20 December 2023

2023 CAPITAL AND SOLVENCY RETURN

STRESS/SCENARIO ANALYSIS – CLASS E, CLASS D AND CLASS C

The Bermuda Monetary Authority (the Authority) requires Class E, Class D and Class C insurers[1] to conduct prescribed stress/scenario testing and analysis. The results are to be submitted to the Authority as part of the 2023 year-end Capital and Solvency Return.

The objective of stress testing within the 2023 year-end Capital and Solvency Return is to assess the capital adequacy of the insurers under adverse financial market and underwriting conditions and provides a comprehensive understanding of the sector's general vulnerability to shocks. More specifically, the purpose of the tests is to assess the impact of the losses, as determined using proprietary/vendor models, on the insurer's Economic Balance Sheet (EBS) (i.e., EBS admitted assets, EBS admitted liabilities, and EBS capital and surplus). Thus, these tests help determine the financial capacity of insurer to absorb the manifestation of key financial risks, such as shocks to investment performance and projected losses arising from specific underwriting risks.

GENERAL INSTRUCTIONS

Measurement of impact: As noted above, the insurer is to provide the post stress/scenario positions of the expected impact and effects on both EBS assets and liabilities.

Accounting treatment: The insurer is to use the accounting standard ordinarily used for statutory reporting so that the pre-stress/scenario EBS capital and surplus can be reconciled to the insurer's 2023 year-end economic balance sheet.

Timing of impact: The stress/scenario impact and effects reported are those that would be observed immediately upon the occurrence of the event (stress/scenario) as determined by the insurer's internal or vendor model(s) (both with and without the effect of reinsurance and/or other loss mitigation instruments).

Balance sheet date: The insurer is to run the stress/scenario tests based on its balance sheet position and aggregate in-force exposures as at 1 January 2024[2].

Reporting currency: All amounts reported with respect to the stress scenarios must be shown in the reporting currency.

[1] In this document, the terms 'insurer' and 'insurers' include 'reinsurer' and 'reinsurers,' respectively.

[2] Where the fiscal year does not correspond to the calendar year, in-force exposures on the day following the fiscal year-end should be used rather than 1 January 2024.

Reporting Unit: All amounts reported with respect to the stress scenarios must be shown in '000s.

Vendor and/or internal model descriptions: To assist the Authority with comparability, the insurer is to provide a description of the vendor model(s) used to perform the stress/scenario tests, identifying what model and version was used for each stress/scenario. The acquisition of a vendor package is not an obligation. Where an internal model is utilised, the description should also include information on the internal model's key assumptions and parameters.

Confirmation of no loss exposure: For instances where the insurer has no loss exposure to a particular financial market scenario(s), underwriting loss scenario(s) and/or 'other underwriting loss scenarios', the Authority has created a new section that allows for the confirmation that fields left blank/omitted are the result of no loss exposure.

A. FINANCIAL MARKET SCENARIOS

The financial market scenarios comprise capital market-related single-factor shocks triggered by specific risk factors (equity returns, credit spreads and defaults). The calibration of these shocks is based on historical data about the evolution of interest rates, exchange rates and equity markets. Further, in light of continued sovereign risk concerns and its implications on the investment performance of insurers, the financial market scenarios include haircuts on sovereign bonds. The ongoing volatility due to political risk and also volatility of capital flows warrants shocks on foreign currency positions.

The insurer is to quantify the impact of the following stress events on its economic balance sheet:

Stress Event	Interpretation
R1. Severe decline in equity prices	The stress test is a decrease of 40% of the value of equities in a portfolio. This stress scenario is consistent with the Black Monday crash of 1987. If there are hedging instruments for equity exposures, their hedging result should be recorded separately. If hedging is done through replication strategies or continuous rollover of assets, this should be mentioned in the stress test result. Short positions are considered hedging positions. Material equity derivative positions should also be included in the test.
R2. Alternative Investments and Real Estate	This stress is related to investment holdings in hedge funds, ILSs, real estate, private placements, venture capital and other types of securities that cannot be characterised as equity, bonds, cash, foreign exchange and mutual funds in typical asset categories or participations to other corporations excluding venture capital. Usual characteristics of these assets are the low correlation with financial markets and the low or lower liquidity compared with typical financial assets. Such assets should be decreased in value by 40%. For assets such as hedge funds with lockup periods, venture capital and real estate in illiquid markets, the (re)insurer should report whether sudden decreases in their value could entail inability for rapid sale and whether this effect has material consequences. **Level 3 Assets** A shock of a 40.0% reduction in the value of level 3 assets should be performed. If level three assets can be found in alternative investments and real estate, equities or other categories, then those assets have to be reported and stressed separately.

R3. Yield Curve Stress

This stress refers to moderate and severe movements in global yields. The (re)insurer will apply the following absolute stresses to the yield curves used for the valuation of assets and liabilities. The stress will apply to all yield curves used (explicitly or implicitly) in those valuations, including (but not limited to) the published risk-free or standard curves, curves used in the SBA calculation, any other curve used for DCF-style calculations and yields used to predict policyholder behaviour. Corporate rates should be revalued assuming constant credit spreads. The **resulting yields should not be floored at zero in any of the scenarios.**

Insurers are to model each scenario separately but report only the Moderate Widening scenario in the BSCR model.

In the attachments section of the BSCR model, details of all scenarios should be provided.

Table 1 – Yield Curve Scenarios

Scenario	**Stress**
Moderate Widening	1% increase in yields across all maturities
Moderate Tightening	1% decrease in yields across all maturities
Severe Widening	2% increase in yields across all maturities
Severe Tightening	2% decrease in yields across all maturities

R4. General widening of credit spreads

Credit spreads widen across different rating classes (see Table 2). The widening reflects the increase of the perceived credit risk in the market. The table summarises the shocks.

Table 2. Credit Spread Widening
In basis points

Rating Category					
AAA	**AA**	**A**	**BBB**	**BB**	**Below BB**
199.6	249.0	241.5	276.4	947.5	3,113.6

Source: BMA staff calculations and Bloomberg. Notes: The 99.9th percentile was used for all but two scenarios. For AAA we used the 99th percentile, for junk bonds (ratings Below BB) we used the 99.99th percentile. The spreads in these rating classes show high (for AAA) or low (for Below BB) variability compared to the intermediate rating classes. The 99th percentile would overestimate the reasonable stress scenario for AAA assets and it would underestimate a reasonable stress scenario for Below BB. We used the Moody's bond indices for ratings from AAA to BBB and the J. P. Morgan bond indices for BB and Below BB rating classes. The reference risk free rate was the 10-year U.S. treasury rate

All positions including available for sale and held to maturity should be stressed. Structured finance products, asset-backed securities, agency and non-agency MBSs must be included as well. If there is no rating for an asset, the (re)insurer must assume that the rating is Below BB. CAT Bonds are treated as alternative investments and not as assets susceptible to credit spread changes.

R5. Combine R1, R2, R3 and R4

Combine the Moderate Widening stress from R3 with the stresses from R1, R2 and R4. This means that corporate bonds must be revalued using the risk-free curve and prevailing credit spread at the valuation date plus the Moderate Widening scenario from R3 plus the widening of credit spreads from R4. Sovereign bonds and other assets with DCF-style valuation methods should be valued as in R3.

R6. Foreign currency shocks

An equal percentage of depreciation and/or appreciation of foreign exchange positions in both assets and liabilities when these shocks reduce the value of assets and increase the value of liabilities. When an FX liability is passed on the party claiming the liability, the shock can be excluded for such positions. The following table provides the percentage depreciations/appreciations. Hedging of FX positions should be reported separately, especially if hedging is done with roll-over strategies.

Table 3. Exchange Rate Shocks *(In percent)*

	EUR/USD	JPY/USD	GBP/USD	CHF/USD	AUD/USD	*Avg.*
Shock	24.9	27.6	41.0	22.4	31.8	29.5

R7. Escalation of Sovereign risk

In this test we assume that the weakest sovereigns will have to undergo a haircut in the face value of their debt. Both available for sale and held to maturity bonds should be stressed.

Table 4. Reductions in Current Value of Sovereign Bonds

	Time to Maturity				
	<1 year	**<3 years**	**<5 years**	**<7 years**	**>7 years**
Greece	50.0	50.0	50.0	50.0	50.0
Italy	50.0	50.0	50.0	50.0	50.0
Portugal	50.0	50.0	50.0	50.0	50.0
Ukraine	100.0	100.0	100.0	100.0	100.0
Argentina	50.0	50.0	50.0	50.0	50.0
Turkey	50.0	50.0	50.0	50.0	50.0
Russia	100.0	100.0	100.0	100.0	100.0

Source BMA staff calculations and Bloomberg. The haircuts are based on the realization of a prolonged pan-European banking crisis in Europe which will cause sovereign defaults.

R8. Inflation and Monetary Policy Risk

Inflation risk stems from the general uncertainty of prices.
Higher than expected inflation decreases the real yield on loans and debts while it may increase the value of indemnities, claims and expenses. Simulate a scenario similar to the 2022 inflationary scenario.
The (re)insurer should apply each inflation scenario for three years assuming no initial action to curb inflation from central banks. In year four, the central bank changes stance and increases rates to restore the current real interest rate. From year five onwards, inflation and interest rates return to current levels.

Scenario	**Change in inflation rate (Y1)**	**Change in inflation rate (Y2)**	**Change in inflation rate (Y3)**	**Change in inflation and interest rate (Y4)**
Moderate Inflation	+5.0%	+5.0%	+5.0%	+5.0%
Severe Inflation	+10.0%	+10.0%	+10.0%	+10.0%

To clarify, these stresses should be additively applied to the prevailing annual inflation/interest rate assumption used in valuing asset and liabilities (e.g., if the prevailing assumption is 3% p.a. then the moderate stressed assumption should be 8% p.a. for the first four years before returning to 3% p.a.).

Scenario	**Stressed inflation rate**
Deflation scenario	-1.0%

This stress should replace the prevailing annual inflation rate assumption used in valuing assets and liabilities (e.g., if the prevailing assumption is 3% p.a. then the deflation scenario assumption should be -1% p.a., i.e., a 4% p.a. reduction in expectations). The interest rate assumption in year four should mirror the change in the inflation rate (i.e., -4% p.a. in the previous example).

All assets and liabilities are to be shocked. In a situation where the (re)insurer holds TIPS or other inflation-sensitive securities, these securities should be indexed to the inflation scenarios. Insurers are to model each scenario separately and report the scenario that has the most significant impact in the BSCR model. In the attachments section of the BSCR model, details of all scenarios should be provided.

R9. Long Term Liquidity Stress Scenario

- **Scope of mass lapse shocks**: The focus of the stress test is on liquidity. The mass lapse shocks are to be applied to all lapsable policies, whether lapsing is beneficial for the insurer from a solvency perspective or not (i.e., the shocks apply to both lapse-supported and lapse-sensitive policies). The Scenario is required for Long-Term (re)insurers and Long-Term groups.
- **Application of shocks**: For purposes of the stress test, the prescribed shocks on the Mass Lapse Shock table are to be applied to cash surrender values as factors.
- **Retail vs institutional**: Retail means policies where the policyholder is a retail customer. Institutional means policies where the policyholder is not a retail customer (e.g., is a corporation or institution). In the case of reinsurance business, the classification of a policy as retail or institutional should be based on the original policyholder (the one that holds the policy issued by the direct writer), not on the cedent. As such, reinsurance contracts are not automatically classified as institutional contracts.
- **Economic penalty**: Economic penalty only includes contractual penalties (i.e., surrender charges) imposed by the insurer on policyholders that surrender early. It does not include Market Value Adjustments (MVA), as these can encourage surrenders depending on circumstances. It also does not include penalties that are imposed by third parties, or are not explicitly quantified in the contract, such as the economic value of foregone benefits (e.g., tax penalties or other tax implications). The larger the economic penalty that counterparties must bear on surrenders, the smaller the incentive to withdraw funds. Conversely, the smaller the costs that counterparties must bear on surrenders, the larger the incentives to withdraw funds. A substantial penalty, by itself, will not remove all surrender risk as some counterparties may be immune to any monetary disincentive (e.g., in the case of panic).
- **Time restraints**: Time restraints are based on the average time between the request by a policyholder and the settlement under the normal course of business. The more quickly policyholders are able to access their funds, the more likely it is that insurers may have to engage in disruptive fire sales of assets to make the payments promised. The longer the delay, the more opportunities insurers will have to spread the sale of assets over time and/or to access liquidity through other means. In addition, a substantial delay in access may create a disincentive for counterparties to surrender their contracts.
- **Pre-stress liquidity sources:** Population of the pre-stress liquidity amount available to the (re)insurer to meet liquidity needs under each liquidity source type is required. Comments for the definitions of Qualified Tier 1, Tier 2 and Tier 3 Liquid Mutual MMFs; and Tier 1, Tier 2 and Tier 3 Certificates of Deposit are provided.
- **Treatment of other assets**: For any assets not mentioned in the Liquidity Source table, no contribution to liquidity for the purposes of the stress test should be assumed i.e., an effective haircut of 100% for liquidity purposes is required to be applied.
- **Cap on tier 3 assets:** Tier 3 assets cannot make up more than 30% of the total post stress liquidity sources.
- **WAM x yield shock liquidity stresses:** For assets where yield shocks are applied instead of haircuts to calculate post stress liquidity source values, the market value

weighted average maturity (WAM) of securities specified in each asset category must be provided. The maturity of securities within each asset category should reflect the greater of the contractual maturity or the maturity with any extension features embedded. Early prepayment or callable dates are ignored. The WAM x yield shock quantity reduces the market value of the security reflecting a corresponding liquidity stress.

- **Total Cash out-flow under the immediate mass lapse shock:** The calculated payout (outgo) for Lapse Risk Sensitive policies/ products (lapse supported and lapse sensitive) in case of a mass lapse Scenario should be provided here.
- **Available Capital & Surplus (C&S)** and the **Enhanced Capital Requirement** (ECR) pre and post mass lapse stress scenarios: The ECR ratio from each of the respective pairs of available C&S and ECR should be populated on the same basis as that used in filings, i.e., regulatory transitional arrangements where applicable are allowed.
- **Table: Total Best Estimate Liability (BEL) by Category** (the BEL table): The BEL of the policies sensitive to lapse risk and the lapse supported policies that fall within the sub-groups indicated should be populated in this table. For example, Column E, first row of the table (Low (no economic penalty)) should be the BEL of policies that have no economic surrender penalty, whose policy conditions and/ or policyholder reasonable expectations stipulate that funds are availed within 1 week of surrender request that are owned by retail policyholders; while the second row is BEL relating to group of policies owned by retail policyholders whose surrender proceeds will be availed within 1 week and the surrender charge applicable to the group of policies is up to 20%, etc.
- **Table: Total Account Value by Category**: The Account Values of the policy groups should be as reported under local GAAPs. The policy grouping is like the one defined under the BEL table.
- **Table: Total Cash Surrender Value by Category**: For the purposes of the mass lapse shock, the cash surrender value is defined as the amount that would be paid out if a policy was surrendered immediately – i.e., the cash surrender values in the table should include the impact of surrender charges and MVAs where applicable. The table should include all products that are exposed to lapse risk, i.e., all lapse sensitive and lapse supported products are required to be provided. The policy groups are as defined under the BEL table.
- **Table: Products Not Sensitive to Lapse Risks:** Product information for products not exposed to any lapse risk should be provided in this table, including their name, BEL and cash surrender values.

B. UNDERWRITING SCENARIOS

The insurer is to submit to the Authority three of its own underwriting loss scenarios and also use these in the calculation under Section D. Worst Case Annual Aggregate Loss Scenario below. The insurer is to submit the following for each of the three scenarios:

a) Description of the scenarios and related key assumptions; and
b) The post stress/scenario positions on aggregate EBS assets and EBS liabilities that would be observed immediately upon the occurrence of the event (stress/scenario) (both with and without the effect of reinsurance and/or other loss mitigation instruments).

C. RATING DOWNGRADE

The insurer is to submit detailed qualitative disclosure of the impact upon both its statutory statement of income and liquidity positions of a ratings downgrade of its Bermuda legal entity by two notches or below

A-, whichever is lower. The disclosure should cover and provide an indication of the relative impact/severity of collateral requirements, loss payment triggers on in-force policy contracts, claw-backs, and/or other adverse financial and liquidity implications of the downgrade.

Upon reviewing the disclosure, the Authority may request additional information relating to the liquidity impact and potential losses.

D. WORST-CASE ANNUAL AGGREGATE LOSS SCENARIO

The insurer is to submit the following:

1. A combination of a financial market scenario and three largest underwriting scenarios

The aggregate impact of:

a) A financial market scenario under Section A above which would result simultaneously in the occurrence of R5; and
b) An aggregation of the three net underwriting losses under Section III above.

It is assumed that the underwriting loss events follow in quick succession and there is the inability to engage in capital or other fundraising activities. Further, it is assumed that there is no geographic correlation between these non-economic events. The insurer is to disclose its assumptions, including any magnified demand surge, if applicable, from the multiple events.

2. Insurer specific worst-case scenario

The insurer is to submit a description of its own worst-case annual aggregate loss scenario and the underlying assumptions. The scenario should be at a level considered extreme but plausible by the insurer.

E. REVERSE STRESS TEST SCENARIO

If an insurer performs reverse stress testing (as outlined in the CISSA IX(b) question 2), then the insurer is to provide the key assumptions, which includes specific market risk scenarios, loss figures and return period that would cause such business failure. Such scenarios should be reported and should be contrasted with the scenarios in the current guidelines, i.e. whether worse or better scenarios than those provided by the BMA cause the (reinsurance company to fail).

If the insurer does not perform Reserve Stress Tests, then insurers are to calculate the clearance between their available economic capital and surplus and enhanced capital requirement (ECR) to determine the size of loss that would cause them to breach their ECR and provide the occurrence and relative return period of such event.

F. TECHNOLOGY RISK

All (re)insurers, including those that do not underwrite cyber risk, shall complete the questions in section A & B Technology Risk– 'Insurer own cyber security and resilience capabilities'. Responses will be selected from the drop down list or typed in as required and relevant documents will be included indicating the document name and identifying the applicable page numbers.