CENTRAL BANK OF TRINIDAD & TOBAGO

DRAFT

INSURANCE SECTOR STRESS TESTING FRAMEWORK

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LIST OF ABBREVIATIONS

CARTAC	Caribbean Regional Technical Assistance Centre
Central Bank	Central Bank of Trinidad and Tobago
FCR	Insurance (Financial Condition Report) Regulations
FSI	Financial Stability Indicators
IA 1980	Insurance Act 1980 Chap (84:01)
IAIS	International Association of Insurance Supervisors
IMF	International Monetary Fund

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1. INTRODUCTION

1.1 The global trend towards the use of stress testing has increased significantly over the past decade. Stress testing is a key tool used by the IMF in assessing the resilience of financial sectors, which forms an integral part of their FSAP. Financial institutions worldwide have incorporated stress testing as a fundamental element of their enterprise risk management framework and capital planning process. Regulators also use stress tests to aid them in macroprudential risk analysis, and as a supervisory and policy tool to highlight the vulnerabilities and shocks that can potentially inhibit the resilience of the financial system and undermine stability.

1.2 The Central Bank views the development of a robust stress testing framework as a key priority, to fulfil its mandate to maintain confidence in, and promote the soundness and stability of, the financial system in Trinidad and Tobago and align itself with international best practices. Since 2010, the Central Bank has been conducting top down stress tests of the commercial banking sector; however, a similar stress testing framework has not been developed for the insurance, payment systems and securities sectors.

1.3 As part of the legislative reform for the insurance sector, the FCR was developed to require insurers to perform their own stress tests (bottom-up) to assess whether they have sufficient capital and liquid assets upon materialization of institution specific shocks. The goal of the FCR, therefore, is to enhance understanding of specific insurance company vulnerabilities and foster individual risk management and stress testing capabilities. These tests, however, would not take into consideration the effects of the shocks at the macro level. In a stressed scenario, the stability of one insurer does not guarantee the stability of the system as a whole.

1.4 As a result, the Central Bank will be implementing insurance sector stress testing using a top-down approach with the aim of assessing the resilience of both the individual insurers and the insurance sector as a whole to shocks.

2. APPLICATION AND SCOPE

2.1 This Framework applies to all insurance companies registered to conduct insurance business in Trinidad and Tobago.

3. AUTHORITY

3.1 Section 51(1) of the IA gives the Inspector the authority to request information in order to ascertain the ability of a company registered under the IA to meet its obligations.

4. STRESS TESTING

4.1 Objectives

The results of the top-down approach will be instrumental in bringing about closer discourse between the regulator and institutions as well as integrating a more macroprudential perspective into the evaluation of the performance of institutions and sources of strains that they could face.

The Central Bank has established four main objectives, both micro and macro, of this top-down stress test framework as follows:

4.1.1 assess the resilience of individual insurers to severe but plausible adverse scenarios, the results of which will be used as a supervisory tool;

4.1.2 assess institution specific capital adequacy and solvency under adverse scenarios;

4.1.3 make useful comparisons with and test for reasonableness of the results of the bottom up stress testing (FCRs);

4.1.4 determine possible insurance sector vulnerabilities and inform policy decisions/changes.

4.2 Coverage and frequency

In order to achieve the objectives as outlined above, all insurance companies registered to carry on insurance business in Trinidad and Tobago will be required to participate in the stress test exercise and submit the required data in the format prescribed by the Central Bank. The frequency of the stress test to be performed will be determined by the Central Bank.

4.3 Stress testing framework

4.3.1 Stress testing frameworks can be very complex and encompass many different types of shocks and models. The stress tests to be conducted under this model will include sensitivity and scenario testing which are based on the analysis of the impact of severe but plausible adverse scenarios on the financial condition of both life and general insurers.

4.3.2 The tests will provide an estimate of the effects of an instantaneous shock or combination of shocks on the elements of the income statement and balance sheet that would be mostly affected by the shock.

4.3.3 The sensitivity testing will estimate the impact of one or more moves in a particular risk factor or limited number of risk factors within a specific risk category which has been identified in section 3 below.

4.3.4 The scenario testing will consider simultaneous movements in a number of risk factors which are linked to a specific change in the economy, the entire financial sector, the region or the world.

4.3.5 The framework does not take into account possible correlations among risk factors.

4.3.6 The shocks to be applied in this framework were developed with the assistance of an IMF/CARTAC subject matter expert, giving consideration to the local environment, shocks being used in other countries in the region and by the FSAP missions conducted by the IMF in similar territories.

4.3.7 The detailed output of the model being used under this framework facilitates quantitative assessments to be conducted by providing the following results:

i) a recalculated income statement, balance sheet and FSIs by insurer and for the industry;
ii) percentile distributions of insurers' results;
iii) numbers of insurers outside acceptable ranges; and
iv) changes from the base case.[1]

4.3.8 The Central Bank understands that institutions may have more sophisticated models and assumptions, but the intention at this time is to establish a baseline for the sector.

4.3.9 More complex factors which constitute other stress testing frameworks such as varying time horizons for different risk factors, the second-round effects of the shocks and the probabilities of occurrence of the shocks are not being taken into account at this time.

4.3.10 The framework is subject to modification as may become necessary and as determined by the Central Bank.

5. RISKS AND INDIVIDUAL RISK FACTORS

The top-down stress test framework will consider some of the main risks[2] to which insurers are exposed , including but not limited to insurance, market, liquidity, group wide risks and credit risks.

5.1 Definition of risk categories

Five main categories of risks are being considered under this framework. These are briefly described below.

5.1.1 Insurance risks

Insurance risk relates to the risk that an inappropriate underwriting strategy is adopted, that the chosen strategy is inadequately implemented, or that unexpected losses arise even when an appropriate strategy is adequately implemented. Insurance risks specifically focus upon the impact of the underwriting and claims functions on an insurer's premiums and technical provisions. Insurance risks may be categorized as underwriting risk, catastrophe risk, or the risk of deterioration of technical provisions.

5.1.2 Market risks

Market risk is concerned primarily with the adverse movement in the value of an insurer's assets and liabilities, both on-balance sheet and off-balance sheet, whose value may be affected by market movement. For insurers, it is the extent to which an adverse movement in the value of the assets as a consequence of market movements, such as interest rates, real estate prices, equity prices, etc., is not offset by a corresponding movement in the value of the liabilities.

[1] The base case refers to the initial income statement and balance sheet prior to any shocks being applied.
[2] The definitions of the main risks being considered have been adopted from the definitions used by the IAIS.

5.1.3 Credit risk

This type of risk relates to the possibility that a counterparty will fail to perform its obligations. Insurers' counterparties may include debtors, borrowers, brokers, policyholders, reinsurers and guarantors.

5.1.4 Liquidity risk

Liquidity risk relates to the possibility that an insurer will be unable to realise assets to fund its obligations as and when they fall due. Understanding whether an insurer's cash flow is sufficient to meet its commitments to policyholders and other creditors is fundamental. While no explicit risk factor is applied to assess liquidity risk, liquidity risk is considered as part of the analysis of the FSIs of the stressed income statement and balance sheet. Factors considered in the evaluation of this risk include any mismatching between expected asset and liability cash flows and the inability of insurers to sell assets quickly.

5.1.5 Group risk

The membership of an insurer in a group can be a potential source of strength, but it can also pose risks. No explicit risk factor is applied to assess group risk, however group risk is considered as part of the analysis of the FSIs of the stressed income statement and balance sheet. Factors considered under the framework include the impact on funding sources available, such as lines of credit, intra-group funding or access to external capital.

5.2 Individual risk factors for sensitivity stress tests

Table 1 below summarizes the specific shocks that can be applied in order to conduct stress tests for the life and non-life insurance sector. The shocks were generally calibrated at levels consistent with those used for Financial Sector Assessments by the IMF.

Table 1: Risk factor variables for single factor sensitivity stress tests

Risk Category	Risk factor/Description	Shocks
1. Insurance Risk	Deterioration in underwriting experience such that there is:	
	• General increase in claims	+25%
	• Increase in property insurance claims because of a natural catastrophe	+50%
	• General strengthening of technical provisions	+10%
	• Increase in health and life insurance claims because of a pandemic	+100%/ +200%
2. Market Risk	Yield curve shifts:	
	• Moderate shift down	-150 bps
	• Severe shift down	-300 bps
	• Moderate shift up	+250 bps
	• Severe shift up	+500 bps
	Adverse market conditions:	
	• Real estate values fall	-25%
	• Domestic equity market values fall	-20%

Risk Category	Risk factor/Description	Shocks
3. Credit Risk	Default by counterparties:	
	• Loss in deposit holdings with top two banks by insurer's exposure	-30%
	• Failure of top two reinsurers based on the insurer's exposure	-40%
	• Default by related parties [losses on: Equity Investments in Subsidiaries and Affiliates; Due from Subsidiaries and Affiliates]	-100%/ -100%
	• Fall in value of government bonds	-40%

6. SCENARIO TESTING

The scenarios described below are hypothetical scenarios and the risk factors and shocks being applied were developed using counterfactual risk analysis.

6.1 Economic downturn

An assumption of the stress testing model is that the country experiences an economic downturn due to an exogenous shock that leads to a rise in unemployment, a fall in share and house prices, low consumer confidence and a decline in investment.

The shocks to be applied to the risk factors being considered can include one or more of the following and will be applicable to both life and non-life insurers:

Risk factor	Shock
• Yield curve shifts down	-300 bps
• Real estate values fall	-20%
• Domestic equity market values fall	-20%
• Losses on mortgages	-20%

6.2 Catastrophe

The natural catastrophe scenario being applied is a composite scenario which assumes the occurrence of two natural disasters during an economic crisis in which the effects of a global recession are felt even more severely in the local economy. The first natural catastrophe is a severe storm, followed by a magnitude 7 earthquake that hits the entire country. The storm would bring severe flooding, wind damage and landslides. The earthquake would cause significant damage to buildings, injuries and loss of life. Cars, roads, and other infrastructure would be damaged by both events, including destruction of the airport and port facilities.

The shocks to be applied to the risk factors being considered are as follows and would apply to both life and non-life insurers where applicable:

Risk factors for Catastrophe: combination of an economic downturn, hurricane/flooding, and earthquake	Shock
• Yield curve shifts down	-300 bps
• Losses on mortgages	-25%
• Real estate values fall	-25%
• Domestic equity market values fall	-20%

• Foreign equity market values fall	-30%
• Increase in non-life claims for all lines of business except liability,	+200%
• Increase in life claims for all lines of business except annuities, and retirement plans.	+100%
• General strengthening of technical provisions	+3%
• Default by related parties [losses on: Equity Investments in Subsidiaries and Affiliates; Due from Subsidiaries and Affiliates]	-50%
• Increase in expenses [operating and other expenses, but not acquisition expenses or reinsurance commissions]	+10%
• Currency devaluation	-30%
• Fall in value of government bonds	-20%

6.3 Pandemic

The pandemic scenarios were developed with reference to the COVID-19 pandemic. Also known as the coronavirus pandemic, COVID-19 results in mild to severe acute respiratory illness in infected persons which is caused by the coronavirus 2 (SARS-CoV-2). It has been declared a global health crisis which experts say may last as long as two years. The first scenario considers, the financial impact on insurance companies as a result of a decline in GDP due to a fall in global oil prices and the reduction in revenues from other significant sectors such as tourism and manufacturing. This is coupled with the fall out in the economy due to the pandemic such that there is increasing unemployment, at the same time that interest rates and, equity prices are all decreasing. The second scenario is more severe than the first since it builds on the economic downturn shocks in the first scenario and includes the occurrence of a natural disaster during the pandemic.

The shocks to be applied to the risk factors being considered are as follows and would apply to both life and non-life insurers where applicable:

Risk factors for Pandemic Scenario 1: Economic downturn due to Pandemic	**Shocks**
• Yield curve shifts down	-300 bps
• Real estate values fall	-10%
• Domestic equity market values fall	-20%
• Foreign equity market values fall	-30%
• Losses on mortgages	-20%

• Increase in claims
  ○ Liability
  ○ Motor vehicle
  ○ Personal accident, health, accident & sickness
  ○ Ordinary life, credit life, group life
	
	+10%
	-15%
	+100%
	
	+200%

• General strengthening of technical provisions	+3%
• Default by related parties [losses on: Equity Investments in Subsidiaries and Affiliates; Due from Subsidiaries and Affiliates]	-30%
• Increase in expenses [operating and other expenses, but not acquisition expenses or reinsurance commissions]	+5%
Risk factors for Pandemic Scenario 2: pa Economic downturn due to pandemic, plus a major hurricane	**Shocks**
• Yield curve shifts down	-300 bps
• Real estate values fall	-30%
• Domestic equity market values fall	-30%
• Foreign equity market values fall	-30%

• Losses on mortgages	-30%
• Increase in claims ○ Property ○ Motor vehicle ○ Personal accident, health, accident & sickness ○ Ordinary life,, credit life, group life	 +100% +100% +200% +250%
• General strengthening of technical provisions	+3%
• Default by related parties [losses on: Equity Investments in Subsidiaries and Affiliates; Due from Subsidiaries and Affiliates]	-40%
• Fall in value of government bonds	-40%
• Increase in expenses [operating and other expenses, but not acquisition expenses or reinsurance commissions]	+10%

7. DATA REQUIREMENTS – SPECIFIC STRESS TESTING DATA FORMS

7.1 The primary source of the data for the stress testing exercise are the Quarterly Returns which are submitted to the Central Bank on a quarterly basis by all insurance companies as part of the regulatory reporting requirements.

7.2 The additional data required to conduct the stress test will be captured in separate forms which are being developed for the purpose of the stress testing exercise.

7.3 The key additional data that will be required to conduct the stress test is provided in Appendix II.

8. DISCLOSURES – USE OF THE RESULTS

8.1 The results of the stress tests will primarily be used internally by the Central Bank as a macroprudential and supervisory tool to aid in meeting the objectives which have been set out earlier in this document.

8.2 Results will not be used as a basis for the Central Bank to take regulatory action.

APPENDICES

Appendix I: Effects of Shocks in the Stress-testing Model

Stress	Income Statement Items Directly Affected	Balance Sheet Items Directly Affected
Change in interest rate	Investment income changes by change in value, plus shock times asset value. Life insurance liabilities changes by change in value.	Fixed-income asset values change by shock times value times (duration); assumed durations can vary by type of asset. Life insurance liabilities change by shock times. duration
Losses on mortgages	Investment income changes by change in value.	Mortgages asset value changes by shock times value.
Change in real estate market values	Investment income changes by change in value.	Investments in real estate changes by shock times value.
Change in equity market values	Investment income changes by change in value.	Equity asset values, except for equity investments in subsidiaries and affiliates, change by shock times value.
Change in claims experience – by class	Gross incurred claims changes by value times the sum of the products of shocks for each class and the share of total gross incurred claims accounted for by the class. Recoveries from reinsurance changes by the sum of the products of the changes in gross incurred claims for each class and the ceded premiums ratio for the class.	Catastrophe provision is reduced by change in net incurred claims for Property class, but not to less than zero. Cash changes by change in incurred claims, less change in catastrophe provision.
Change in technical provisions	Changes in provisions change by changes in values.	Provisions change by shock times their values.
Failure of a bank	Investment income changes by change in value.	Asset value changes by shock (loss given default) times value times percentage in failed bank.
Default by related parties	Investment income changes by change in value.	Asset value changes by shock [loss given default] times value; shock can differ between investments in and amounts due from related parties.
Failure of a reinsurer	Reinsurance recoveries changes by change in value.	Asset value for reinsurers' shares of provisions changes by shock [loss given default] times value times percentage of reinsurance ceded to failed reinsurer.
Adverse expenses	Expense item changes by shock times value (assumes no effect on insurance liabilities).	Cash changes by (change in expenses).
Government securities devaluation	Investment income changes by change in value.	Asset value changes by shock [devaluation percentage] times value times percentage of government securities invested in the government with deterioration of credit rating.

Appendix II: Additional data required for stress testing

1. **Duration of assets**
2. **Duration of liabilities**
3. **Reinsurance exposures by Line of business:**
    - 3.1. Maximum premium ceded to a single reinsurer
    - 3.2. Maximum exposure to single risk
    - 3.3. Maximum exposure to single event
4. **Related and counterparty exposures:**
    - 4.1. Revenues from related parties
    - 4.2. Expenditures to related parties
    - 4.3. Gross premiums written from group
    - 4.4. Gross premiums written from related parties
    - 4.5. Claims paid to group
    - 4.6. Claims paid to related parties
    - 4.7. Maximum investment in a single counterparty
    - 4.8. Maximum receivable from a single counterparty
    - 4.9. Investments by related parties
    - 4.10. Distribution of the insurer's deposits by bank
    - 4.11. Distribution of the insurer's reinsurance ceded premium
5. **Claims provisions:**
    - 5.1. Initial claims provisions on claims incurred in t
    - 5.2. Initial claims provisions on claims incurred in t-1
    - 5.3. Initial claims provisions on claims incurred in t-2
    - 5.4. Initial claims provisions on claims incurred in t-3
    - 5.5. Initial claims provisions on claims incurred in t-4
6. **Non-performing assets:**
    - 6.1. Non-performing investment assets
    - 6.2. Non-performing loans [including mortgages]