



BANK NEGARA MALAYSIA
CENTRAL BANK OF MALAYSIA

Stress Testing for Insurers and Takaful Operators

Concept Paper

ISSUED ON: 3 JUNE 2015

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The Bank is issuing this concept paper on stress testing to promote higher standards of stress testing for all insurers and takaful operators licensed under the Financial Services Act 2013 and Islamic Financial Services Act 2013. The proposals in this concept paper provide for revisions to the respective sets of stress testing guidelines currently applicable to licensed insurers and takaful operators, and when finalised, will replace those existing guidelines and combine the requirements for both these licensed persons in a single policy document.

Main changes to the existing stress testing guidelines include-

1. outlining key principles and requirements for conducting stress testing
2. requirements to conduct stress testing based on scenarios specified by the Bank
3. streamlining requirements for conducting stress testing for submission purposes to the Bank to improve comparability of stress testing results
4. strengthening requirements on submission of the Stress Test Report and documentation of the stress testing process.

The Bank invites written comments on this concept paper, including any suggestions for particular issues/areas to be clarified or elaborated further and any alternative proposals that the Bank should consider. To facilitate the Bank's assessment, please support each comment with a clear rationale, accompanying evidence or illustration as appropriate.

Responses must be submitted by **3 July 2015** to-

Pengarah
Jabatan Penyeliaan Insurans dan Takaful
Bank Negara Malaysia
Jalan Dato' Onn
50480 Kuala Lumpur
Email: jp3@bnm.gov.my

Electronic submission is encouraged. Submissions received may be made public unless confidentiality is specifically requested for the whole or part of the submission.

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PART A OVERVIEW

1. Introduction

- 1.1 Stress testing is a risk management tool used for assessing the financial strength of a licensed person and the impact on the licensed person's solvency and profitability of a particular defined set of alternative assumptions with outcomes that are adverse but plausible.

2. Policy objectives

- 2.1 This policy document provides standards and guidance for the insurance and takaful industry in conducting stress testing to support a licensed person's risk and capital management. Stress testing by licensed persons also forms part of the Bank's supervisory framework and monitoring of risks in the financial system.

3. Scope of policy document

- 3.1 This policy document sets out-
- (a) key principles that licensed persons have to observe when conducting stress testing;
 - (b) requirements for conducting stress testing based on both internally developed scenarios and scenarios specified by the Bank; and
 - (c) requirements for the Stress Test Report and documentation of the stress testing process.

4. Applicability

- 4.1 This policy document is applicable to the following persons:

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- (a) licensed insurers and licensed professional reinsurers; and
- (b) licensed takaful operators and licensed professional retakaful operators.

5. Legal provisions

- 5.1 The requirements in this policy document are specified pursuant to-
- (a) sections 47(1) and 143(2) of the Financial Services Act 2013 (FSA); and
 - (b) sections 57(1) and 155(2) of the Islamic Financial Services Act 2013 (IFSA).

6. Effective date

- 6.1 This policy document will come into effect on a date to be specified in the final policy document.

7. Interpretation

- 7.1 The terms and expressions used in this policy document shall have the same meanings assigned to them in the FSA and IFSA, as the case may be, unless otherwise defined in this policy document.

- 7.2 For the purposes of this policy document-

“**S**” denotes a standard, requirement or specification that must be complied with. Failure to comply may result in one or more enforcement actions;

“**G**” denotes guidance which may consist of such information, advice or recommendation intended to promote common understanding and sound

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industry practices which are encouraged to be adopted;

“**board**” means the board of directors of a licensed person, or a committee of the board where the responsibilities of the board set out in this policy document have been delegated to such committee.

“**internally developed scenarios**” means a set of stress scenarios that are developed by a licensed person;

“**licensed person**” collectively refers to-

- (a) a licensed insurer;
 - (b) a licensed takaful operator;
 - (c) a professional reinsurer; and
 - (d) a professional retakaful operator,
- unless otherwise specified.

“**specified scenarios**” means a set of stress scenarios developed and specified by the Bank for testing a licensed person’s capital adequacy and financial positions; and

“**senior management**” means the chief executive officer and senior officers of a licensed person.

8. Related policy documents

8.1 This policy document should be read together with the following policy documents:

- (a) BNM/RH/GL/004-24 “Risk-Based Capital Framework for Insurers [Version 3.0]” issued on 20 June 2013;
- (b) BNM/RH/GL/003-23 “Risk-Based Capital Framework for Takaful Operators” issued on 26 June 2013;

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- (c) BNM/RH/GL/003-29 “Guidelines on Internal Capital Adequacy Assessment Process (ICAAP) for Insurers” issued on 22 February 2012;
- (d) BNM/RH/GL/013-5 “Risk Governance” issued on 1 March 2013.
- (e) BNM/RH/CP/032-3 “Concept Paper on Management of Participating Life Policy Business” issued on 7 November 2014 and the final policy document when published; and
- (f) BNM/RH/CP/029-8 “Concept Paper on Financial Condition Report” issued on 24 December 2014 and the final policy document when published.

9. Policy documents superseded

- 9.1 The policy documents listed below are superseded with the coming into effect of this policy document-
- (a) BNM/RH/GL/003-23 “Guideline on Stress Testing for Insurers” issued on 11 December 2007; and
 - (b) BNM/RH/GL/004-16 “Guideline on Stress Testing for Takaful Operators” issued on 11 December 2007.

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PART B CONDUCT OF STRESS TESTING

10. General requirements for conduct of stress testing

- S** 10.1 Stress testing shall form an integral part of the licensed person's internal capital management framework¹ and risk management framework².
- S** 10.2 For the purposes of the Bank's supervisory review and ongoing monitoring and assessment of the resilience of the insurance and takaful industry, a licensed person is required to conduct regular stress testing based on:
- (a) internally developed scenarios; and
 - (b) specified scenarios.
- G** 10.3 The two general approaches to stress testing are sensitivity analysis and scenario analysis. Sensitivity analysis estimates the impact arising from assumed movements in a single risk factor or several closely related risk factors while scenario analysis contains simultaneous moves in a number of risk factors.
- G** 10.4 Stress testing is primarily used to determine the impact of risk factors or events on the financial condition of a licensed person. Stress testing can also be used to determine which scenarios could give rise to a pre-defined adverse outcome, such as breaching a capital or earnings threshold, thereby allowing key vulnerabilities to be identified (also referred to as reverse stress testing).

¹BNM/RH/GL/003-29 "Guidelines on Internal Capital Adequacy Assessment Process (ICAAP) for Insurers" requires the use of stress testing when determining a licensed person's Individual Target Capital Level (ITCL) and the assessment of sound capital management strategy and BNM/RH/GL/004-23 "Risk-Based Capital Framework for Takaful Operators" requires takaful operators to perform iterative process of stress and scenario tests to derive the ITCL.

² Paragraph 29 of policy document BNM/RH/GL 013-5 "Risk Governance" requires stress testing to be performed as part of a licensed person's risk management framework.

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11. Key principles for conduct of stress testing

- S** 11.1 The principles outlined in this section must be observed by a licensed person when conducting stress testing.

Principle 1: Stress testing must be rigorous and forward looking.

- G** 11.2 A rigorous stress test is one that should identify possible scenarios, the occurrence of which would have a material adverse impact on the licensed person's capital adequacy and financial positions.
- G** 11.3 A forward looking stress test should cover a broad range of scenarios incorporating changes in the licensed person's portfolio composition, new information and emerging risk possibilities, which are not necessarily covered by historical scenarios.
- G** 11.4 The construction of forward looking scenarios may involve combining the knowledge and judgement of senior management and experts across the licensed person.

Principle 2: Coverage and scope of stress testing must be sufficiently comprehensive to cover all material risks to a licensed person.

- S** 11.5 To achieve comprehensive coverage, the licensed person must apply multiple approaches and a range of techniques in conducting stress testing. The licensed person must include quantitative and qualitative techniques to support and complement the use of models, where appropriate.
- G** 11.6 Stress testing techniques adopted by the licensed person may range from less complex sensitivity analyses based on changes in a particular risk factor to more complex scenario analyses that revalue

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portfolios taking into account interactions between risk factors conditional on the stress event.

- S** 11.7 At a minimum, the scope of a stress test must reflect the significant activities undertaken by the licensed person and consider all material risks of the licensed person. Material risks are risks that have a significant adverse impact on any significant activity or the overall financial condition of the licensed person.
- G** 11.8 Significant activities that a licensed person should reflect in the scope of a stress test are products, lines of business, business units or processes that have a material impact on the licensed person's profitability or financial condition.
- S** 11.9 Material risks must include all risks emanating from every level of the licensed person's business i.e. from other entities within the group, at the enterprise level and also from specific activities of the licensed person. The licensed person's assessment of material risks must include at least the following major risk categories:
- (a) market risk;
 - (b) liquidity risk;
 - (c) credit risk;
 - (d) insurance risk;
 - (e) operational risk;
 - (f) financial group risk; and
 - (g) for takaful operators, shariah non-compliance risk and specific risks arising from takaful operational models.
- G** 11.10 Appendix I sets out guidance on the major risk categories and examples of the risk factors for each of the risk categories.

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Principle 3: A licensed person must identify and appropriately reflect risk concentrations and interactions between risk factors within the stress scenarios.

- G** 11.11 Concentration risk is a risk of increased exposure to losses arising from undertaking similar risks. A licensed person should reflect risk concentrations in stress testing by aggregating risks across various dimensions such as products, lines of business, counterparties, sectors and geographical areas. Examples of concentration risk include loss from a single large event or a series of events, over-reliance on a small number of reinsurers / retakaful operators and a concentration of investment in certain types of asset classes or instruments.
- G** 11.12 Risk interactions arise from correlated risks which include second round effects arising from original shocks as well as increased correlation between risks. The overall impact of an event may exceed the impact from first round of shocks when taking into account risk interactions.
- G** 11.13 In modelling the second round effects, the licensed person may consider both factors that are directly associated with the original shocks or indirect consequences of the shocks. This may require an analysis of the correlation and multi-correlation between the risk factors within a stress scenario.

Principle 4: Impact of stress test must reflect effectiveness of a licensed person's risk mitigation techniques in an adverse scenario.

- S** 11.14 Where the risk mitigation techniques applied by the licensed person are not as effective under the specific adverse scenario being considered compared with normal operating conditions, the impact of

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the scenario must be increased accordingly by the licensed person. For example, in a major catastrophe that results in the failure of a number of reinsurers, licensed insurers might not be able to obtain reinsurance recoveries and could be exposed to gross claim amounts.

- G** 11.15 Risk mitigation techniques applied by the licensed person may include all its policies and procedures in place for avoidance, acceptance, control and transfer of risks.

Principle 5: Where management actions are assumed in response to stress scenarios, the management actions considered must be objective and realistic.

- G** 11.16 Management actions are potential future actions that the licensed person would reasonably expect to carry out in response to adverse scenarios for the purposes of restoring the financial position or adjusting the risk profile of the licensed person.
- G** 11.17 Examples of management actions include changes in asset allocation, reduction in bonus rates for participating policies, changes in product mix and increase in expense charges.
- S** 11.18 For management actions to be objective and realistic, the following principles must be observed by the licensed person:
 - (a) the type of actions and circumstances under which the management actions would be taken must be defined in policies approved by the relevant approving authorities of the licensed person;
 - (b) the licensed person has the required financial and operational resources to take the management actions;
 - (c) the management actions must be realistic in the context of the scenarios considered;

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- (d) the management actions must not be constrained by any legal, regulatory or market restrictions; and
- (e) the management actions must take into account past actions taken by the licensed person.

- S** 11.19 In quantifying the impact of management actions, the licensed person must take into consideration the following factors:
- (a) the time required for the management action to take effect;
 - (b) consistency with other assumptions within the scenario;
 - (c) second round effects resulting from the management action, including policyholders action; and
 - (d) costs associated with the management action.

Principle 6: Licensed persons must ensure that data used in any part of the stress testing process is credible, accurate and complete.

- G** 11.20 The establishment of policies and procedures by the licensed person for ensuring the credibility, accuracy and completeness of data used in stress testing will be important for the reliability and usefulness of the stress test results in supporting the licensed person's risk and capital management objectives.
- G** 11.21 Where available data is not sufficiently credible, accurate or complete for the scope of the stress test, the licensed person may use other inputs or estimates as proxies where these do not impact the reliability or usefulness of the stress test.
- S** 11.22 The licensed person must explicitly reflect the degree of uncertainty and the credibility of the data and other input used in the stress testing through appropriate loadings or risk margins.

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12. Projection of base scenario

- S** 12.1 The licensed person must project a base scenario of its capital adequacy and financial positions with a specified reference date and projection period.
- S** 12.2 For the purposes of regular stress testing referred to in paragraph 10.2, the licensed person must conduct stress testing annually based on its financial position as at a reference date of 31 December³ and the projection of the base scenario must cover a period of one year⁴ from the reference date.
- S** 12.3 The licensed person must conduct the projection for each fund separately as established and maintained in accordance with section 81 of the FSA for licensed insurers (including licensed professional reinsurers) and section 90 of the IFSA for licensed takaful operators (including licensed professional retakaful operators).
- S** 12.4 The licensed person must develop the base scenario projection using a set of assumptions representing the best estimate of its future experience.
- G** 12.5 Best estimate assumptions for the base scenario should include consideration of future business volumes, claims experience, reserves requirements, expenses incurred and investments achieved over the projection period.

³ Licensed persons that operate with a financial year other than 31 December may conduct the stress testing based on unaudited financial statements.

⁴ The impact of medium-to-long term risks beyond a period of one year is considered under the Dynamic Solvency Test (DST) as specified in the policy document BNM/RH/CP/029-8 "Concept Paper on Financial Condition Report".

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- S** 12.6 The best estimate assumptions must reflect the licensed person's realistic expectation of its future financial position and must be derived by the licensed person using current, credible and realistic information.
- G** 12.7 Information used by the licensed person in setting the best estimate assumptions should include its business plan over the projection period and should consider external factors affecting the outlook of the business such as economic, political, demographic, social and regulatory changes.
- S** 12.8 The licensed person must also ensure that the assumptions made in the projections have due regard to its own historical experience. Where the credibility or relevance of the assumptions are affected by a lack of experience, data quality issues or a change in the underlying business, appropriate mitigating actions must be taken by the licensed person including data adjustments and supplementing the choice of assumptions with appropriate expert judgement and benchmarks.

13. Construction of internally developed scenarios

- S** 13.1 The licensed person must include at least three stress scenarios which it has developed internally for purposes of the regular stress testing submission to the Bank.
- S** 13.2 The licensed person must use stress scenarios that are adverse yet plausible such that their occurrence will have a significant negative impact on the licensed person's solvency and profitability.
- S** 13.3 The licensed person must define the severity of the stress scenarios using established risk measures and choose the magnitude of shocks

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that correspond to the defined level of severity, taking into account its risk appetite and internal policies on risk management.

- G** 13.4 Where it is not possible to calibrate the magnitude of a shock to the defined severity level, the licensed person should use approximation methods that are adequately justified.
- S** 13.5 The licensed person must consider stress scenarios that have an instantaneous impact as well as stress scenarios that have a continuous effect throughout the period of projection.
- S** 13.6 Where the timing of events in a stress scenario has a significant impact on the outcome, the licensed person must choose the timing of shocks occurring during the projection period which result in the most adverse impact.
- G** 13.7 The licensed person may test the impact of a stress scenario at the end of each quarter during the projection period to assess when it has the greatest impact.
- S** 13.8 For a stress scenario involving multiple events or risk categories, the licensed person must ensure that the sequence and linkages between the events or risk categories are addressed in a realistic and logical manner in determining how the scenario unfolds.
- S** 13.9 The licensed person must also consider second round effects that may arise from the original shocks due to increased dependency on one or more risk factors. For example, second round effects may include a change in the size and profitability of new business. In such cases, assumptions on new business growth in the base scenarios will need to be modified by the licensed person to be consistent with the scenario.

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- S** 13.10 In developing the stress scenarios, the licensed person must make reference to internal and external experience, combined with an outlook on potential adverse events in the future. For events that are cyclical in nature, the licensed person must include in its assumptions margins for potential uncertainties in the assessment of the size and duration of the cycle.
- S** 13.11 The licensed person must consider qualitative and quantitative input from all relevant sources in developing the stress scenarios.
- G** 13.12 The licensed person should ensure that the stress scenarios are sufficiently credible by adopting a collaborative approach that incorporates information from a wide range of sources. This entails the licensed person having in place a robust process of eliciting and combining inputs from a range of sources including its various functions and business units, and internal and external databases.
- S** 13.13 In addition to the internally developed scenarios, the licensed person must run additional scenarios or make modification to its internally developed scenarios when required by the Bank, arising from the Bank's review of the licensed person's stress test or as part of the overall supervisory review of the licensed person.

14. Conduct of stress testing for specified scenarios

- S** 14.1 In addition to conducting the stress testing based on the internally developed scenarios, the licensed person must also conduct stress testing of scenarios specified by the Bank (specified scenarios).

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- G** 14.2 For conducting the stress testing of each specified scenario, the Bank may specify:
- (a) the scope of the stress test, whether applicable to all licensed persons or only a selected group of licensed persons;
 - (b) the reference date and the projection period of the stress test;
 - (c) the methodology in conducting the stress test; and
 - (d) the detailed stress parameters for each of the specified scenarios and their application.
- G** 14.3 The Bank may also specify the frequency of conducting stress testing for specified scenarios, including the frequency for any ad-hoc stress testing of such scenarios.
- G** 14.4 The specified scenarios will normally be specified by the Bank on an annual basis prior to the end of each calendar year. However, ad-hoc stress testing may also be required for specified scenarios from time to time depending on the Bank's activities in monitoring of risks within the insurance and takaful sectors or across the financial system as a whole.
- G** 14.5 Where the specified scenarios are specified for the purposes of the Bank's macro-prudential surveillance activities, the scenarios might not necessarily reflect the risk profile of licensed persons, on an individual basis.

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15. Responsibilities of board and senior management

- S** 15.1 The board must be ultimately responsible for the overall stress testing process of the licensed person and must exercise effective oversight⁵ on all aspects of the stress testing process. At a minimum, the board must be responsible for:
- (a) approving policies and key components of the licensed person's stress testing;
 - (b) ensure that the licensed person's stress testing design and processes are appropriate and commensurate with its risk profile; and
 - (c) consider any implications of stress test results on the licensed person's risk appetite and risk tolerance levels; capital and risk management policies; and strategic business decisions.
- S** 15.2 The board must constructively challenge any management actions that are being considered to ensure that such actions proposed by senior management are objective and realistic.
- S** 15.3 The senior management must exercise effective oversight⁵ to ensure:
- (a) the licensed person's conduct of stress testing are in accordance with the requirements set out in this policy document; and
 - (b) the licensed person's stress testing is consistent with its risk appetite statement and risk management policies as approved by its board.

⁵ This paragraph is to be read in conjunction with the policy document BNM/RH/GL 013-5 "Risk Governance", which outlines roles of the Board and the Senior Management in performing their risk oversight function.

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PART C REPORTING AND DOCUMENTATION

16. Reporting to board

- S** 16.1 Senior management must ensure that the following are communicated in a clear and comprehensive manner to the board to facilitate their duties as specified in paragraphs 15.1 and 15.2:
- (a) stress scenarios including detailed parameters used in their construction by the licensed person;
 - (b) results of the licensed person's stress test and key areas of vulnerability;
 - (c) justification on management actions considered in the licensed person's stress test; and
 - (d) comparison of emerging experience with scenarios used in previous stress tests by the licensed person and the impact of changes to scenarios.
- S** 16.2 The licensed person must submit to the Bank an extract of the minutes of its board meetings detailing the deliberations made by its board on the items specified in paragraph 16.1.

17. Reporting to the Bank

- S** 17.1 A report on the regular stress testing must be submitted by the licensed person to the Bank by **31 March** each year.
- S** 17.2 The stress test report must be prepared by the licensed person in accordance with the report format, and contain the minimum information specified in Appendix II.

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- S** 17.3 The licensed person must provide results in the stress report for each internally developed scenario at minimum at a level detailed in Appendix III for licensed insurers (including licensed professional reinsurers) and Appendix IV for licensed takaful operators (including licensed professional retakaful operators). The results must include the impact of the stress scenarios to the following statements of the licensed person:
- (a) Balance Sheet;
 - (b) Profit and Loss; and
 - (c) Capital Adequacy Ratio (CAR)
- S** 17.4 Where management actions are considered within the internally developed scenarios, the licensed person must include results of the stress tests with and without the impact of management actions as part of the stress test report.
- S** 17.5 The licensed person must also complete an electronic results template to be provided by the Bank with the detailed results of its stress tests on the specified scenarios.
- S** 17.6 The licensed person must comply with the time frame specified by the Bank for submission of the electronic results template referred to in paragraph 17.5 which may differ from the time frame for the submission of the regular stress testing report specified in 17.1.

18. Documentation

- S** 18.1 The licensed person must retain comprehensive, accurate and up to date documentation on all aspects of its stress testing process.

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- S** 18.2 Areas to be documented by the licensed person must include, but are not limited to the following:
- (a) policies and procedures of the stress test process;
 - (b) description of key risks and methods;
 - (c) assumptions used in projections;
 - (d) reasons for the choices and bases for internally developed scenarios;
 - (e) deliberation of the stress test results by the board and senior management including issues raised and recommendations;
 - (f) description of situations that trigger the management actions and their rationale;
 - (g) constraints on the data and assumptions, approximations or risk margins applied in addressing these constraints; and
 - (h) nature and extent of any reliance placed on external parties.

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APPENDICES

Appendix I Guidance on Risk Categories and Risk Factors

Stress Testing for Market Risk

- 1.1 Market risk is the risk of financial losses as a result of the reduction in the market value of assets due to exposure to equity, interest rate, property, commodity and currency risks, as well as the risk of financial losses arising from non-parallel movement between the value of liabilities and the value of assets backing the liabilities due to movements in interest rate (interest rate mismatching risks).

- 1.2 The following are examples of risk factors that may be considered when developing scenarios involving market risk:
 - a) The extent of any mismatch of assets and liabilities, including reinvestment risk;
 - b) Widening of yield spread between non-sovereign and sovereign rates;
 - c) Exposure to movements in the equity market as a whole and to individual equity issuers;
 - d) Impact of foreign exchange movements on the value of assets and liabilities; and
 - e) Adverse non-linear effects on asset values due to usage of derivatives.

- 1.3 The following are examples of methods that may be considered in assessing the impact of market risk factors:
 - a) Parallel shifts in the yield curve and changes in the shape of the yield curve (e.g. steepening, flattening or inversions);
 - b) Widening of credit spreads based on ratings, sectors in which the issuer of the debt securities operates or tenure; and
 - c) Stress testing general equity risk based on historical events (e.g. Asian financial crisis) and specific equity risk using the beta of individual equities to the market index.

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Stress Testing for Credit Risk

- 1.4 Credit risk is the risk of losses due to a counterparty's inability or unwillingness to fully meet its contractual financial obligations as they fall due. A licensed person is exposed to this risk from its financial transactions with counterparties such as debtors, borrowers, brokers, policyholders, reinsurers / retakaful operators and guarantors.
- 1.5 The following are examples of risk factors that may be considered when developing scenarios involving credit risk:
- a) Deterioration in credit worthiness of reinsurers / retakaful operators, intermediaries and other counterparties;
 - b) Defaults or rating downgrades of bonds held by licensed persons;
 - c) Default by reinsurers / retakaful operators and debtors;
 - d) Deterioration in the extent and quality of collateral; and
 - e) Greater losses from bad debts than anticipated.
- 1.6 The following are examples of methods that may be considered in assessing the impact of credit risk factors:
- a) For rated private debt securities (PDS), apply published transition probabilities and losses given default statistics;
 - b) For unrated PDS, use a bottom-up approach such as assessing the impact of risk factors on individual obligor creditworthiness or a top-down approach such as ratings migration based on internal scoring systems; and
 - c) For receivables and recoveries, stress the flow rate between "ageing buckets"

Stress Testing for Insurance Risk

- 1.7 Insurance risk refers to the inherent uncertainties as to the occurrence, amount and timing of insurance liabilities and can be separated into the

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following:

- (i) product design, pricing and underwriting risk, which is the risk of costs and liabilities assumed in respect of a product line exceeding the expectation in pricing the product line; and
- (ii) liability risk, which is the risk of under-estimation of liabilities and inadequate provisions to meet obligations to policyholders.

1.8 The following are examples of risk factors that may be considered when developing scenarios involving insurance risk:

- a) increase in claims costs and benefit outgoes;
- b) increase in expenses (including inflation);
- c) variations in persistency and early terminations;
- d) rapid increase or decline in the volume of new business;
- e) changes in reinsurance premium rates, terms and conditions, and availability of cover;
- f) increase in costs of options and guarantees;
- g) catastrophe risks such as flood and pandemic; and
- h) demographic risks such as adverse movements in mortality, morbidity and longevity.

1.9 The following are examples of methods that may be considered in assessing the impact of insurance risk factors:

- a) additional number of deaths per 1000 lives to mortality rates across all ages;
- b) additional number of claims reported per 1000 lives to rates across all ages for medical and health benefits;
- c) estimation of Probable Maximum Losses (PMLs) for general fund exposures to a single catastrophic event with a 1-in-200 year return period;
- d) applying a stressed claims inflation assumption to long-tail classes of general business; and
- e) mass surrenders.

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1.10 Licensed takaful operators are also expected to cover scenarios specific to takaful and retakaful businesses. Examples of such scenarios include:

- a) Deficits in Participants' Risk Fund (PRF) funds which require qard to be paid immediately from shareholders' fund; and
- b) Irrecoverability of qard due to longer than expected time period over which the qard shall be repaid.

Stress Testing for Liquidity Risk

1.11 Liquidity risk arises from a licensed person's inability to realise assets or otherwise obtain the necessary funds to meet its on-balance and off-balance sheet obligations as they fall due, without incurring unacceptable losses or costs.

1.12 The following are risk factors that may be considered when developing scenarios involving liquidity risk:

- a) Mismatch between asset and liability cash flows resulting in realisation of assets during an inopportune time;
- b) Market conditions that encourage the wide spread exercise of embedded options against the licensed person;
- c) A significant and adverse change in the rate of surrenders due to a loss of confidence in the licensed person;
- d) Lower than expected level of new business growth causing the licensed person to utilise assets to meet policy claims;
- e) High new business growth resulting in net cash outflows due to high acquisition costs; and
- f) Significantly large single claim or catastrophe.

Stress Testing for Operational Risk

1.13 Operational risk refers to the risk of loss resulting from inadequate or failed

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internal processes, people and systems; or from external events.

1.14 The following are risk factors that may be considered when developing scenarios for operational risk:

- a) An error in key processes;
- b) Increasing fraudulent activities;
- c) The impact of a catastrophic event on the licensed person's day-to-day operations i.e. business continuity management (BCM);
- d) Potential failure of back-up systems or failure in the efficiency and effectiveness of off-site back-up facilities during recovery period;
- e) The reputational risks to which the licensed person may be exposed;
- f) The impact of legal risks;
- g) The failure of the compliance function in ensuring compliance with all applicable laws, rules and regulations;
- h) The failure of general personnel management controls or inadequate controls put in place;
- i) The marketing and distribution risks to which the licensed person may be exposed;
- j) The technological risks to which the licensed person may be exposed; and
- k) The possible impact of any outsourcing difficulties.

Stress Testing for Financial Group Risk

1.15 The membership of a licensed person in a group can be a potential source of strength to the licensed person, but it can also pose risks, particularly as a result of contagion.

1.16 The following risk factors, while not exhaustive, may be considered when developing scenarios for group risk:

- a) The effect on the licensed person of a high degree of dependence on group resources to support the licensed person's operations; and

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- b) The effect on the licensed person of an impaired parent, subsidiary or affiliate within the group or downgrade in rating of the group.

Stress Testing for Shariah Non-Compliance (SNC) Risk

- 1.17 A licensed takaful operator could be adversely affected if any of its operations is not in compliance with Shariah, or against the advice of its Shariah Committee or the rulings of the Shariah Advisory Council of the Bank (SAC) and policy documents issued by the Bank on Shariah matters.
- 1.18 SNC could have financial and non-financial implications. Financial implications include fines imposed by regulatory authorities and loss of investment income while non-financial implications include legal risk and reputational risk.
- 1.19 The following risk factors, while not exhaustive, may be considered when developing scenarios for SNC risk:
- a) Loss of income or being fined by regulatory authorities due to the holding of SNC assets which may be a result of improper market practices, system errors (e.g. systems not updated with the latest delisted SNC stocks) or purchases made by an external party;
 - b) Legal risk and reputational risk arising from actions that are not in line with SAC Shariah Resolutions; and
 - c) Loss of business due to reputational damage arising from occurrence of an unexpected SNC event due to a Shariah Committee advice.

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Appendix II Stress Testing Report Template and Minimum Information Required

A. Introduction

- 1) Executive summary
- 2) Scope of the stress test
- 3) Limitations of the stress test and reliance on external parties
- 4) Data
 - i. Sources of data used for the stress test
 - ii. Assumptions or approximations used to address inaccurate or incomplete data

B. Scenarios

- 1) Base scenario
 - i. Description of the base scenario
 - ii. Details and justification for methodology and assumptions
- 2) Internally developed scenarios
 - i. Description of scenarios
 - ii. Details and justification for methodology and assumptions
 - iii. Details on management actions considered
 - iv. Adjustments and modifications for specific purposes, for example stress testing for the determination of Individual Target Capital Level under Internal Capital Adequacy Assessment Process (ICAAP)
- 3) Specified Scenarios
 - i. Description of scenarios
 - ii. Adjustments and modifications made in applying prescribed scenarios

C. Results

- 1) Summary and Analyses of Results
 - i. Base scenario
 - ii. Internally developed scenarios (with and without management actions)
 - iii. Specified scenarios
- 2) Assessment of Key Areas of Vulnerability
 - i. Identification of main vulnerable areas and main risk factors affecting

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each of the areas⁶

3) Analysis of Experience and Changes to Scenarios

- i. Comparison of key assumptions and results from projected base scenario in the previous report with actual experience
- ii. Analysis of impact of changes to internally developed scenarios and scenarios prescribed by the Bank compared with the previous report using updated methodology and assumptions in light of actual experience in (i)

D. Minutes of Board Meeting

Extract of minutes of board meetings in carrying out duties under this policy document which shall include discussion on all aspects of the licensed person's stress testing process.

E. Certification of Submission

The licensed person's chief executive officer (CEO) shall certify that:

- (a) the stress test was performed in accordance with standards specified in this policy document.
- (b) the data used in conducting the stress test is credible, accurate and complete.

F. Attachments

- i. Detailed methodology of the stress testing and derivation of assumptions including any models or formulas used
- ii. Summary of all stress parameters for each stress scenario
- iii. Projection to Balance Sheets, Revenue Accounts and Capital Adequacy Ratio in the form as set out in Appendix III for licensed insurers (including licensed professional reinsurers) and Appendix IV for licensed takaful operators (including licensed professional retakaful operators)
- iv. Additional supporting details

⁶ A sufficient level of detail should be given in the assessment in order to provide a meaningful understanding of the vulnerable areas and the causes of stress losses.

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Appendix III Stress Test Result Submission Template for Insurers

Life Insurance Funds (Participating / Non-Participating / Investment-Linked)

Projection To:

Balance Sheet

| Item | Reference Data | Projections | | | |
|--|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Assets</u> | | | | | |
| A Cash and deposits | | | | | |
| B Investment Properties | | | | | |
| C Loans | | | | | |
| D Investments | | | | | |
| 1 Debt instruments | | | | | |
| 2 Equity instruments | | | | | |
| 3 Others | | | | | |
| E Foreign Assets | | | | | |
| F Property, Plant and Equipment | | | | | |
| G Other Assets | | | | | |
| H Total Assets (A+B+C+D+E+F+G) | | | | | |
| <u>Liabilities</u> | | | | | |
| I Policyowner's Fund | | | | | |
| J Investment-Linked Fund | | | | | |
| K Other Liabilities | | | | | |
| L Amount due to Income Statement/Insurance Funds | | | | | |
| M Reserve for Insurance Fund | | | | | |
| N Provision for Tax on Unrealised Capital Gains | | | | | |
| O Total Liabilities (I+J+K+L+M+N) | | | | | |

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General Insurance Fund

Projection To:

Balance Sheet

| Item | Reference Data | Projections | | | |
|---------------------------------------|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Assets</u> | | | | | |
| A Cash and deposits | | | | | |
| B Investment Properties | | | | | |
| C Loans | | | | | |
| D Investments | | | | | |
| 1 Debt instruments | | | | | |
| 2 Equity instruments | | | | | |
| 3 Others | | | | | |
| E Foreign Assets | | | | | |
| F Property, Plant and Equipment | | | | | |
| G Other Assets | | | | | |
| H Total Assets (A+B+C+D+E+F+G) | | | | | |
| <u>Liabilities</u> | | | | | |
| I Premium Liabilities | | | | | |
| J Claims Liabilities | | | | | |
| K Other Liabilities | | | | | |
| L Reserves for Insurance Fund | | | | | |
| M Total Liabilities (I+J+K+L) | | | | | |

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Shareholder's Working Fund

Projection To:

Balance Sheet

| Item | Reference Data | Projections | | | |
|---------------------------------------|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Assets</u> | | | | | |
| A Cash and deposits | | | | | |
| B Investment Properties | | | | | |
| C Loans | | | | | |
| D Investments | | | | | |
| 1 Debt instruments | | | | | |
| 2 Equity instruments | | | | | |
| 3 Others | | | | | |
| E Foreign Assets | | | | | |
| F Property, Plant and Equipment | | | | | |
| G Other Assets | | | | | |
| H Total Assets (A+B+C+D+E+F+G) | | | | | |
| <u>Liabilities</u> | | | | | |
| I Policyowners' Fund EOY | | | | | |
| J Other Liabilities | | | | | |
| K Total Liabilities (I+J) | | | | | |
| <u>Shareholder's Equity</u> | | | | | |
| L Share Capital/Working Fund | | | | | |
| M Share Premium | | | | | |
| N Reserves | | | | | |
| O Retained profits/(loss) | | | | | |
| P Total Equity (L+M+N+O) | | | | | |

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Life Insurance Funds (Participating / Non-Participating / Investment-Linked)

Projection To:

Revenue Account

| Item | Reference Data | Projections | | | |
|---|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Income</u> | | | | | |
| A Net Premium / Net Creation of Units / Consideration for Annuities Granted | | | | | |
| B Net Investment Income | | | | | |
| C Net Unrealised Gain/Loss | | | | | |
| D Net Profit/Loss on Disposal | | | | | |
| E Net Writeback/(Impairment Loss) | | | | | |
| F Net Accretion/(Amortisation) on Securities | | | | | |
| G Other Income | | | | | |
| H Total Income (A+B+C+D+E+F+G) | | | | | |
| <u>Outgo</u> | | | | | |
| I Net Policy Benefits | | | | | |
| J Agency Remuneration | | | | | |
| K Management Expenses | | | | | |
| L Net Bad & Doubtful Debt / (Bad Debt Recovery) | | | | | |
| M Taxation | | | | | |
| N Other Outgo | | | | | |
| O Total Outgo (I+J+K+L+M+N) | | | | | |
| P Excess of Income over Outgo (H-O) | | | | | |
| Q Policyowners' Fund BOY | | | | | |
| R Policyowners' Fund EOY | | | | | |

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General Insurance Fund

Projection To:
Revenue Account

| Item | Reference Data | Projections | | | |
|--|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Income</u> | | | | | |
| A Gross Premium Income | | | | | |
| B Less: Reinsurance Ceded/retrocessions premiums | | | | | |
| C Net Premium Income (A-B) | | | | | |
| D Add/Less: Change in Premium Liabilities | | | | | |
| E Earned Premium Income (C-D) | | | | | |
| F Net Investment Income | | | | | |
| G Net Unrealised Gain/Loss | | | | | |
| H Net Profit/Loss on Disposal | | | | | |
| I Net Writeback/(Impairment Loss) | | | | | |
| J Net Accretion/(Amortisation) on Securities | | | | | |
| K Other Income | | | | | |
| L Total Income (E+F+G+H+I+J+K) | | | | | |
| <u>Outgo</u> | | | | | |
| M Net Claims Paid | | | | | |
| N Add/Less: Change in Claims Liabilities | | | | | |
| O Net Claims Incurred (M+N) | | | | | |
| P Net Commission Paid | | | | | |
| Q Management Expenses | | | | | |
| R Other Outgo | | | | | |
| S Total Outgo (O+P+Q+R) | | | | | |
| T Surplus/Deficit Arising (L-S) | | | | | |
| U Opening Reserves BOY | | | | | |
| V Closing Reserves EOY | | | | | |

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All Funds except Participating Fund / All Funds

Projection To:

Capital Adequacy Ratio (CAR)

| Item | Reference Data | Projections | | | |
|---|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| A Tier-1 Capital | | | | | |
| B Tier-2 Capital | | | | | |
| C Less: Deductions | | | | | |
| D Total Capital Fund Available (TCA) (A+B+C) | | | | | |
| E Market Risk Capital Charges | | | | | |
| F Credit Risk Capital Charges | | | | | |
| G Operational Risk Capital Charges | | | | | |
| H Life Insurance Liabilities Capital Charges | | | | | |
| I General Insurance Liabilities Capital Charges | | | | | |
| J Surrender Value Capital Charges | | | | | |
| K Total Capital Required (TCR) [Max (E+F+G+H+I,J)] | | | | | |
| L Capital Adequacy Ratio (CAR) % (D/K) | | | | | |

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Appendix IV Stress Test Result Submission Template for Takaful Operators

Family Takaful Funds (Sub-Funds for Protection Fund and Annuity Fund)

Projection To:

Balance Sheet

| Item | Reference Data | Projections | | | |
|---|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Assets</u> | | | | | |
| A Cash and deposits | | | | | |
| B Investment Properties | | | | | |
| C Financing | | | | | |
| D Investments | | | | | |
| 1. Debt instruments | | | | | |
| 2. Equity instruments | | | | | |
| 3. Others | | | | | |
| E Foreign Assets | | | | | |
| F Property, Plant and Equipment | | | | | |
| G Other Assets | | | | | |
| <u>H Total Assets (A+B+C+D+E+F+G)</u> | | | | | |
| <u>Liabilities</u> | | | | | |
| I Participants' fund | | | | | |
| J Investment-linked fund | | | | | |
| K Other Liabilities | | | | | |
| L Amount due to Income Statement/Takaful Funds | | | | | |
| M Provision for Tax on Unrealised Capital Gains | | | | | |
| N Revaluation Reserves for Takaful Funds | | | | | |
| <u>O Total Liabilities (I+J+K+L+M+N)</u> | | | | | |

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General Funds

Projection To:

Balance Sheet

| Item | Reference Data | Projections | | | |
|---|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Assets</u> | | | | | |
| A Cash and deposits | | | | | |
| B Investment Properties | | | | | |
| C Financing | | | | | |
| D Investments | | | | | |
| 1. Debt instruments | | | | | |
| 2. Equity instruments | | | | | |
| 3. Others | | | | | |
| E Foreign Assets | | | | | |
| F Property, Plant and Equipment | | | | | |
| G Other Assets | | | | | |
| <u>H Total Assets (A+B+C+D+E+F+G)</u> | | | | | |
| <u>Liabilities</u> | | | | | |
| I Unearned Contribution Reserves | | | | | |
| J Surplus Attributable to Participants | | | | | |
| K Other Reserves | | | | | |
| L Other Liabilities | | | | | |
| M Amount due to Income Statement/Takaful Funds | | | | | |
| N Revaluation Reserves for Takaful Funds | | | | | |
| <u>O Total Liabilities (I+J+K+L+M+N)</u> | | | | | |

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Shareholder's Fund

Projection To:

Balance Sheet

| Item | Reference Data | Projections | | | |
|--|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Assets</u> | | | | | |
| A Cash and deposits | | | | | |
| B Investment Properties | | | | | |
| C Financing | | | | | |
| D Investments | | | | | |
| 1. Debt instruments | | | | | |
| 2. Equity instruments | | | | | |
| 3. Others | | | | | |
| E Foreign Assets | | | | | |
| F Property, Plant and Equipment | | | | | |
| G Other Assets | | | | | |
| <u>H Total Assets (A+B+C+D+E+F+G)</u> | | | | | |
| <u>Liabilities</u> | | | | | |
| I Other Liabilities | | | | | |
| J Amount due to Income Statement/Takaful Funds | | | | | |
| <u>K Total Liabilities (I+J)</u> | | | | | |
| <u>Shareholder's Equity</u> | | | | | |
| L Share Capital | | | | | |
| M Share Premium | | | | | |
| N Reserves | | | | | |
| O Retained Profits/(Loss) | | | | | |
| <u>P Total Equity (L+M+N+O)</u> | | | | | |

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Family Takaful Funds (Ordinary Family/ Family/ Investment-Linked)

Projection To:

Revenue Account

| Item | Reference Data | Projections | | | |
|--|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| <u>Income</u> | | | | | |
| A Net Contribution Income | | | | | |
| B Net Investment Income | | | | | |
| C Net Unrealised Gain/Loss | | | | | |
| D Net Profit/Loss on Disposal | | | | | |
| E Net Writeback/(Impairment Loss) | | | | | |
| F Net Accretion/(Amortisation) on Securities | | | | | |
| G Other Income | | | | | |
| H Total Income (A+B+C+D+E+F+G) | | | | | |
| <u>Outgo</u> | | | | | |
| I Net Certificate Benefits | | | | | |
| J Wakalah Fees | | | | | |
| K Net Commission Paid | | | | | |
| L Management Expenses | | | | | |
| M Increase in Certificate Liabilities (R-Q) | | | | | |
| N Other Outgo | | | | | |
| O Total Outgo (I+J+K+L+M+N) | | | | | |
| P Excess of Income over Outgo (H-O) | | | | | |
| Q Takaful Fund and Reserves BOY | | | | | |
| R Takaful Fund and Reserves EOY | | | | | |

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General Fund

Projection To:
Revenue Account

| Item | Reference Data | Projections | | | |
|--|----------------|-------------|----------|----------|----------|
| | | Base | Scenario | Scenario | Scenario |
| <u>Income</u> | | | | | |
| A Gross Contribution Income | | | | | |
| B Less: Retakaful Ceded/retrocessions premiums | | | | | |
| C Net Contribution (A-B) | | | | | |
| D Add/Less: Change in Unearned Contribution Reserve | | | | | |
| E Earned Contribution (C-D) | | | | | |
| F Net Investment Income | | | | | |
| G Net Unrealised Gain/Loss | | | | | |
| H Net Profit/Loss on Disposal | | | | | |
| I Net Writeback/(Impairment Loss) | | | | | |
| J Net Accretion/(Amortisation) on Securities | | | | | |
| K Other Income | | | | | |
| L Add/Less: Change in Surplus Attributable to Participant and Others | | | | | |
| M Total Income (E+F+G+H+I+J+K+L) | | | | | |
| <u>Outgo</u> | | | | | |
| N Net Claims Paid | | | | | |
| O Add/Less: Change in Provision for Outstanding Claim | | | | | |
| P Net Claims Incurred (N +O) | | | | | |
| Q Wakalah Fee | | | | | |
| R Net Commission Paid | | | | | |
| S Management Expenses | | | | | |
| T Other Outgo | | | | | |
| U Surplus Paid and Payable to Participants | | | | | |
| V Total Outgo (P+Q+R+S+T+U) | | | | | |
| W Surplus/Deficit Arising (M-V) | | | | | |
| X Opening Reserves BOY | | | | | |
| Y Closing Reserves EOY | | | | | |

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All Funds (Family Takaful Funds, General Fund and Shareholder's Fund)

Projection To:

Capital Adequacy Ratio (CAR)

| Item | Reference Data | Projections | | | |
|---|----------------|---------------|------------|------------|------------|
| | | Base Scenario | Scenario 1 | Scenario 2 | Scenario 3 |
| A Tier-1 Capital | | | | | |
| B Tier-2 Capital | | | | | |
| C Less: Deductions | | | | | |
| D Capital Available (CA) (A+B-C) | | | | | |
| E Credit Risk Capital Charges | | | | | |
| F Market Risk Capital Charges | | | | | |
| G Takaful Liabilities Capital Charges | | | | | |
| H Operational Risk Capital Charges | | | | | |
| I Expense Risk Capital Charge | | | | | |
| J Total Risk Capital Charges | | | | | |
| K Surrender Value Capital Charges | | | | | |
| L Capital Required (CR) [max(J,K)] | | | | | |
| Total Capital Available (TCA) | | | | | |
| Total Capital Required (TCR) | | | | | |
| Capital Adequacy Ratio (CAR) % | | | | | |