Actuarial Standards Board
Conseil des normes actuarielles

Exposure Draft

Changes to the Standards of Practice – Practice-Specific Standards for Insurers – Section 2300 Valuation of Policy Liabilities: Life Insurance regarding Stochastic Modeling and Segregated Fund Valuation

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800-150 Metcalfe, Ottawa ON Canada K2P 1P1 613.236.8196 613.233.4552 secretariat@asb-cna.ca www.asb-cna.ca

Memorandum

To: All Fellows, Affiliates, Associates and Correspondents of the Canadian Institute of Actuaries and Other Interested Parties

From: Charles C. McLeod, Chairperson
Actuarial Standards Board

John F. Brierley, Chairperson
Designated Group

Date: December 21, 2009

Subject: **Exposure Draft regarding changes to the Standards of Practice – Practice-Specific Standards for Insurers – Section 2300 Valuation of Policy Liabilities: Life Insurance regarding Stochastic Modeling and Segregated Fund Valuation**

Comment Deadline: **March 31, 2010**

INTRODUCTION

The attached exposure draft was approved by the Actuarial Standards Board on December 3, 2009. The changes made, compared to the current Standards of Practice, are highlighted.

A notice of intent on this subject was published on June 5, 2009 with a comment period ending on July 31, 2009.

BACKGROUND

The stochastic modeling and valuation of liabilities for segregated funds is currently covered by a combination of Standards of Practice, educational notes and other guidance. Some of the material in the educational notes and other guidance may be more appropriate to be included in the Standards of Practice.

The current guidance consists of the following,

Research Paper: Financial Considerations of Segregated Fund Investment Guarantees, November 1998 (http://www.actuaries.ca/members/publications/1998/9858e.pdf),

Research Paper: Use of Stochastic Techniques to Value Actuarial Liabilities under Canadian GAAP, August 2001 (http://www.actuaries.ca/members/publications/2001/20169e.pdf),

Report: CIA Task Force on Segregated Fund Investment Guarantees, March 2002 (http://www.actuaries.ca/members/publications/2002/202012e.pdf),

Educational Note: Selection of Interest Rate Models, December 2003 (http://www.actuaries.ca/members/publications/2003/203106e.pdf),

Educational Note: Valuation of Segregated Fund Investment Guarantees (Revised), October 2005 (http://www.actuaries.ca/members/publications/2005/205111e.pdf),

Educational Note: Considerations in the Valuation of Segregated Fund Products, November 2007 (http://www.actuaries.ca/members/publications/2007/207109e.pdf).

ISSUES, PROPOSED CHANGES AND DESIRED OUTCOMES

Generally, the current Standards of Practice already provide much of what is needed for the valuation of the guaranteed in segregated fund products. The educational notes and other guidance (in many instances) refer to the Standards of Practice and provide further guidance thereon. However, there are some changes to the Standards of Practice that would be useful, such as,

1. Stochastic modeling principles are embedded in a number of the above documents. These principles should be formalized into the Standards of Practice for generic application of stochastic modeling.

2. The Standards of Practice do not refer to the method used to value the segregated fund guarantees. The Committee on Life Insurance Financial Reporting (CLIFR) of the Canadian Institute of Actuaries has a firmly entrenched position that the method may be either the "Whole Contract" method or the "Bifurcated" method. The Whole Contract method is used by a number of companies currently and does not separate the cost of the guarantees from the cost of amortizing acquisition expenses. This method is most consistent with the valuation of other life insurance products. The Bifurcated method identifies the various costs associated with the product and values them separately. This method is likely to be consistent with International Financial Reporting Standards (IFRS). Adding both methods to the Standards of Practice would be an improvement over having these methods described in guidance. The Standards of Practice should also include a statement that it would be appropriate to value liabilities associated with segregated fund guarantees using stochastic techniques (as stated in the 2005 guidance document).

3. The stochastic model calibration criteria identified in the segregated fund task force report would be an appropriate addition to the Standards of Practice. The task force report does not recommend how to develop a stochastic model but relies on this calibration to provide similar results for valuation, regardless of how the various models are set up.

4. Subsection 2350 of the Standards of Practice could be enhanced to cover the additional policyholder options included in segregated fund products. The assumptions for these options are discussed in the segregated fund guidance and it would be consistent with other assumptions in the current Standards of Practice if these features were at least mentioned in the Standards of Practice.

5. Paragraph 2350.19.1 identifies some factors that would influence withdrawal rates. Should paragraph 2350.19.1 be enhanced to include additional factors that may also influence withdrawal rates?

Educational Notes, research papers and task force reports are designed to provide supplemental guidance to the Standards of Practice. The desired outcome would be to have recommendations and guidance in the Standards of Practice so that these other publications provide supplementary guidance instead of the current situation where they provide primary guidance. There is no intention to change the meaning of the existing guidance.

As there were no written comments made to the Designated Group on the notice of intent, the Designated Group believes that these changes are not controversial and that there are no significant issues.

The exposure draft includes annuitant mortality rates and calibration criteria for stochastic models to be promulgated by the Actuarial Standards Board. This would need to be completed prior to the revised Standards of Practice becoming effective.

YOUR FEEDBACK

Comments on this exposure draft are invited **by March 31, 2010**. Please send your comments, preferably in electronic format, to John F. Brierley at jfbrierley@sympatico.ca, with a copy to Chris Fievoli at Chris.Fievoli@actuaries.ca.

There is no intended forum planned for submitting comments on this exposure draft, other than the receipt of written comments at the above addresses.

Feedback is particularly invited on the following issues:

1. Do you agree that the identified changes would be more appropriate as Standards of Practice instead of guidance in educational notes, research papers and reports?
2. Is there other guidance in the identified publications on stochastic modeling and segregated fund valuation that would be appropriate as Standards of Practice?

EARLY IMPLEMENTATION

Early implementation is expected to be permitted, as the changes are not intended to change the meaning of the current guidance.

It is the responsibility of the Actuarial Standards Board to make final decisions regarding the revised Standards of Practice. The Actuarial Standards Board hopes to publish final Standards of Practice in 2010 after considering the comments received.

CCM, JFB

2300 VALUATION OF POLICY LIABILITIES: LIFE AND HEALTH (ACCIDENT AND SICKNESS) INSURANCE

2310 SCOPE

.01 The standards in this section 2300 apply in accordance with subsections 2110 and 2120. 2110

2320 METHOD

.01 *The actuary should calculate policy liabilities by the Canadian asset liability method. For valuation of the general account policy liability associated with segregated fund guarantees, the actuary should calculate the policy liability for the guarantee elements by the Canadian Asset Liability Method using stochastic modelling.* 2130.37

.02 *The amount of policy liabilities ~~by that~~using the Canadian asset liability method for a particular scenario is equal to the amount of supporting assets at the balance sheet date that are forecasted to reduce to zero ~~at~~coincident with the last liability cash flow in that scenario.*

.03 *The term of the liabilities should take account of any renewal, or any adjustment equivalent to renewal, after the balance sheet date if* 2320.16

the insurer's discretion at that renewal or adjustment is contractually constrained, and

policy liabilities are larger as a result of taking account of that renewal or adjustment.

.04 *In forecasting the cash flow ~~which~~expected to be generated by the policy liabilities ~~comprise~~, the actuary should* 2130.05

take account of policyholder reasonable expectations, and

include policyholder dividends, other than the related transfers to the shareholders account and other than ownership dividends, in the comprised cash flow from benefits.

.05 *The actuary should calculate policy liabilities for multiple scenarios and adopt a scenario whose policy liabilities make sufficient but not excessive provision for the insurer's obligations in respect of the relevant policies.* 1740.04

.06 *The assumptions for a particular scenario consist of*

scenario-tested assumptions, which should include no margin for adverse deviations, and

each other needed assumption, whose best estimate should be consistent with the scenario-tested assumptions and which should include margin for adverse deviations.

.07 *The scenario-tested assumptions should include at least the interest rate assumptions.*

.08 *The scenarios of interest rate assumptions should comprise*

a base scenario, as defined under paragraph 2330.09.1,

each of the prescribed scenarios in a deterministic application,

ranges which comprehend each of the prescribed scenarios in a stochastic application, and

other scenarios appropriate for the circumstances of the insurer. [Effective October 15, 2006]

.08.1 *For stochastic modelling of segregated fund guarantees, the scenarios of investment returns should comprise*

selection of market indices and proxies,

development of economic scenario generators and model parameters, and

calibration of investment returns.

.08.2 *If the bifurcated approach is used for valuation of the general account policy liability associated with segregated fund guarantees, the allocation of future management expense cash flow between amortization of the allowance for acquisition expense and the guarantee should not change from period to period.*

Liability grouping and asset segmentation

.09 The actuary would usually apply the Canadian asset liability method to policies in groups that reflect the insurer's asset-liability management practice for allocation of assets to liabilities and investment strategy. That application is a convenience, however, that would not militate against calculation of policy liabilities that, in the aggregate, reflect the risks to which the insurer is exposed.

Other methods

.10 For a particular scenario, another method may be equivalent to or approximate, the Canadian asset liability method. If the actuary uses that other method, then the calculation for multiple scenarios and the selection of one that makes sufficient but not excessive provision for the insurer's obligations would be the same as for the Canadian asset liability method.

.10.1 For valuation of the general account policy liability associated with segregated fund guarantees, a factor-based approach, approved by a regulator, would be considered an appropriate approximation and the actuary would not need to undertake testing to determine the appropriateness of this approximation.

.10.2 Two approaches would be appropriate to value segregated fund policies where both additional benefits or guarantees are involved and the allowance for acquisition expense is being amortized.

For the bifurcated approach, management expense cash flow is allocated between recoverability testing of the allowance for acquisition expense and the liability for the guarantee. The portion allocated to the guarantee would be based on the additional charge priced into the product for that guarantee with the remainder applied to amortize the remaining unamortized allowance for acquisition expense. The policy liability for the guarantee is calculated separately using the net cash flows available for the guarantee while the recoverability of the allowance for acquisition expense is tested excluding those revenues allocated to guarantee.

For the whole contract approach, all general account net cash flows associated with segregated funds are considered in calculating the total liability. This total liability will change over the reporting period as a result of market movements and other factors and, therefore, the approach may implicitly include a write-up of the balance of the allowance for acquisition expense.

Supporting assets

.11 In allocating assets to support liabilities, the actuary would preserve the connection between unamortized capital gains, both realized and unrealized, and the asset segments that generated them.

.12 The value of the assets that support policy liabilities at the balance sheet date would be their value in the insurer's financial statements; i.e., book value, taking account of accrued investment income and of adjustments for impairment, amortized unrealized capital gains, and amortized realized capital gains.

.13 The forecasted cash flow of the assets would take account of any related, off-balance sheet, financial instruments.

.13.1 For valuation of segregated fund guarantees, the value of the assets and forecasted cash flow would take account of the insurer's hedging instruments existing at the balance sheet date.

.14 The forecast of cash flow from taxes would take account of permanent and temporary differences between the amortization of capital gains in accordance with generally accepted accounting principles and in accordance with tax law.

.15 The assumed cash flow from policyholder dividends would avoid omission and double counting. 2320.35
For example, if the dividend scale includes distribution of a deferred realized capital gain (adjusted for any corresponding future tax asset or liability), then the assumed cash flow from policyholder dividends would exclude that distribution. In the opposite case, the assumed cash flow from policyholder dividends would provide for negative distribution of a deferred realized capital loss asset (net of any corresponding future tax liability). Such avoidance is appropriate only in the case of liabilities and would not be appropriate if the dividend scale included distribution of assets that support capital, or distribution of investment income on assets that support capital.

Term of the liabilities

.16 If an element of a policy operates independently of the other elements, then it would be treated as a separate policy with its own term of liabilities. Examples are

a flexible premium deferred annuity where the interest guarantee and cash value attached to each premium are independent of those for the other premiums, and

a certificate of voluntary non-contributory association or creditor group insurance.

.17 The term of a policy's liabilities is not necessarily the same as the contractual term of the policy.

.18 In this context,

"renewal" means the renewal of a policy at the end of its term, with the insurer having discretion to adjust premiums or coverage for the new term,

"adjustment" means an insurer's adjustment to a policy's coverage or premiums equivalent to that in a renewal, and

"constraint" means a constraint on the insurer's exercise of discretion in renewal or adjustment that results from contractual obligations, legally binding commitments and policyholder reasonable expectations. Examples of constraint are an obligation to renew a policy unless renewal is refused for all other policies in the same class, a guarantee of premiums, a guarantee of credited interest rate, a general account guarantee of segregated fund value, and a limitation on the amount of adjustment. "Constraint" would not include a price-competitive market expected at renewal or adjustment. 2320.28

.19 The term of a policy's liabilities takes account of all renewals and adjustments before the balance sheet date. Depending on the circumstances, that term may also take account of one or more renewals or adjustments after the balance sheet date.

.20 If the term of the liabilities is not evident, and if selection of a longer term would reduce policy liabilities, then the actuary would be cautious in making such a selection. On the other hand, if selection of a longer term would increase those liabilities, then the actuary would usually select the longer term. Substance would supersede form in the selection; for example, a universal life policy which is in form an annual premium life insurance policy may be in substance a single premium deferred annuity.

.21 The term of the liabilities of

a policy that has been cancelled by the insurer ends at the effective date of cancellation,

a policy that has not been cancelled, but that is cancellable by the insurer at or before the date to which its premiums have been paid, ends at that date,

an individual annual premium life or accident and sickness insurance policy ends at the last day to which the policyholder may prolong its coverage without the consent of the insurer, and

a certificate of group insurance if the group policy is in effect a collection of individual policies is the same as if it were an individual policy, unless contributions or experience rating of the group negate anti-selection by certificate holders.

.22 The term of the liabilities of any other policy ends at the earlier of

the first renewal or adjustment date at or after the balance sheet date at which there is no constraint, and

the renewal or adjustment date after the balance sheet date that maximizes the policy liabilities.

An exception to the above would exist for the liabilities for guarantees of the fund value for segregated fund annuities where the contracts contain material constraints. In this situation, the term of the liability ends at the date after the valuation date which maximizes the policy liabilities, consistent with the treatment for contracts with no material constraints.

.23 The actuary would extend such term only

to permit recognition of cash flow to offset acquisition or similar expenses,

whose recovery from cash flow that would otherwise be beyond such term was contemplated by the insurer in pricing the policy, and

where the value of the additional cash flow recognized by such extension of the term cannot exceed the value of the remaining balance of acquisition or similar expenses, or

to permit reflection of hedging arrangements related to segregated fund guarantees by considering both the value of the liability and its associated hedge,

where the resulting balance sheet presentation is consistent with market movements over the reporting period, and

where such extension would be subject to constraints on the amount of cash flow capitalized, consistent with an unhedged position.

.24 The balance of the allowance for acquisition ~~or similar~~ expense~~s~~ would be written down to zero using an appropriate method. Such method would

have a term consistent with the extended term established at inception,

have a write-down pattern reasonably matched with the net cash flow available to offset these expenses at inception, and

be locked in, so that the amount of write-down in each period will not fluctuate from the expected amount established at inception provided such balance is recoverable from the additional cash flow recognized at the balance sheet date, and where not fully recoverable at the balance sheet date, is written down to the recoverable amount, with the expected amount of write-down in each future period proportionately reduced.

.25 That implies that the term ends at

the balance sheet date if the policy is continually renewable or adjustable without constraint,

the first renewal or adjustment after the balance sheet date if there is no constraint at that renewal or adjustment, and

a renewal or adjustment determined by testing for any other policy. The actuary would calculate the policy liabilities assuming that the term of its liabilities ends at each renewal or adjustment at or after the balance sheet date up to and including the first renewal or adjustment at which there is no constraint, and would select the term corresponding to the largest policy liabilities.

.26 A change in the outlook may provoke a change in the term of a policy's liabilities. For example, the constraint of a cost of insurance guarantee that previously lengthened the term of the policy's liabilities may no longer do so if the outlook for mortality improves. On the other hand, the constraint of a guaranteed credited interest rate that previously was considered innocuous may become meaningful, and thereby lengthen the term of the policy's liabilities, if the outlook changes to one of lower interest rates.

.27 For example, the term of the liabilities ends at

the balance sheet date for a daily interest rate deposit without minimum guarantee, an administrative services only (ASO) contract without expense guarantee, and the general account portion of a deferred annuity with segregated fund liabilities but without guarantees; for example, with no guarantee of the segregated fund value,

the date after the balance sheet date that maximizes the policy liabilities for guarantees of the fund value for segregated fund annuities whose contracts have no material constraints, and for consistency, for those contracts that contain material constraints,

the first renewal of a single premium deferred annuity that is, in effect, a term deposit (i.e., having a credited interest rate guarantee for a stipulated period, say three years, beginning at the date of deposit, and no guarantee thereafter),

the first renewal (usually one year after the previous renewal) of a group policy that insures employee benefits, unless there is a constraint at that renewal, and

the next renewal date or adjustment date even if there is a constraint at renewals and adjustments at and after that date, but the constraint is so weak that its operation does not increase policy liabilities.

Policyholder reasonable expectations

.28 The insurer's policies define contractually its obligations to its policyholders. The contractual definition may leave certain matters to the insurer's discretion, such as

> the determination of policyholder dividends, experience-rating refunds, and retrospective commission adjustments, and
>
> the right to adjust premiums.

.29 Matters left to the insurer's discretion implicitly include

> underwriting and claim practices, and
>
> the right to waive contractual rights and to create extra-contractual obligations.

.30 Policyholder reasonable expectations are the expectations that

> may be imputed to policyholders as their reasonable expectations of the insurer's exercise of discretion in those matters, and
>
> arise from the insurer's communication in marketing and administration, from its past practice, from its current policy, and from general standards of market conduct. Past practice includes the non-exercise of discretion; for example, long non-exercise without affirmation of a right to adjust premiums may undermine it. The insurer's communication includes policyholder dividend and investment performance illustrations at sale of a policy and that of intermediaries reasonably perceived as acting in its behalf.

.31 In selecting assumptions for the insurer's exercise of discretion in those matters, the actuary would take policyholder reasonable expectations into account. Taking account of policyholder reasonable expectations may affect not only the amount of policy liabilities but also disclosure in the financial statements.

.32 The determination of policyholder reasonable expectations is straightforward when the insurer's practice has been clear, unvarying, consistent with its communications, consistent with general standards of market conduct, and the insurer does not intend to change it. The actuary would discuss any other practice with the insurer, with a view to clarifying policyholder reasonable expectations.

.33 If the insurer makes a change that will eventually alter policyholder reasonable expectations, then the actuary would consider both the appropriate disclosure of the change in policyholder communication and the financial statements, and the time elapsed before the altered expectations crystallize.

.34 A dispute over policyholder reasonable expectations may lead to class action or other litigation by policyholders against the insurer, which may affect policy liabilities or generate contingent liabilities.

Policyholder dividends

.35 The assumed cash flow from policyholder dividends would be that from both periodic (usually annual) dividends and terminal and other deferred dividends, but excluding that from the related transfers from the participating to the shareholders account in a stock insurer.

.36 The assumed cash flow from policyholder dividends would avoid omission and double counting with other elements of the policy liabilities and with liabilities other than policy liabilities. For example, if the actuary has valued the policy liabilities for riders and supplementary benefits in participating policies as though they were non-participating — i.e., with provision for adverse deviations in excess of that appropriate for participating insurance – then the assumed cash flow from policyholder dividends would exclude the portion of that excess which is included in the dividend scale.

.37 The selected policyholder dividend scales in a particular scenario would be consistent with the other elements of that scenario, but would take account of how insurer inertia, policyholder reasonable expectations, and market pressure may preclude the dividend scale from being responsive to changes assumed in the scenario. Those scales would also be consistent with the insurer's dividend policy except in a scenario which that policy does not contemplate and which would provoke a change in it.

.38 If the current dividend scale anticipates a future deterioration in experience, then the actuary would assume continuance of that scale in response to that deterioration. If the current dividend scale does not respond to a recent deterioration in experience but the insurer's policy is to do so, and if the delay in doing so does not provoke a contrary policyholder reasonable expectation, then the actuary would assume such response.

.39 An assumption of cash dividends to all policyholders is appropriate only if the alternative options to cash have equivalent value, failing which the actuary would

either adjust the cash dividends to reflect the non-equivalence or make explicit assumption about policyholder exercise of the various dividend options, and

provide for the anti-selection which will result from increasing exercise of the more valuable options.

Forecast of cash flow

.40 In calculating policy liabilities, the actuary would allocate assets to the liabilities at the balance sheet date, forecast their cash flow after that date, and, by trial and error, adjust the allocated assets so that they reduce to zero at the last cash flow.

.41 Use of the work of another person may be appropriate for forecasting the cash flow of certain assets, such as real estate. 1610

Income tax and alternative tax

.42 This item deals with cash flow from tax based on income (herein called "income tax") and other taxes not based on income but which interact with income tax; for example, certain capital taxes in Canada (herein called "alternative tax").

.43 The cash flow from such taxes would be limited to that in respect of the relevant policies and the assets which support their policy liabilities, and thus, with the exception of the recoverability of future tax losses described below would ignore any interaction between that cash flow and cash flow in the rest of the insurer; e.g., it would ignore tax on investment income from assets which support the insurer's capital. For a particular scenario, forecasted income before tax is equal to zero in each accounting period after the balance sheet date. That is so because that scenario assumes occurrence of the adverse deviations for which it makes provision. If income according to tax rules were equal to income in accordance with generally accepted accounting principles, and if there were no alternative tax, then the corresponding forecasted tax cash flow would also be equal to zero. In reality, however, such tax cash flow may differ from zero because of 2320.40

differences – both temporary and permanent – between income in accordance with generally accepted accounting principles and in income in accordance with tax rules,

the operation of carry-forward and carry-back in the tax rules, and

alternative tax and the interaction between it and income tax.

.44 An example of a temporary difference is a difference between policy liabilities and the corresponding tax liabilities.

.45 An example of a permanent difference is a preferential tax rate on the investment income on a class of assets.

.46 The forecast of cash flow from such taxes would therefore take account of positive or negative tax as a result of permanent and temporary differences at, and arising after, the balance sheet date, and of alternative taxes incurred after the balance sheet date.

.47 The resulting policy liabilities make appropriate provision for cash flow on account of such taxes. If the insurer's balance sheet records a future tax asset or liability in respect of such taxes, then, in order to avoid double counting, the actuary would adjust the policy liabilities otherwise calculated upward to reflect the existence of the future tax asset and downward to reflect the existence of future tax liability.

.48 The realization of negative tax depends on the simultaneous availability of income that is otherwise taxable. In forecasting such income, the actuary would 2320.43

make provision for adverse deviations,

take into account the projected tax position of the company overall, but

not take account of the expected release of provisions for adverse deviations in the policy liabilities because, as noted above, their calculation implicitly assumes that those adverse deviations occur.

Adverse deviations borne by policyholders

.49 The policy liabilities need not make provision for adverse deviations to the extent that the insurer can offset its effect by adjustments to policyholder dividends, premium rates, and benefits. The insurer's contractual right of such offset may be constrained by policyholder reasonable expectations, competition, regulation, administrative delays, and the fear of adverse publicity or anti-selection. 1740.12 1740.24

Adoption of a scenario

.50 If the selection of scenarios is deterministic, then the actuary would adopt a scenario whose policy liabilities are within the upper part of the range of the policy liabilities for the selected scenarios, provided, however, that the policy liabilities would not be less than those in the prescribed scenario with the largest policy liabilities.

.51 If the selection of scenarios is stochastic, then the actuary would adopt a scenario whose policy liabilities are within the range defined by

the average of the policy liabilities which are above the 60th percentile of the range of policy liabilities for the selected scenarios, and

the corresponding average for the 80th percentile.

Scenario-tested assumptions

.52 The provision for adverse deviations in respect of scenario-tested assumptions results from calculating the policy liabilities for multiple scenarios and adopting a scenario whose policy liabilities are relatively high. 1740.21

Other assumptions

.53 The provision for adverse deviations in respect of each assumption other than the scenario-tested assumptions results from a margin for adverse deviations included in that assumption.

.54 The assumptions unique to a particular scenario are the scenario-tested assumptions and each other assumption which is correlated with them. For example, policyholder dividends and the exercise of options by borrowers and issuers are strongly correlated with interest rates. Lapses may be correlated or not, depending on the circumstances. The assumption on a matter not so correlated would be common to all scenarios. 1740.39

Margin for adverse deviations

.55 The margin for adverse deviations would be at least the average of the applicable high and low margin whenever at least one 'significant consideration' exists, or at least one other consideration is significant in the context of the valuation. Significant considerations vary by type of assumption and are described under subsections 2340 and 2350.

2330 SCENARIO ASSUMPTIONS: INTEREST RATES

General Considerations

.01 An interest rate scenario comprises, for each forecast period between the balance sheet date and the last cash flow,

an investment strategy, and

an interest rate for each risk-free asset and the corresponding premium for each asset subject to default.

.02 Each interest rate scenario would include an assumption with respect to the rate of inflation that is consistent with that scenario.

.03 The interest rate scenario would be consistent among the insurer's lines of business.

.04 The investment strategy defines reinvestment and disinvestment practice for each type, default risk classification, and term of the invested assets that support policy liabilities. Assumption of the insurer's current investment strategy implies investment decisions of reinvestment and disinvestment in accordance with that strategy and hence the risk inherent in that strategy.

.05 The investment strategy for each scenario would be consistent with the insurer's current investment policy. The policy liabilities would, therefore, make no provision for any increased risk which may result from a change in that policy.

.06 When using non-debt instruments, the actuary would ensure that the proportion of non-debt instruments, at each duration, would be in accordance with the insurer's current investment policy (regardless of whether net cash flows for the period are positive or negative). This review would be performed without taking into consideration any business that could be issued after the valuation date (new sales) even for a valuation done on a going concern basis as stipulated in paragraph 2130.02. In the case where the investment policy limits are set on a going concern basis, the actuary would be satisfied that the projected proportion of non-debt assets is appropriate to support only the in-force business at the valuation date, and does not explicitly or implicitly assume any future new business. This may create a situation where the actuary would have to assume that non-debt instruments would be divested. This disinvestment is not limited to non-debt instruments acquired after the valuation date.

.07 The number of assumed terms of assets would be large enough to permit assumption of changes in the shape and steepness of the yield curve. That implies a minimum of a short, a medium, and a long term.

.08 A scenario for a foreign country's interest rates would be formulated independently of that for Canadian interest rates unless their positive historical correlation is expected to continue.

.09 The importance of the assumptions for a particular forecast period depends on the magnitude of the net forecasted cash flow for that period.

Base Scenario

.09.1 The interest rates for investments purchased or sold would be based on the following interest rate scenario using the insurer's current investment strategy,

> risk-free interest rates effective after the balance sheet date would be equal to the forward interest rates implied by the equilibrium risk free market curve at that date, for the first 20 years after the balance sheet date,
>
> at or after the 40th anniversary from the balance sheet date, risk-free interest rates would be equal to the sum of ½ of the 60 month and 120 month moving averages of historic long-term Canadian risk-free bond yields (V122544 term-to-maturity>10 years), annualized and rounded to the nearest 10 basis points, and
>
> between the 20th and 40th anniversary, the forward risk-free interest rates would be determined using a uniform transition,

and the premiums for default risk at all durations, would be consistent with the current investment strategy and risk premiums available in the market at the balance sheet date.

.09.2 The provision for adverse deviations for interest rate risk for both deterministic and stochastic applications would be measured as the difference between the reported policy liabilities and the policy liability resulting from the application of the Base Scenario.

Prescribed scenarios

.10 Because future investment returns and inflation rates are so conjectural, it is desirable that the calculation of policy liabilities for all insurers take account of certain common assumptions. There are, therefore, nine prescribed scenarios as presented below.

.11 The prescribed scenarios apply to debt investments acquired or sold after the balance sheet date.

.12 For a prescribed scenario, if the net cash flow forecast for a period is positive, then the actuary would assume its application to repay the outstanding balance, if any, of borrowing in accordance with paragraph 2330.14, and then would

> assume the reinvestment of any remainder in debt investments, except that, in lieu of debt investments, the actuary may assume reinvestment in non-debt investments
>
> not to exceed their proportion of investments at the balance sheet date if the insurer controls investment decisions and if such reinvestment is consistent with its investment policy, or
>
> in the proportion expected to be selected by policyholders if policyholders control investment decisions.

.13 The limitation on reinvestment in non-debt instruments is intended to apply in situations where reflecting increased utilization of these instruments would reduce the policy liabilities.

.14 For a prescribed scenario, if the net cash flow for a period is negative, then the actuary would assume an offsetting disinvestment or borrowing, or a mix of the two. For insurer controlled investment decisions, any borrowing would be in accordance with the investment policy, would be short term, and would be expected to be soon repayable by subsequent positive forecasted net cash flow.

.15 The prescribed scenarios provide guidance on interest rates for sale and purchase of investments and on the type and term of investments purchased, but provide no guidance on the type and term of investments sold.

.15.1 The prescribed range of short-term Canadian risk-free interest rates for the ultimate forecast period is calculated as follows (but see also paragraph 2330.153 below for limitations). The lower bound of the short-term rates is determined as the lesser of 3%, and the rate determined by taking 90% of the sum of 1/2 of the 60 month and 120 month moving averages of historic 91-day Canadian risk-free interest rates. The upper bound of the short-term rates is determined as the greater of 10%, and 110% of the sum of 1/2 of the 60 month and 120 month moving averages of historic 91 day Canadian risk- free rates. These range bounds are rounded to the nearest 10 basis points. The 91 day Canadian risk-free interest rate is defined as the effective annual rate equivalent to the Short Rate: V122531 - Government of Canada 91 Day Treasury Bill Yield rate which is compounded quarterly.

.15.2 The prescribed range of long-term Canadian risk-free interest rates for the ultimate forecast period is calculated as follows (but see also paragraph 2330.153 below for limitations). The lower bound of the long-term rates is determined as the lesser of 5%, and the rate determined by taking 90% of the sum of 1/2 of the 60 month and 120 month moving averages of historic long-term Canadian risk-free bond interest rates (term-to-maturity >10 years). The upper bound of the long-term rates is determined as the greater of 12%, and 110% of the sum of 1/2 of the 60 month and 120 month moving averages of historic long-term Canadian risk-free bond interest rates (term-to-maturity >10 years). These range bounds are rounded to the nearest 10 basis points. The long-term Canadian risk-free bond interest rate (term-to-maturity >10 years) is defined as the effective annual rate equivalent to the Long Rate: V122544 - Government of Canada Benchmark Bond Yield – Long Term rate which is compounded semi-annually.

.15.3 The width of the prescribed range of interest rates is exactly 7%. As a result, if the lower bound of the range is below 3% (short-term) or 5% (long-term), the upper bound of the range will be adjusted to be exactly 7% larger than the lower bound. Similarly, if the upper bound of the range is above 10% (short-term) or 12% (long-term), the lower bound of the range will be adjusted to be exactly 7% less than the upper bound.

.16 The parameters in the prescribed scenarios apply to investments denominated in Canadian dollars. For each prescribed scenario, the actuary would determine the corresponding parameters for investments denominated in a foreign currency from the historical relationship between investments denominated in that currency and investments denominated in the Canadian dollar if the expected continuance of that relationship so permits. Otherwise the actuary would devise independent scenarios for investments denominated in that currency.

.17 For each of prescribed scenarios 1 to 6 the insurer's reinvestment strategy for debt instruments by type and term

at the balance sheet date is the distribution which the insurer is then purchasing,

at and after the 20th anniversary of the balance sheet date is risk-free coupon bonds with a term of 20 -years or less, and

between those two dates is according to a uniform transition from the balance sheet date distribution to risk-free coupon bonds with a term of 20 years or less.

Prescribed scenario 1

.18 The risk-free interest rates for investments purchased or sold

at the balance sheet date are those for the distribution of investments which the insurer is then making,

at the first anniversary from the balance sheet date are 90% of the risk-free rates at the balance sheet date,

at and after the 20th anniversary of the balance sheet date are the lower bounds of the short-term and long-term rates as described in paragraphs 2330.15.1 through 2330.15.3, and

between the last two dates are determined according to a uniform transition from the first anniversary rates to the lower bounds of the prescribed range.

Interest rates between the short-term and long-term bounds are determined using yield rates that are appropriate for the terms of those assets, in accordance with the historic relationship between the rates of those assets and the short-term and long-term interest rates.

Prescribed scenario 2

.19 This scenario is the same as prescribed scenario 1, with the 90% replaced by 110% and with the short-term lower bound replaced by the short-term upper bound and the long-term lower bound replaced by the long-term upper bound.

Prescribed scenario 3

.20 The long-term risk-free interest rate moves cyclically in 1% steps between the long-term lower and upper bounds of the prescribed range determined in paragraphs 2330.15.1 through 2330.15.3. The first cycle is irregular; at the first anniversary of the balance sheet date, the rate is

> the next step higher, such that the interest rate is an integral difference from the bounds of the range, if the actual rate at the balance sheet date is less than the long-term upper bound, with the rate at subsequent anniversaries increasing in 1% steps to the long-term upper bound, at which point the cycle continues regularly, and
>
> the next step lower, such that the interest rate is an integral difference from the bounds of the range, if the actual rate at the balance sheet date is equal to or greater than the long-term upper bound, with the rate at subsequent anniversaries decreasing in 1% steps to the long-term upper bound, at which point the cycle continues regularly.

.21 The short-term risk-free interest rate changes uniformly over a period, usually not more than three years, from that at the balance sheet date to 60% of the corresponding long-term interest rate, and thereafter remains at 60% of the corresponding long-term interest rate.

.22 Other interest rates are determined using yield rates that are appropriate for the terms of those assets, in accordance with the historic relationship between the rates of those assets and the short and long-term interest rates.

Prescribed scenario 4

.23 This scenario is the same as prescribed scenario 3, except that the first irregular cycle reaches the long-term lower bound rather than the long-term upper bound.

Prescribed scenario 5

.24 This scenario is the same as prescribed scenario 3, except that the short-term interest rate at an anniversary of the balance sheet date is a percentage of the corresponding long-term interest rate. That percentage moves cyclically in 20% annual steps from 40% to 120% and back. The first cycle is irregular; at the first anniversary, the percentage is

> the next step above the actual percentage at the balance sheet date if that actual percentage is less than 120%, and
>
> 120% otherwise,

after which the cycle continues regularly.

Prescribed scenario 6

.25 As respects long-term interest rate, this scenario is the same as prescribed scenario 4.

.26 As respects short-term interest rate, this scenario is the same as prescribed scenario 5, except that, at the first anniversary of the balance sheet date, the percentage is

the next step below the actual percentage at the balance sheet date if that actual percentage is more than 40%, and

40% otherwise.

Prescribed scenario 7

.27 The interest rates for investment purchased or sold are 100% of the Base Scenario at the balance sheet date and 90% of the Base Scenario at the first anniversary from the balance sheet date and all following durations.

Prescribed scenario 8

.28 The interest rates for investment purchased or sold are 100% of the Base Scenario at the balance sheet date and 110% of the Base Scenario at the first anniversary from the balance sheet date and all following durations.

Prescribed scenario 9

.29 This scenario assumes continuance of risk-free interest rates and the premiums for default risk consistent with the current investment strategy and risk premiums available in the market at the balance sheet date.

Other scenarios

.30 In addition to the prescribed scenarios, which would be common to the calculation of policy liabilities for all insurers, the actuary would also select other scenarios that would be appropriate to the circumstances of the case. If current rates are near or outside the limits of the prescribed ranges defined, then some scenarios would include rates that, in the near term, would be outside the prescribed ranges. The reasonableness of degrees of change of interest rates would be largely dependent on the period of time being considered. Other plausible scenarios would include parallel shifts up and down as well as flattening and steepening of the yield curve. The scenarios would include those in which the premiums for default risk range from 50% to 200% of the actual premiums at the balance sheet date.

.31 The number of other interest rate scenarios would be relatively large to the extent that

the pattern of forecasted net cash flow in the Base Scenario is such that the classification of scenarios between favourable and unfavourable is unclear,

forecasted net cash flow is sensitive to the selection of interest rate scenarios,

the range of present values of forecasted net cash flow is wide, suggesting exposure to mismatch risk,

investment policy does not control mismatch risk,

asset-liability management is loose, or

flexibility to manage assets or liabilities is limited.

Stochastic scenarios

.32 If stochastic modelling is performed for other than segregated fund guarantees, the actuary would ensure that the stochastic model includes scenarios that generate policy liabilities outside the range produced by application of the prescribed deterministic scenarios.

2340 OTHER ASSUMPTIONS: ECONOMIC

Margin for adverse deviations

.00.1 Significant considerations indicating difficulties in properly estimating the best estimate assumption would include

there is little relevant experience,

future experience is difficult to estimate,

operational risks adversely affect the likelihood of obtaining the best estimate assumption,

asset underwriting criteria are weak or poorly controlled,

there are liquidity concerns,

there is uncertainty regarding the credit enhancement techniques used,

the trust structure and legal responsibilities of the different parties for a securitized asset are not clearly understood in a practical and/or legal sense,

the asset held is from a non-passthrough structure with a repackaging of the credit risk that is difficult to understand,

the asset held is from a lower quality tranche of a non-passthrough structure that repackages credit risks,

there is uncertainty about the counterparty credit, or

there is no netting of the aggregate exposure with a counterparty.

.00.2 Other significant considerations indicative of a potential deterioration of the best estimate assumption would include

there is significant concentration of risks and/or lack of diversification, or

operational risks are present such that the likelihood of continuing to obtain the best estimate assumption is adversely impacted.

Fixed income assets: investment return

.01 The forecast of cash flows from a fixed income asset would be the promised cash flows over the term of the asset, modified for asset depreciation and borrower and issuer options. 2340.02 2340.08

Fixed income assets: asset depreciation

.02 The actuary's best estimate of asset depreciation would depend on

asset type, credit rating, liquidity, term, and duration since issue,

subordination to other debt of borrower or issuer,

the insurer's credit underwriting standards, diversification within a particular type of investments, to the extent that it is indicative of the future, the insurer's own experience,

the insurance industry's experience,

guarantees which offset depreciation, such as that in an insured mortgage, and

potential for anti-selection by borrowers and issuers.

.03 Asset depreciation comprises that of both assets that are impaired at the balance sheet date and assets that become impaired after the balance sheet date, and includes loss of interest, loss of principal, and expense of managing default.

.04 Asset depreciation is likely to be relatively high after the forced renewal of a mortgage loan; i.e., one where the mortgagor can neither pay, nor find an alternative mortgagee for the balance outstanding at the end of its term but is able to continue its amortization. The explicit forecasting of subsequent cash flow is usually so conjectural that, to commute the cost of that asset depreciation to the end of the term of the mortgage would be an acceptable approximation unless it undermines the interest rate assumption in the scenario.

.05 The actuary would not necessarily assume that the best estimate of asset depreciation is less than the premium of an asset's investment return over the corresponding default-free interest rate.

.06 The low and high margins for adverse deviations for a scenario would be respectively 25% and 100% of the best estimate for that scenario, except that

a higher range would be appropriate where those percentages of an unusually low best estimate are not meaningful, and

zero would usually be appropriate for an Organisation for Economic Cooperation and Development (OECD) government's debt denominated in its own currency.

.07 Repealed

Fixed income assets: exercise of borrower and issuer options

.08 Examples of borrower and issuer options are the option to prepay a mortgage loan, to extend the term of a loan, and to call a bond.

.09 The assumed exercise may depend on the interest rates in the scenario. Anti-selection by commercial borrowers and issuers would usually be intense.

.10 Forecasted cash flows would include any penalty generated by exercise of an option.

Non-fixed income assets: investment return

.11 The actuary's best estimate of investment return on a non-fixed income asset would not be more favourable than a benchmark based on historical performance of assets of its class and characteristics.

.12 The low and high margins for adverse deviations in the assumptions of common share dividends and real estate rental income would be respectively 5% and 20%.

.13 The margin for adverse deviations in the assumption of common share and real estate capital gains would be 20% of the best estimate plus an assumption that those assets change in value at the time when the change is most adverse. That time would be determined by testing, but usually would be the time when their book value is largest. The assumed change as a percentage of market value

of a diversified portfolio of North American common shares would be 30%, and

of any other portfolio would be in the range of 25% to 40% depending on the relative volatility of the two portfolios.

.14 Whether the assumed change is a gain or loss would depend on its effect on benefits to policyholders. A capital loss may reduce policy liabilities as a result of that effect.

Taxation

.15 The best estimate would be for continuation of the tax regime at the balance sheet date, except that the best estimate would anticipate a definitive or virtually definitive decision to change that regime. The margin for adverse deviations would be zero. 1520.06

Foreign exchange

.16 The needed assumptions would include foreign exchange rates when policy liabilities and their supporting assets are denominated in different currencies.

.17 The base scenario used to develop the assumption for foreign exchange rates would be based on currency forwards. If currency forwards are not available, the forward exchange rates would be derived based on risk-free interest rate differentials where available. If neither is available, the actuary would use his or her best judgment to develop an appropriate approach. 1130

.18 A provision for adverse deviations would be developed from a scenario using adverse movements in the exchange rate. Such movements would reflect the historical volatility in the exchange rate over the applicable period. The provision for adverse deviations would be the excess of the policy liabilities based on this adverse scenario over the policy liabilities calculated using the base scenario.

.19 A minimum provision for adverse deviations would apply. This would be the excess of the policy liabilities resulting from the application of an adverse five percent margin to the projected exchange rates underlying the base scenario over the policy liabilities calculated using the base scenario.

2350 OTHER ASSUMPTIONS: NON-ECONOMIC

Margin for adverse deviations

.01 The actuary would select a margin for adverse deviations between a low margin and a high margin

specified for each best estimate assumption discussed below, and 1740.39

of 5% and 20% (or –5% and –20%) respectively of each other best estimate assumption.

.02 Provided, however, that, if a margin for adverse deviations cannot be defined as a percentage of the best estimate assumption, then the related provision for adverse deviations would be taken as the increase in policy liabilities that results from substitution of a conservative assumption for the best estimate assumption.

.03 Significant considerations indicating difficulties in properly estimating the best estimate assumption would include

the credibility of the company's experience is too low to be the primary source of data,

future experience is difficult to estimate,

the cohort of risks lack homogeneity,

operational risks adversely impact the likelihood of obtaining best estimate assumption, or

the derivation of the best estimate assumption is unrefined.

.03.1 Other significant considerations indicative of a potential deterioration of the best estimate assumption would include

there is significant concentration of risks and/or lack of diversification,

operational risks adversely impact the likelihood of continuing to obtain best estimate assumption, or

past experience may not be representative of future experience and the experience may deteriorate.

Other significant considerations may exist, but are tied to specific assumptions. Where applicable, they are described below.

.04 A selection above the high margin would be appropriate, however, for unusually high uncertainty or if the resulting provision for adverse deviations is unreasonably low because the margin is expressed as a percentage and the best estimate is unusually low.

Insurance mortality

.05 The actuary's best estimate of insurance mortality would depend on

the life insured's age, sex, smoking habit, health, and lifestyle,

duration since issue of the policy,

plan of insurance and its benefits provided,

the insurer's underwriting practice (that of its reinsurer for facultative reinsurance), including, if applicable to the policy, the absence of underwriting or less stringent underwriting for a group of simultaneously sold policies,

the size of the policy, and

the insurer's distribution system and other marketing practice,

and would include the effect of any anti-selection. 1730.18

.06 If the actuary's best estimate assumption includes a secular trend toward lower mortality rates whose effect is to reduce the policy liabilities, then the actuary would negate that trend by an offsetting increase or decrease in what the actuary would otherwise select as a margin for adverse deviations.

.07 The low and high margins for adverse deviations for the mortality rate per 1,000 would be respectively an addition of 3.75 and 15, each divided by the best estimate curtate expectation of life at the life insured's projected attained age.

.08 Repealed

Annuity mortality

.09 The actuary's best estimate assumption of annuity mortality would depend on

the annuitant's age, sex, smoking habit, health, and lifestyle,

size of premium,

plan of annuity and its benefits provided, and

whether registered or not, whether structured settlement, and whether group or individual contract,

and would include the effect of any anti-selection resulting from the annuitant's option to select the timing, form, or amount of annuity payment, or to commute annuity payments. 1730.18

.10 The insurance underwriting in a "back-to-back" insurance/annuity package may unfavourably affect the best estimate.

.11 It is prescribed that the actuary's best estimate includes a secular trend toward lower mortality rates as promulgated from time to time by the Actuarial Standards Board.

.12 The low and high margins for adverse deviations would be respectively a subtraction of 5% and 15% of the best estimate.

.13 An additional significant consideration for the determination of the level of margin for adverse deviations would be the possibility of commuting survival dependent benefits after periodic payments have started. 2350.01

Morbidity

.14 The actuary's best estimate of insurance morbidity would depend on

the life insured's age, sex, smoking habit, occupation, industry, health, and lifestyle,

duration since issue of the policy,

in the case of income replacement insurance, definition of disability, unemployment levels, and, in the case of an outstanding claim, cause of disability,

plan of insurance and its benefits provided, including elimination period, guarantees, deductibles, coinsurance, return-of-premium benefits, and benefit limits, indexation, and offsets,

the insurer's underwriting practice (that of its reinsurer for facultative reinsurance), including, if applicable to the policy, the absence of underwriting or less stringent underwriting for a group of simultaneously sold policies,

the insurer's administration and claim adjudication practice,

the size of the policy,

seasonal variations,

in the case of group insurance, participation level, and

environmental factors, such as a change in the offset to government benefits,

and would include the effect of any anti-selection. 1730.18

.15 If the actuary selects a higher than usual best estimate of disability incidence because of an outlook for a high level of unemployment, he or she would not necessarily select a concomitant higher than usual best estimate of disability termination.

.16 Repealed

.17 The low and high margins for adverse deviations would be respectively an addition of 5% and 20% of the best estimate of morbidity incidence rates, and a subtraction of 5% to 20% of the best estimate morbidity termination rates. The actuary's selection would reflect any expected correlation between incidence and termination rates.

.18 Additional significant considerations to be taken into account when determining the level of margin for adverse deviations would include 2350.01

the contract wording not tight enough to protect against medical advances,

definitions of claim events not precise and/or not protecting against potential anti-selection, or

interpretation of claim event definitions by the court uncertain.

Withdrawal and partial withdrawal

.19 The actuary's best estimate of withdrawal rates would depend on

policy plan and options,

the life insured's attained age,

duration since issue of the policy,

method of payment and frequency of premiums,

premium paying status,

policy size,

the policy's competitiveness, surrender charges, persistency bonuses, taxation upon withdrawal, and other incentives and disincentives to withdrawal,

policyholder and sales representative sophistication,

the insurer's distribution system and its commission, conversion, replacement, and other marketing practices, and

the interest rate scenario,

and would include the effect of any anti-selection. 1730.18

.19.1 For the valuation of segregated fund guarantees, the actuary's best estimate of withdrawal rates would also depend on

extent to which the guaranteed values are greater or less than the market value of the funds,

time to maturity,

systematic withdrawal consistent with the contractual terms of the policies,

market conditions, and

distribution of investment income from the funds if such amounts are not automatically reinvested.

.20 The insurer's withdrawal experience would be pertinent and usually credible. It would not be available for new products and for higher durations on recent products, which is a problem for the actuary if the policy liabilities are sensitive to withdrawal rates.

.21 The automatic payment of insurance premiums by the annuity benefit in a "back-to-back" insurance/annuity package would be a disincentive to withdrawal.

.22 Reinsurance assumed withdrawal rates would depend on practice in the direct insurer.

.23 A "cliff" is a sudden significant increase in the benefit available at withdrawal. That increase may result from increase in cash value, decrease in surrender charge, or availability of a maturity benefit or persistency bonus. Unless there is pertinent persistency experience data to the contrary, the actuary's best estimate withdrawal rates would grade to zero as the cliff approaches and remains at zero for an interval before the cliff is reached. The same would apply to a return of premium benefit in life insurance and to one in accident and sickness insurance, with modification in the latter case if the benefit is contingent upon zero claims or reduced by the amount of claims.

.24 The actuary's best estimate withdrawal rate would be zero for a paid-up policy without non-forfeiture benefit.

.25 The low and high margins for adverse deviations would be respectively an addition or subtraction, as appropriate, of 5% and 20% of the best estimate withdrawal rates. In order to ensure that the margin for adverse deviations increases policy liabilities, the choice between addition and subtraction may need to vary by interest scenario, age, policy duration, and other parameters. In the case of partial withdrawal, two assumptions would be needed – the amount withdrawn and the partial withdrawal rate. 2350.01 1740.47

.26 Additional significant considerations to be taken into account when determining the level of margin for adverse deviations in situations where a decrease in lapse rates increases the policy liabilities would include

remuneration policy encouraging persistency, or

cancellation of a contract being clearly detrimental to the policyholder.

~~.261~~ .26.1 Additional significant considerations to be taken into account when determining the level of margin for adverse deviations in situations where an increase in lapse rates increases the policy liabilities would include

remuneration policy encourages terminations,

cancellation of a contract would be clearly beneficial to the policyholder,

company's contracts have provisions where rating decreases may trigger additional withdrawals, or

there is no market value adjustment on withdrawals for deposits and deferred annuities.

Anti-selective lapse

.27 Strictly speaking, "lapse" means termination of a policy with forfeiture, but in the context of anti-selection has come to include any termination or the election of the extended term insurance non-forfeiture option. "Anti-selective lapse" is a tendency of healthy policyholders to lapse or unhealthy policyholders not to lapse, with a concomitant deterioration in the insurer's mortality or morbidity experience. To determine whether the tendency has operated in a particular case would require either a re-underwriting of those who have lapsed and those who have not, or a study of the mortality among those who lapsed, neither of which is likely to be practical. Policyholders will, however, make decisions in their own perceived interest, so that anti-selective lapse is plausible whenever that perceived interest is for unhealthy policyholders not to lapse or for healthy policyholders to lapse.

.28 It is difficult to estimate with confidence the intensity of anti-selective lapse. It is plausible for the intensity to be proportional to the intensity of policyholder perceived interest. However anti-selective lapse is merely a tendency provoked by the policyholder's perceived interest. The policyholder may not know the true state of his or her health. The policyholder may imprudently favour, or be obliged by financial pressure to adopt, a short-term interest with long-term detriment; thus, an unhealthy policyholder may lapse when the premium increases, perceiving the policy to be no longer affordable. Through ignorance or inertia, a healthy policyholder may continue a policy which could be replaced by a superior one. Moreover, anti-selective lapse is not the unvarying effect of a decision in the policyholder's perceived interest. For instance, an unhealthy policyholder may lapse a policy no longer needed for which the healthy policyholder perceives continuing need. Without pertinent and reliable experience, however, the actuary would not assume that the non-lapsation of healthy policyholders favourably affects the mortality best estimate for the persisting policyholders.

.29 The premise to the actuary's assumptions would be that policyholder decisions

will tend to serve their perceived interest, and

will not serve the insurer's interest unless the two run together.

.30 Examples where the perceived interest of the healthy policyholder may be to lapse include 1730.18

premium increase at renewal of term insurance,

unfavourable underwriting decision at renewal of re-entry term insurance,

benefit decrease or premium increase of adjustable insurance,

premium needed to avoid termination of universal life insurance with exhausted funding,

reduction in policyholder dividend scale,

offer or availability of a superior replacement policy, such as by the creation of preferred underwriting class,

significant but temporary increase (spike) in non-forfeiture value, and

downgrade in the insurer's credit rating.

Expense

.31 The actuary would select a best estimate assumption that provides for the expense of the relevant policies and their supporting assets, including overhead. The insurer's other expense is irrelevant to the valuation of policy liabilities. Other expense would include

expense related to policies that, for the relevant policies, was incurred before the balance sheet date, such as marketing and other acquisition expense, and

expense not related to the relevant policies and their supporting assets, such as investment expense for the assets that support capital.

.32 The assumption would provide for future expense inflation consistent with that in the interest rate scenario. 2330.01

.33 A stable insurer's expense experience is pertinent if its expense allocation is appropriate fo valuation of policy liabilities (or if the actuary can correct the inappropriateness, e.g., b reallocating corporate expense to operating lines of business).

.34 A particular insurer may have an expectation of reduced expense rates, but the actuary would anticipate only a reduction which is forecasted with confidence.

.35 Investment expense comprises

administration expense, both internal and external,

expense related to investment income, such as deferred fees and commissions and direct taxes, and

interest on money borrowed to finance investment.

.36 The insurer incurs neither cash rental expense nor cash rental income on real estate which it owns and occupies. The actuary would deem such expense and, if the real estate supports the policy liabilities, such income at a reasonable rate in the selection of an assumption of expense and investment return.

.37 Certain taxes are akin to expenses. The actuary would make similar provision for them in the policy liabilities to the extent that they relate to the relevant policies and their supporting assets. They include both premium taxes, which are straightforward, and taxes whose basis is neither income nor net income but which may be complicated by a relationship with income tax; for example, those currently incurred may be offset against later income tax. 2320.42

.38 The low and high margins for adverse deviations would be respectively 2.5% and 10% of best estimate expense including inflation thereof. No margin for adverse deviations is needed for a tax, such as premium tax, whose history has been stable.

.39 Additional significant considerations to be taken into account when determining the level of margin for adverse deviations would include

distribution of general expenses by line of business, by product, or by issue and administrative expenses is not based on a recent internal expense study,

allocation is not an appropriate basis for the best estimate expense assumption,

expense study does not adequately reflect the appropriate expense drivers, or

future reductions in unit expenses (before inflation) are assumed.

Policyholder options

.40 Examples of policyholder options are options to

purchase additional insurance,

convert term to permanent insurance,

select the extended term insurance non-forfeiture option,

make partial withdrawal from a universal life insurance policy,

select the amount of premium for a flexible premium policy, and

purchase an annuity at a guaranteed rate.

.41 The actuary would select a best estimate assumption of policyholder exercise of both contractual options and extra-contractual options of which they have reasonable expectation.

.42 The actuary's best estimate would depend on

life insured's attained age,

duration since issue of the policy,

plan of insurance and its benefits provided,

historical premium payment patterns,

method of premium payment,

sophistication of the policyholder and the intermediary,

perceived self-interest of the policyholder and the intermediary,

policy's competitiveness, and

insurer's distribution system and other marketing practice,

and would make provision for anti-selection.

.43 The actuary would make provision for adverse deviations by testing the effect on policy liabilities of plausible alternative assumptions of policyholder exercise of options and adopting one with relatively high policy liabilities.

Maturities

.44 For valuation of segregated fund guarantees, the actuary would assume the contract terminates on maturity unless allowing a proportion of the policyholders to roll their contracts over would increase the policy liabilities. The proportion of policyholders that elect to roll their policies over would take into account the experience of the insurer. The actuary would test future maturity dates that the policyholder may elect and would use caution in setting this maturity date assumption.

Management expense ratios and/or charges

.45 For valuation of segregated fund guarantees, the actuary would select a best estimate assumption for management expense ratios (including all taxes charged to the fund such as GST) that varies by fund according to the terms of the contract and recent practice of the insurer. The actuary would not assume a change in management expense ratios in the future unless there is a clear and justifiable reason for doing so, taking into account past practices, competitive pressures and reasonable policyholder reactions.

Fund transfers (switching/exchanges)

.46 For valuation of segregated fund guarantees, the actuary would test the effect of fund transfers and shifting asset mix and would exercise caution in assuming that the status quo would be maintained indefinitely.

Future optional deposits

.47 For valuation of segregated fund guarantees, the actuary would test the effect of future optional deposits to the extent they can reasonably be anticipated and use caution in assuming that the status quo would be maintained indefinitely.

Ratchet and reset rates

.48 For valuation of segregated fund guarantees, the actuary's best estimate of rates that ratchet and reset options are exercised by contract holders would depend on

extent to which the guaranteed values are greater than the market value of the funds,

the relationship of the fund value and guaranteed benefit amounts,

term to maturity, and

growth of funds.

.49 If resets are discretionary, the actuary would assume that some proportion of contract holders would elect to exercise the reset option when it is in their financial best interest to do so. The actuary need not assume that all policyholders would act with absolute efficiency in an economically rational manner. However, the assumptions would allow the frequency of elective resets to vary according to the current and/or historical economic environment.

2360 SCENARIO ASSUMPTIONS FOR VALUATION OF SEGREGATED FUND GUARANTEES

Model calibration

.01 *It is prescribed that the actuary's calibration of stochastic models used in the valuation of segregated fund guarantees should meet the criteria for investment returns as promulgated from time to time by the Actuarial Standards Board.*

.02 Investment returns would be generated on a gross basis, before the application of any fees or consideration of specific product features. The objective would be to model the investment returns independently of any product features. However, care would be taken to assess whether total or price returns are required for the specific segregated funds being modelled.

Random number generators

.03 The random numbers generated by computer algorithms are called pseudo-random because they are not truly random. Knowing the algorithm and the seed to the sequence is sufficient to predict the next random number that will be generated. A sound pseudo-random number generator provides a sequence that is statistically indistinguishable from a truly random sequence from the given distribution. The actuary would test the random number generator to demonstrate that it provides a sequence that is statistically indistinguishable from a truly random sequence for the given distribution.

.04 It would be preferable for the results from stochastic modelling to be reproducible, so that a repeatable pseudo-random number generator would be available to an auditor.

Number of scenarios

.05 The actuary would test that the number of scenarios used to calculate the policy liabilities provides an acceptable level of precision that meets the standard of materiality. To increase the precision of the policy liability calculation, it may be necessary to increase the number of scenarios significantly.

.06 The actuary may consider scenario reduction techniques, such as stratified sampling, to reduce the number of scenarios on a sound statistical basis.

Modelling period

.07 The actuary would use a modelling period that is not longer than one month unless testing shows that the liability for segregated fund guarantees is not sensitive to the frequency of election of benefits or features.

Economic scenario generators

.08 The actuary would develop stochastic models for each market index or proxy that is constructed for the segregated funds.

.09 The actuary would select economic scenario generators for stochastic models that are robust and statistically sound.

Model parameter estimation

.10 The actuary would estimate model parameters based on historical market data as opposed to recent market performance. Due to the long-term nature of the segregated fund guarantee, the historical data would cover a period at least twice as long as the projection period. However, when historical data are not available or appropriate for use, adjustments may be required.

.11 The actuary would update model parameters regularly to reflect recent changes in market conditions.

.12 When market data for foreign indices are used to estimate model parameters, the foreign exchange rate would be taken into account. The actuary may consider separate parameters for the market index and for the foreign exchange rate, for example, by including an explicit currency exchange model together with using local currency data to estimate the model parameters.

.13 Parameters would take into account appropriate correlations among investment returns for all market indices and proxies that are constructed.

Selecting investment return assumptions for specific funds

.14 To develop investment returns for a specific fund, an appropriate proxy for the segregated fund would be constructed. The specific fund's investment policy, its asset allocation implied by the fund performance objective, its performance history, and its trading activities would be considered and reflected in the proxy asset composition. The proxy may take the form of a combination of recognized market indices or economic sector sub-indices or, less commonly, a well-defined set of trading rules in a specified asset universe. It would be appropriate for there to be a close relationship between the investment return proxy and the specific segregated funds.

Discount rates

.15 The actuary would select discount rates (or accumulation rates) to determine the asset balance necessary to support the liabilities using the assets allocated to support the segregated fund guarantees.

Base scenario

.16 The base scenario for calculating the provision for adverse deviations would be defined as the average of the policy liabilities for all investment return scenarios.