaps;
- e. The adequacy of the risk management policies and stress-testing procedures;
- f. The adequacy of the contingency planning developed to mitigate risks associated with the occurrence of a given stress scenario; and
- g. The adequacy of the licensee’s internal review/audit of the stress-testing program.



The Bank may request licensees to perform additional stress tests on areas it considers important to the financial system's overall stability. The stress testing data and results collected from individual licensees may be used to help evaluate the vulnerabilities and soundness on the financial sector.



Appendix 1

Stress Test Risk Factors

Licenses are expected to identify their own risk factors based on the nature of their business activity. This list is illustrative only of the risks that licenses may consider in designing their stress tests.

1. Credit risk and counterparty risk;
2. Concentration risk as it relates to exposures to individual counterparties, industries, market sectors, countries or regions;
3. 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);
4. Market or price risk arising from adverse changes in asset prices (e.g. currencies, equities, commodities, bonds and real estate) and their impact on relevant portfolios and markets;
5. Liquidity risk;
6. Operational risk caused by various factors such as internal or external fraud, system failure and security risks; and
7. Macro-economic factors (e.g. GDP growth, change in property prices, unemployment rate and inflation or deflation rate) and their impact on other risk factors.



Appendix 2

Examples of Stress Scenarios

This appendix illustrates how a few sensitivity tests can be put together to form a scenario analysis. The figures used in the table are for illustration only; licensees are expected to develop their own assumptions on which to base their sensitivity test and stress scenarios. The table represents increasing level for a stress period moving from mild to severe, and in general represents a period of one year. The actual time frame (e.g. 3 month, 6 months) used by a licensee should reflect its risk profile and the volatility of the risk factors being stressed. The stress scenario should include both on and off-balance sheet exposures.

Scenario Components	Stressed Items	Stress Scenario		
		Mild	Medium	Severe
Retail exposures	Specific provisions / direct write offs	Increase by 50%	Increase by 100%	Increase by 150%
Corporate exposures	Classified loans	Increase by 50%	Increase by 100%	Increase by 150%
	Specific provisions	40% of gross classified loans	50% of gross classified loans	60% of gross classified loans
Interest rate exposures	Prime rate	Decrease by 100 basis points	Unchanged	Unchanged
	Saving deposits rate	Unchanged	Increase by 200 basis points	Increase by 400 basis points
	Time deposit rate	Unchanged	Increase by 200 basis points	Increase by 400 basis points
	LIBOR	Unchanged	Increase by 200 basis points	Increase by 400 basis points
Liquidity exposures	Deposit base	Decrease by 20%	Decrease by 30%	Decrease by 50%
	Downgrade in credit rating	Downgrade in investment grade	Downgrade in investment grade	Downgrade to non-investment grade
Operating profit before provision	Non interest income	Decrease by 20%	Decrease by 30%	Decrease by 40%
	Net interest income	Decrease by 20%	Decrease by 30%	Decrease by 50%
Macro economic	Unemployment rate	14.0%	18.0%	25.0%
	Real GDP growth	-3.0%	-7.2%	-10.0%