ACTUARIAL GUIDANCE NOTE

AGN 8 PROCESS FOR DETERMINING LIABILITIES UNDER THE GUIDANCE NOTE ON RESERVING STANDARDS FOR INVESTMENT GUARANTEES AS ISSUED BY THE OFFICE OF THE COMMISSIONER OF INSURANCE

1. Introduction

1.1 The Office of the Commissioner of Insurance issued a Guidance Note on Reserving for Investment Guarantees, called GN7. This guidance note provides members with guidance on the steps to be taken in complying with this GN7.

1.2 GN7 recognises that the factor or deterministic approach is acceptable. However it further states that a stochastic adequacy test must be performed on the total provision for investment guarantees at least once a year. Care should be taken in using a factor or a deterministic approach and where significant changes have occurred then the factors may need to be revised by the use of stochastic modelling.

2. Stochastic Approach

2.1 The following outlines the process for completing a full stochastic investigation.

Select the economic scenario model(s):

- determine the relevant economic/market risk factors to model in the valuation (e.g. equity returns, interest rates, inflation, etc.);
- analyse the long term asset allocation benchmark and investment policy of the fund. This includes considering the asset composition (e.g. proportion invested in equities vs. bonds), including the geographical dispersion of assets, and maturity profile for bonds;
- develop stochastic models to simulate the evolution of these quantities;
- ensure the robustness of the random number generators (e.g. unbiased);
- estimate or set appropriate values for all model parameters (e.g. drift, volatility, mean-reversion interest rate targets, market correlations, etc.). Current updated market data/parameters should be used as far as possible, with historic data as a guide. The historic market data should be taken from recognised market indices and when there are insufficient historical market data, reference should be made to market indices which most closely reflects the long term asset characteristics;
- the model parameters may be adjusted to reflect any hedging strategies and the cost of hedging;
- select a random seed to prime the generator (or otherwise guarantee the reproducibility of scenarios) The generated sets of scenarios are saved to a database and can be re-used when needed;
- sample the projected scenarios to ensure sufficient frequency/severity of tail events over multiple holding periods;

- determine the number of scenarios appropriate to the risk analysis (minimum 1000), this could require prior testing of a sample block of business to establish reasonable convergence in the results.

Populate the in-force business model(s):

- extract relevant in-force information from the company's administrative systems as close as possible to the calculation date, paying particular attention to contract values, especially the nature of any investment guarantees or options;
- test the policy data for integrity and completeness;
- make appropriate assumptions for missing fields and values;
- grouping of data on similar characteristics are acceptable if such approximations do not materially affect the results. It may be necessary to perform some modelling to ensure that the grouping is acceptable.

Determine other model assumptions:

- mortality, lapse, withdrawal, future contributions, new business volumes, etc. Policyholder behaviour including mortality, lapse, withdrawal, future contributions should be consistent with past experience and reasonable future expectations;
- for "scenario tested assumptions" (those whose values vary by economic scenario), establish appropriate parameters for the behaviour models, including management strategies. Establish appropriate parameters for the behaviour models, taking into consideration the impact of different investment scenarios upon the liability cashflows and management strategies;
- also review the options available for management to reduce any risks including wind-up the funds.

Test the cash flow model:

- for a limited sample of policies, ensure the mechanics of the valuation are sound and that the entire process (from data extraction to output of results) is functioning as intended
- check output for reasonableness in light of assumptions and selected behavioural models
- maintain audit trail at each verification phase.

Carry out the projections:

- run the business model over each scenario in the set
- collect the relevant result items for all scenarios (e.g. present value of benefit claims/costs, present value of attributed fee income, present value of expenses)
- calculate the liability (required reserve) for each scenario consistent with the parameters and assumptions for that scenario (e.g. present value of claims less present value of attributed fee income)
- as the test is a solvency test the projection should run to the end of the portfolio lifetime or for a sufficiently long period (say 30 years) for open-end portfolios in each scenario.

Results:

- rank the scenario results in order of increasing severity of the reserve required.
- establish the total provision for the investment guarantees consistent with a 99% level of confidence (e.g. a Conditional Tail Expectation of 96% or CTE(96%)). It will be necessary to show that the proposed measure is likely to be consistent with the 99% confidence level.
- the assumptions and data set should be saved so that the results can be traceable and reasonably reproducible for audit purposes.

3. Factor Approach

3.1 If using a factor-based approach:

- a factor-based approach is acceptable if the risk exposure is minimal or the volume of business is immaterial to the company's balance sheet. Prior stochastic modelling may be necessary to determine the significance of the risk exposure to the company. Application of factors is also acceptable for inter-period (i.e., non quarter-end) reporting.
- factors must be developed from stochastic testing and verified for applicability in the current environment. Separate factors should be used for each product form and vary by the major underlying characteristics of the business being valued.

3.2 A factor-based approach should recognise the primary risk drivers of guaranteed benefit costs, including:

- product form
- member demographics (e.g. attained age, contribution rates, etc.)
- current asset/fund mix
- current guaranteed values
- underlying fee structure
- attributed fee income (margin available to fund the benefit claims)

3.3 The factors should be updated frequently and revised as appropriate to reflect changes in the underlying characteristics of the business.

4. Report

4.1 It is expected that a report would be produced which indicated that the requirements of GN7 are met. This report should include:

- the date of the report
- the purpose of the report and the person producing the report
- the methodology taken in producing the result.
- the data used to arrive at the result
- the assumptions used in arriving at the result.
- the results by types of product and by nature of guarantees.
- any limitations which should be noted either in the data, methodology or assumptions.

5.   **Further Information**

5.1   The following papers may be useful references.

- Report of the CIA Task Force on Segregated Fund Investment Guarantees (1 August 2000) produced by the Canadian Institute of Actuaries
- CIA Research Paper: Financial Considerations of Segregated Fund Investment Guarantees (November 1998)
- CIA Working Group Report: The Use of Stochastic Techniques to Value Actuarial Liabilities under Canadian GAAP (August 2001)

*** END OF ACTUARIAL GUIDANCE NOTE ***