

GUIDELINE ON STRESS TESTING CBK/PG/20

CONTENTS

PART I: Preliminary

- 1.1. Title
- 1.2. Authorization
- 1.3. Application
- 1.4. Definitions

PART II: Statement of Policy

- 2.1. Purpose
- 2.2. Scope
- 2.3. Responsibility

PART III: Role of Board and Senior Management

PART IV: Introduction

- 4.1. Overview and Objective of the Guideline
- 4.2. Principles for Banks

PART V: Approach to Stress Tests by Institutions

- 5.1. Coverage and Risk Factors
- 5.2. Frequency
- 5.3. Magnitude of Shock
- 5.4. Stress Testing Methodologies
 - A. Stress Testing for Credit Risk
 - B. Stress Testing for Market Risk
 - 1. Interest Rate Risk
 - 2. Foreign Exchange Risk
 - C. Stress Testing for Liquidity Risk
 - D. Stress Testing for Operational Risk
 - E. Reverse Stress Testing
- 5.5. Reporting of Stress Test Results to Central Bank of Kenya

PART VI: Remedial Measures

PART VII: Effective Date and Supersedence

PART I: PRELIMINARY

- 1.1 Title** - Guideline on stress testing.
- 1.2 Authorization** - This Guideline is issued under Section 33(4) of the Banking Act, which empowers the Central Bank of Kenya to issue guidelines to be adhered to by institutions in order to maintain a stable and efficient banking and financial system.
- 1.3 Application** - This Guideline applies to all institutions licensed under the Banking Act (cap 488) and approved Non Operating Holding Companies.
- 1.4 Definitions** – the terms used in this guideline are as defined in the Banking Act (Cap 488). Other terms used in this guideline shall be taken to have the meaning assigned to them hereunder.
- 1.4.1 “Stress”** refers to the potential effect on an institution’s given financial or prudential parameter to a specific event and/or movement in a set of financial variables.
- 1.4.2 “Stress Testing”** is a risk management technique used to evaluate the potential effect on an institution’s financial condition of a specific event and/or movement in a set of financial variables. The traditional focus of stress testing relates to the exceptional but plausible events.
- 1.4.3 “Credit Risk”** is the risk that a counter party (for example, individuals, corporations, sovereign governments), fails to meet their obligations. Many different types of obligations are covered (from simple personal overdrafts to complex derivative transactions).
- 1.4.4 “Exposure at Default” (EAD)** is defined as the gross exposure under a credit facility upon the default of an obligor
- 1.4.5 “Operational Risk”** is the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events.
- 1.4.6 “Probability of Default” (PD)** is the probability a borrower will default over a one year time horizon
- 1.4.7 “Loss Given Default” (LGD)** is the extent of credit loss when a borrower defaults. It is defined as (1 minus recovery rate)
- 1.4.8 “Market Risk”** is the risk to an institution’s financial condition resulting from adverse movements in market variables, such as prices or interest rates.

- 1.4.9 “Interest Rate Risk”** is the risk to an institution’s earnings and capital arising from adverse movements in interest rates.
- 1.4.10 “Non-Performing Loan” (NPL)** is as defined under CBK Prudential Guideline on Risk Classification of Assets, Provisioning and Limitation on Interest Recoverable on Non-Performing Loans (CBK/PG/04).
- 1.4.11 “Repricing Risk”** repricing risk arises due to pricing mismatches between assets and liabilities of a bank. Assets may be priced at fixed rates while liabilities may be on floating rate. If the rate of change in interest for assets is not the same as that for liabilities, then repricing risk will result.
- 1.4.12 “Reverse Stress Testing”** is the process of assessing a pre-defined adverse outcome for an institution, such as a breach of key regulatory requirements, insolvency or illiquidity, and identifying possible scenarios that could lead to such adverse outcome.
- 1.4.13 “Yield curve Risk”** arises when unanticipated shifts in the yield curve have an adverse effect on bank’s income and capital.
- 1.4.14 “Basis Risk”** arises when assets and liabilities are priced using different market outcomes. Assets may be priced off the interbank rate while liabilities may be priced off Treasury bill rate. If there is change in the spread between the interbank and Treasury bill rate a bank will be subject to a basis risk.
- 1.4.15 “Liquidity”** is the ability to fund increases in assets and meet obligations as they fall due.
- 1.4.16 “Liquidity Risk”** is the risk to an institution’s earnings or capital arising from its inability to meet its obligations as they fall due, without incurring significant costs or losses”

PART II: STATEMENT OF POLICY

2.1. Purpose

The purpose of this guideline is to provide institutions with minimum requirements for developing stress testing mechanisms as a part of their overall risk management systems and frameworks.

2.2. Scope

Stress tests cover a range of methodologies and their complexity can vary, ranging from simple sensitivity tests, which are aimed at assessing the impact of severe macroeconomic stress event on measures like earnings and capital.

2.3. Responsibility

Stress testing requirements are an integral component of an institution's business planning and risk management framework. Therefore, it is the responsibility of senior management and the board to ensure appropriate stress tests are incorporated in its strategic plans. Senior management should establish the Stress Testing framework and maintain an effective oversight in the process by agreeing on the assumptions and reviewing the results.

2.4. Proportionality

The scope of the stress testing exercise should be appropriate for the size, risk profile and scale of operations of the institution under review. The stress testing exercise should be based on an institution's specific vulnerabilities arising from its lines of business.

PART III: ROLE OF BOARD AND SENIOR MANAGEMENT

- 3.1. The Board has ultimate responsibility for the overall stress testing and should be aware of the key findings of the stress test. The board must ensure that its senior management has in place a fit for purpose stress testing program that is enterprise wide and that management has adopted policies requiring use of stress testing as a management tool.
- 3.2. The management has a critical role in implementing stress testing in the institution's risk management. This calls for taking ownership of the overall framework, identifying potential stress scenarios, taking remedial measures or actions (where warranted), given the institution's risk appetite and business strategy. Remedial measures or actions are imperative since much of the value in stress testing is derived from internal discussion of which stress scenarios imply the greatest vulnerability.

PART IV: INTRODUCTION

4.1. Overview and Objective of the Guideline

The primary objective of the "Guideline on Stress Testing" (the Guideline) is to reinforce the importance of stress testing as a risk management tool. The guideline provides guidance and principles on the critical areas pertaining to stress testing as well as specific requirements that are expected of institutions.

4.2. Principles for Banks

- 4.2.1. Stress testing should form an integral part of the overall governance and risk management culture of the bank. Stress testing should be actionable, with the results

from stress testing analysis impacting decision making at the appropriate management level, including strategic business decisions of the board and senior management. Board and senior management involvement in the stress testing programme is essential for its effective operation.

- 4.2.2. A bank should operate a stress testing programme that promotes risk identification and control; provides a complementary risk perspective to other risk management tools; improves on capital and liquidity management; and enhances internal and external communication.
- 4.2.3. Stress testing programmes should take account of views from across the organization and should cover a range of perspectives and techniques.
- 4.2.4. A bank should have written policies and procedures governing the stress testing programme. The operation of the programme should be appropriately documented.
- 4.2.5. A bank should have a suitably robust infrastructure in place, which is sufficiently flexible to accommodate different and possibly changing stress tests at an appropriate level of granularity.
- 4.2.6. A bank should regularly maintain and update its stress testing framework. The effectiveness of the stress testing programme, as well as the robustness of major individual components, should be assessed regularly and independently.
- 4.2.7. Stress tests should cover a range of risks and business areas, including at firm-wide level. A bank should be able to integrate effectively, in a meaningful fashion, across the range of stress testing activities to deliver a complete picture of the firm-wide risk.
- 4.2.8. Stress testing programmes should cover a range of scenarios, including forward-looking scenarios, and aim to take into account system-wide interactions and feedback effects.
- 4.2.9. As part of an overall stress testing programme, a bank should aim to take account of simultaneous pressures in funding and asset markets, and the impact of a reduction on market liquidity on exposure valuation.
- 4.2.10. The effectiveness of risk mitigating techniques should be systematically challenged.

PART V: APPROACH TO STRESS TESTS BY INSTITUTIONS

5.1. Coverage and Risk Factors

- 5.1.1** Stress tests should be designed to take into account large movements in the risk factors. Stress tests should reflect exceptional but plausible events and take into account new concentrations of risks that may emerge, contagion effect and failure of hedging techniques. Exceptional events would be fairly rare and have a large magnitude or impact on the portfolio to be stress tested. Plausible events cannot be too extreme that no entity could withstand such a shock or have zero probability of occurring.
- 5.1.2** In addition, institutions also need to derive the risk drivers of these material risks as this would assist in understanding the underlying factors that affect the risks and determine the appropriate remedial measures. The number of risk factors to be stressed will depend on the complexity of the portfolio and the risks faced by the institutions. Nevertheless, licensed institutions should be able to justify their choice of factors stressed.
- 5.1.3** Among the risk factors that institutions should consider when constructing the stress tests would be:
- Macroeconomic factors (interest rates, foreign exchange rates, inflation, GDP growth, unemployment rate, asset prices);
 - Geographical and political factors (health of other economies, vulnerabilities to external events, contagion effects);
 - Financial market conditions (liquidity);
 - Concentration risks (borrowers, industries, regions);
 - Borrower risk characteristics that would affect obligor risks and increase the default probabilities (for example, borrower type, demographics, industry);
 - Transaction risk characteristics (product, collateral type, loan to value ratio, guarantees); and
 - Other category of risks such as operational risk (cyber-risks and risks arising from third party failures),

The stress tests should also reflect the specific risk characteristics of the institutions including events such as mergers or strategic acquisitions.

5.2 Frequency

- 5.2.1.** The frequency of stress testing should be determined in accordance with the nature of the risks which the institutions are exposed to and the types of tests performed. Thus, stress tests may be run on a daily, weekly, monthly, quarterly or yearly basis, depending on the nature of the portfolio and risks as well as circumstances.

- 5.2.2. Stress tests should be produced regularly enough to take account of changing market conditions and the institution's changing risk profile. Generally, the trading portfolio would be subject to more frequent stress testing. Similarly, in times of greater volatility and unstable market conditions, more stress testing would be conducted.
- 5.2.3. However under specific circumstances, ad-hoc stress tests may also be required to assess the impact of observed deterioration which licensed institutions had not taken into account or to assess the impact of similar stress across the industry.

5.3 Magnitude of Shock

- 5.3.1. Institutions may vary the level of stress to assess its vulnerability under different scenarios. Accordingly, institutions would need to determine the magnitude of shocks to be administered.
- 5.3.2. Selecting the worst movement in the previous one-year period may not be optimal as the period may not include any stressful event. The time interval should include at least one business cycle (appropriate to the portfolio).
- 5.3.3. The magnitude of the shock used should be greater than the conservative estimate of potential losses over the business cycle. It is more than the adverse market movement (point of worst movement) relevant to the long-term risk profile of the specific portfolio.
- 5.3.4. The shocks should have some reference to but not be bound by historical events nor be so large that the exercise becomes purely hypothetical. The scenarios should be forward looking and also have some relevance to the current events or circumstances.

5.4 Stress Testing Methodologies

5.4.1 Stress Testing For Credit Risk

- Credit risk is measured by measuring potential losses that are dependent on the obligor's ability and willingness to repay credit. There is no single indicator for credit risk since it cannot be measured directly. Hence, it is measured indirectly through the credit risk drivers *namely Exposure, Probability of Default (PD), Loss Given Default (LGD) and Maturity*.
- Credit stress tests measures the impact on the institution's asset quality and financial position arising from the impairment of the borrowers' creditworthiness during stress condition. Stress test by definition measures the effect of only large moves (shocks) in risk factors that would affect the obligor's business operations and income. For stress test purposes, such shocks should be 'exceptional but plausible'. *As elaborated earlier, there are two approaches to decide on the appropriate magnitude of shock; the shocks that actually occurred during historical stress episodes and shocks based on subjective judgment. When using historical episodes, the size of the shock can be based on the most adverse movement in the risk factor during the period of the stress event.*

- Similar to the measurement of credit risk under normal conditions, credit risk under stress conditions could stem from both on- and off-balance sheet activities and, for banks, from both the banking and trading books.

5.4.2 Stress Testing For Market Risk

Stress testing should, as far as possible, be conducted on an institution-wide basis, and should take into account the effect of unusual changes in prices or volatilities, market liquidity, changes in historical correlations and assumptions in stressed market conditions, the vulnerability to historically worst case scenarios and the default of a large counter-party.

i) Interest Rate Risk

- Interest rate risk is the exposure of a licensed institution's financial condition to adverse movements in interest rates arising from four main sources namely repricing risk, basis risk and yield curve risk.
- Institutions can apply risk measurement techniques such as gap analysis, duration analyses, income simulation or other interest rate risk model in performing stress test for the banking and trading books.
 - The main step in performing the stress test is to specify the nature of the shocks to be applied. For interest rate risk, the simplest forms of shock are a parallel shift in the yield curve, a change in slope of the yield curve and a change in the spread between different interest rates with the same time horizon. **Parallel shifts in the yield curve** - stress the extreme movement in interest across the maturity spectrum, for example, the effects on the licensed institution's profitability of a 200 or 300 basis-point (bp) shifts in the interest rates.
- At the very basic level, institutions can apply gap analysis to measure the level of interest rate risk exposure in the banking book. The gap in each time band can be multiplied by various scaling factors to calculate the sensitivity of income to changes in interest rates. For example, the average interest rate or yield on assets and liabilities in each time band can be calculated and applied to the gap as a way of scaling the change in net interest income.

ii) Foreign Exchange Risk

- Foreign exchange risk is the risk that exchange rate changes can affect the value of a institution's assets and liabilities, as well as off-balance sheet items. It can be direct that is, where the licensed institution takes or holds a position in foreign currency or indirect that is, where a foreign position taken by one of the institution's borrowers or counterparties may affect their creditworthiness.

- The most commonly used measure of foreign exchange is the institution's net open position and the net open position in each currency can be stressed against variations in the exchange rate of a particular currency.
- If the overwhelming majority of foreign exchange exposure is in one currency, institutions may use either the net open position by currency or the aggregated net open position. The latter may be necessary if a breakdown by currency is not available.
- Institutions are also subject to indirect foreign exchange risk, that is, foreign exchange risk incurred by the institution's borrowers that can be transmitted to the institutions through credit risk. In order to assess the indirect foreign exchange risk, it is necessary to stress the major borrowers of the institutions and then estimate the impact on the loan portfolio.
- The basic type of shock to be used in all stress tests is a shock to the exchange rate itself. Depending on their relevance to the institutions, one or more exchange rates will have to be shocked either separately (sensitivity analysis) or simultaneously (scenario analysis).
- Institutions should incorporate past experience of financial crisis where the domestic currency suffered sharp depreciation into the stress test in order to assess the impact of the current portfolio.
- The following is a common scenario that institutions can take into consideration when performing stress testing for foreign exchange risk:
 - *Adverse changes in exchange rates between major currencies* – this estimates the impact on the licensed institution's net open position on major currencies. In addition, institutions may assess the impact of such changes on their major customers with substantial foreign exchange exposures.

5.4.3 Stress Test for Liquidity Risk

- There are two types of liquidity risk namely asset liquidity risk and funding liquidity risk. Asset liquidity risk refers to the inability to conduct a transaction at current market prices because of the size of the transaction. Funding liquidity risk refers to the inability to access sufficient funds to meet payment obligations in a timely manner.
- In many cases of bank failure, illiquidity occurs after the institutions have become insolvent. Thus, the lack of adequate funding liquidity is considered to be a key sign that the institutions are in serious financial difficulties.
- Commonly, institutions face liquidity pressures from imbalances between the maturity dates on their assets and liabilities, where cash inflows from assets may not match the cash outflows to cover liabilities.
- Interest rate changes can also lead to liquidity problems where high interest rates may cause liquidity withdrawals as depositors seek higher returns elsewhere.
- Liquidity stress tests should take into consideration the most recent assessments of an institution's key liquidity risk ratios, namely Liquidity Coverage Ratio (LCR), Net Stable Funding Ratio (NSFR).
- Institutions should include the following scenarios when performing liquidity stress test:

- *Liquidity crisis* - assess the adequacy of its short-term liquidity to meet crisis situations such as significant deposit outflows. In assessing the impact on the institution's funding and cash flow projections, institutions may adopt behavioral assumptions for borrowers and depositors such as increase in depositor withdrawal rate.
- *Credit tightening* - stress the impact of credit and counterparty (such as reduced access to interbank lending) lines tightening and estimate and anticipate alternative funding costs and sources in a difficult market environment due to the downgrading of an institution's rating. Then determine how it would affect the current business and the pricing and competitiveness of future business.

5.4.4 Stress Test for Operational Risk

- Stress tests for the risk of losses resulting from inadequate or failed internal processes, people and systems or from external events (including cyber-incidents, technology failure, business disruption and system failures, breaches in internal controls, legal risks and risks arising from adverse market conduct) that may result in operational losses for the institution. Institutions should systematically track and record the frequency, severity and other information on operational loss events to provide meaningful information for assessing the bank's exposure to operational risk and developing a policy to mitigate / control that risk.
- Institutions should develop stress scenarios for operational risk stress tests based on the data of their past operational loss events and using professional judgement.
- Operational risk exists in the natural course of business activity. It is not an objective for institutions to eliminate all exposure to operational risk as this would be neither feasible nor commercially viable. The recommended approach to managing operational risk is for institutions to adopt fit-for-purpose operational risk practices that assist senior management in understanding the institution's inherent risks and reducing its risk profile while maximising operational performance and efficiency
- Operational risk sub-types or loss events for which stress tests ought to be conducted include the following:
- External loss events that may impact or threaten an institution's operational continuity – such as external fraud and other events originating from an institution's external environment.
- Internal loss events as specified under CBK's Prudential Guideline on Capital Adequacy (CBK/PG/03). These include:

- Internal fraud: Losses due to acts of a type intended to defraud, misappropriate property or circumvent regulations, the law or company policy, excluding diversity/discrimination events, which involves at least one internal party.
- External fraud: Losses due to acts of a type intended to defraud, misappropriate property or circumvent the law, by a third party.
- Employment practices and workplace safety: Losses arising from acts inconsistent with employment, health or safety laws or agreements from payment of personal injury claims, or from diversity/discrimination events.
- Clients, products and business practices: Losses arising from an unintentional or negligent failure to meet a professional obligation to specific clients (including fiduciary and suitability requirements), or from the nature or design of a product.
- Damage to physical assets: Losses arising from loss or damage to physical assets from natural disaster or other events.
- Business disruptions and systems failures: Losses arising from disruption of business or system failures.
- Executions, delivery and process management: Losses from failed transaction processing or process management, from relations with trade counterparties and vendors.

For the above event-types, institutions should maintain an up-to-date historical internal loss database to facilitate conduct of effective stress scenarios as well as compliance with regulatory reporting requirements.

- Cyber-resilience
 - Direct cyber-risks – Risks of losses arising from cyber risks and cyber incidents, adverse litigation outcomes and their impact on liquidity, earnings and institutional reputation.
- Third party risks - Stress tests for the risks resulting from an institutions exposure to third party actions and systems.

5.4.5 Reverse Stress Testing

- Reverse Stress Testing is used to identify and assess the stress scenarios most likely to cause an institution's current business plan to become unviable. A reverse stress test starts from a specified outcome that challenges the viability of an institution, then works back (in reverse) to identify a scenario or combination of scenarios that could lead to the specified outcome. The ultimate objective of reverse stress testing is to enable the institution to fully explore the vulnerabilities of its current business plan, take decisions that better integrate business and capital planning, and improve its contingency planning.

- For reverse stress tests to be of decisional import, institutions should reverse stress test their business plan to failure or breach of critical minimum regulatory parameters (such as a breach of minimum capital or liquidity requirements). This should be the point at which the institution reaches a specified ‘point of failure’ or becomes unable to carry on its business due to a deterioration in critical prudential indicators. In doing this, institutions should identify a range of circumstances that would possibly lead to the specified ‘point of failure’ and assess the likelihood that such events could occur. The institution must then determine and implement measures to prevent or mitigate the said risk.
- An institution should fully document its entire process of reverse stress testing as part of its stress testing framework.

5.5 Reporting of Stress Test Results to the Central Bank of Kenya

It is expected that institutions will conduct several different stress tests in terms of scenarios and frequency. However, the reporting to Central Bank will be required for two scenarios only that is, the **latest** stress test conducted by the institutions using an **exceptional but plausible event** scenario and a **worst case** scenario, based on the minimum requirements. Institutions are required to submit the stress test results to the Central Banks’ Bank Supervision Department by the 10th day after end of each quarter. The submission should cover the following:

5.5.1 Coverage

- A description of the risk areas being subjected to stress tests.
- Conditions prevailing and assumptions used for the stress test. Institutions are required to describe the event as well as give details of the conditions prevailing in each scenario such as the level of GDP, interest rates, unemployment, concentration in properties. Institutions should also include any other significant assumptions used in the stress tests.

5.5.2 Results of Latest Stress Test

The results of the stress test for each risk, to be reported as indicated in Table 1 below and should include, at a minimum, the impact on the profitability, capital, liquidity and asset quality at end of each reporting quarter. Both absolute amounts and key financial ratios should be reported. Other indicators and ratios may be included by the institution if deemed useful. The results of the stress tests shall be reported for individual institutions and at group level, where applicable.

TABLE 1: STRESS TESTING RESULTS REPORT

	Baseline				Exceptional but Plausible event scenario				Worst Case Scenario			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1) Impact of Shock on:												
Profit												
Capital												
Asset Quality, etc												
2)Description of Condition, assumptions,												
Proposed management actions												
Interest Rate												
Inflation, etc												

NOTE: For all the stress tests carried out present the results in this format as shown in the table above.

PART VI: REMEDIAL MEASURES

Where any provision of this Guideline is breached or not observed, the Central Bank may pursue any or all of the remedial actions and administrative sanctions provided for under the Banking Act.

PART VIII: EFFECTIVE DATE AND SUPERSEDEANCE

The effective date of this Guideline shall be 1st January 2027. This Guideline supersedes Prudential Guideline CBK/PG/20 on Stress Testing issued on 1st January 2013.

ENQUIRIES

Enquiries on any aspect of this guideline should be referred to:

The Director,
Bank Supervision Department
Central Bank of Kenya
P. O. Box 60000 - 00200

NAIROBI

TEL.2860000 e-mail: fin@centralbank.go.ke