FINAL

STANDARDS OF PRACTICE FOR THE VALUATION OF POLICY LIABILITIES OF LIFE INSURERS

COMMITTEE ON LIFE INSURANCE FINANCIAL REPORTING

DECEMBER 2000

Document 20070

Ce document est disponible en français

Canadian Institute of Actuaries • Institut Canadien des Actuaires

MEMORANDUM

TO: All Members and Students of the CIA Interested in Life and Property and Casualty Issues

FROM: Geoff Guy, chairperson, Practice Standards Council

DATE: December 20, 2000

SUBJECT: **Standards of Practice for the Valuation of Policy Liabilities of Life Insurers**

The Practice Standards Council, on the advice of the Committee on Life Insurance Financial Reporting, has approved the enclosed standard of practice in accordance with the Institute's interim due process for adoption of standards of practice.

This standard defines accepted actuarial practice for the valuation of policy liabilities of life insurers prepared in accordance with generally accepted accounting principles in Canada, and is effective immediately.

For practical reasons, the old standards of practice for the valuation of policy liabilities of life insurers will remain in force for valuations with a valuation date up to and including September 30, 2001. This transition period is intended to allow actuaries sufficient time to implement technology required to effectively apply the new standard recognizing that these revised standards have been under discussion for the past five years.

Therefore, until September 30, 2001, compliance with either the old or the new standards will be accepted. During this transition period, actuaries need not select either the old standards in their entirety or the new standards in their entirety, but should use their professional judgment with skill and care in determining whether to apply the old standards or the new standard to a given aspect of the valuation. In particular, it would be unacceptable to "cherry-pick" between old and new standards in a way that would inappropriately weaken or strengthen the aggregate liabilities during the transition period, for example by:

1) when wide adoption is feasible, choosing to adopt the new standards only where the impact is to reduce the liabilities,
2) adopting the lower range of margins for adverse deviations for lapse rate assumptions without also removing the "crossover" logic, or

3) removing the minimum 0.50% margin for adverse deviations on valuation interest rate assumptions without also ensuring that margins for adverse deviations provide for asset default, investment expenses and the interest rate risk associated with uncertainty of cash flow timing.

Where material, actuaries should review with the insurance company auditors any disclosure requirements regarding the impact of adopting the new standard on the policy liabilities.

Questions about the interpretation of the new standard or about the transition period should be directed to Simon Curtis, the chairperson of CLIFR, at his *Yearbook* address.

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1. INTRODUCTION

This is the consolidation of life practice-specific standards, for eventual inclusion in the overall consolidation of standards of practice.

The authors of this draft, the Committee on Life Insurance Financial Reporting, expect additional guidance to be provided to practitioners through educational notes.

2. GENERAL OBJECTIVES OF THE STANDARDS OF PRACTICE

The general objectives of the authors in writing these standards of practice are:

- to respect the actuary's professionalism and judgment, and to recognize the responsibility of the actuary in performing the valuation;
- to create a range of accepted actuarial practice which is sufficiently narrow to promote an environment where any two actuaries in the same situation would independently produce valuation results that are not materially different;
- that the standards of practice be internally consistent (within and across practice areas);
- that the standards of practice be sufficiently general to be comprehensive and to be relatively stable over time;
- to strike a reasonable balance between theoretically precise standards and standards that provide clear practical guidance – an actuary should be able to comply with the standards and demonstrate such compliance;
- that the Canadian GAAP valuation basis described in these standards also be judged acceptable for Canadian statutory reporting;
- to foster public confidence in the actuarial profession and in the ability of life insurance companies to meet their financial obligations.

In certain situations, the objectives may be mutually inconsistent. Rather than prioritize the objectives, these standards attempt to balance competing objectives in a reasonable manner.

3. KEY PRINCIPLES OF THE VALUATION OF POLICY LIABILITIES

The key principles underlying the valuation of policy liabilities of life insurers are summarized below. These key principles form a set of necessary, though not sufficient, conditions that help the actuary determine if the valuation is in compliance with the standards of practice. The key principles are also intended to provide guidance to the actuary if faced with a situation that is not covered elsewhere in the standards of practice.

- *spirit and intent.* The actuary should follow the spirit and intent of the standards of practice. This implies both that the spirit and intent are respected, and conversely, that a literal application of the standards is not necessarily required for compliance.
- *acceptable range of practice*. The valuation of liabilities is an estimate rather than an exact measure, and, therefore, there exists an acceptable range of results.
- *going concern*. The valuation is premised on the insurer operating as a going concern.
- *interdependence of asset and liability values*. The valuation of liabilities is dependant on the statement value of the assets supporting those liabilities. The valuation of liabilities should be appropriate in the context of the entire balance sheet.

- *explicit and prospective*. The valuation of liabilities is appropriately determined by an explicit, prospective analysis of asset and liability cash flows. If using an approximate approach, the actuary should be satisfied that a prospective cash flow analysis would validate the appropriateness of the valuation.
- *comprehensive*. The valuation includes assumptions for all concrete contingencies and factors inherent in the insurer's business in-force which materially affect the anticipated cash flows.
- *policyholders' reasonable expectations*. The valuation of liabilities extends beyond contractual obligations to encompass policyholders' reasonable expectations.
- *sufficient without being excessive*. The valuation of liabilities makes provision for the expected experience scenario and for adverse deviations in experience. The provision for adverse deviations (PFAD) is necessary to provide an appropriate degree of assurance that the valuation is sufficient without being excessive to provide for the policy liabilities.
- *aggregate provision*. The appropriateness of the valuation is established for the insurer as a whole in relation to the aggregate risks assumed.

4. GENERAL CONSIDERATIONS

4.1 Scope

Unless otherwise apparent from the context, these standards apply to the valuation of policy liabilities in life insurer (and reinsurer) financial statements prepared in accordance with generally accepted accounting principles in Canada. A life insurer includes a fraternal or a mutual benefit society.

4.2 Objective of the Valuation

The objective of the valuation is to determine the amount of the insurer's assets that, in the opinion of the actuary and taking into account the other pertinent items on the balance sheet, will be sufficient without being excessive to provide for the policy liabilities over their respective terms (see 4.8 *Term of the Liability*).

The words "in the opinion of the actuary" imply that the actuary provides a degree of assurance that does not amount to a guarantee.

To provide an appropriate degree of assurance that the valuation is "sufficient, without being excessive, to provide for the policy liabilities" the actuary establishes an appropriate provision for adverse deviations (see 4.5 *Provisions for Adverse Deviations* and 6 *The Canadian Asset Liability Method*).

"To provide for the policy liabilities" means to provide for payments to policyholders and for related outlays and expenses, with the exception of shareholder dividends and shareholder transfers. It also means to provide for the insurer's insurance obligations arising from commitments the insurer has made on, or prior to, the valuation date. Such commitments include, for example, conditional insurance receipts arising from insurance applications and time-limited interest rate guarantees designed to attract new premiums. In this context, "insurance obligations" are not limited to strictly contractual obligations or fixed guarantees (see 4.6 *Policyholders' Reasonable Expectations*).

4.3 Going Concern

The valuation of policy liabilities should be premised on the insurer operating as a going concern. In particular, the actuary should assume:

- that an insurer which is, which intends to remain, and which can remain open to new business continues as such;
- that an insurer which is closed to new business continues as such and as a going concern until such time as the actuary expects circumstances to change (e.g., by the reinsurance of the policies in force or amalgamation with another insurer);
- in any other case that the insurer presently becomes closed to new business, incurs transitional administrative expenses during a period of retrenchment, and thereafter operates as above.

4.4 Wind-up Valuations

The policy liabilities of an insurer that has been declared insolvent by competent authority should be valued according to the same principles as a going concern, with due regard to the changes in future experience that are likely to result from the insolvency.

However, in the winding up of an insurer by distribution to policyholders and other claimants, the policy liabilities should be valued on the basis determined by the Canadian Institute of Actuaries.

4.5 Provisions for Adverse Deviations (PFAD)

The objective of the valuation is to determine the amount of assets that is sufficient, without being excessive, to provide for the policy liabilities. Because of the uncertainty associated with the elements of the expected experience scenario, the actuary should provide for adverse deviations in order to achieve an appropriate degree of assurance that the amount of assets is sufficient.

To avoid an excessive valuation, the extent of adverse deviations from the expected experience scenario that the actuary should provide for is limited to what appears reasonable to the actuary. While this implies the exercise of judgment on the part of the actuary, it also implies that the actuary should not provide for abnormal deviations from expected experience, for catastrophic events, nor for major unexpected alterations in experience.

The actuary should not make provision in the policy liabilities for adverse statistical fluctuations since such fluctuations can be expected to cancel out against positive ones. Therefore, the adverse deviations to be provided for represent a limited and reasonable level of misestimation of, and deterioration from, the expected experience scenario assumptions, commensurate with the degree of uncertainty of the expected experience scenario assumptions.

The manner of providing for adverse deviations is described in 6 *The Canadian Asset Liability Method*.

The application of provisions for adverse deviations should be consistent among lines of business. All other things being the same, the following general statements about the provisions for adverse deviations may be made.

High dividend participating policy liabilities, where the impact of adverse or beneficial experience is passed through to the policyholders, generally require the smallest provisions. Nonparticipating adjustable policy liabilities require higher provisions where the pass-through features operate prospectively and are not used to recoup historical deficiencies. Liabilities undertaken on fixed terms generally require the highest provisions.

Provisions for adverse deviations are related to policyholders' reasonable expectations. Consider a fraternal, which may provide no guarantees and can assess its members or cut benefits to recover experience deficits. If the members of the fraternal expect benefits or contribution levels to be adjusted frequently as experience unfolds, then the provisions for adverse deviations would be relatively small. On the other hand, if it is reasonable for the members to expect benefits and contributions to be adjusted only rarely, then the appropriate provisions for adverse deviations would be similar to those applicable to liabilities undertaken on fixed terms.

4.6 Policyholders' Reasonable Expectations

Providing for the insurer's insurance obligations also means providing for policyholders' reasonable expectations. In this context, the word "policyholders" should be taken to include claimants, applicants and beneficiaries.

Policyholders' reasonable expectations have a bearing on liabilities undertaken on fixed terms, as well as those not undertaken on fixed terms.

Providing for policyholders' reasonable expectations is a complex matter. It is intended to cover situations where strictly contractual obligations are an insufficient standard for determining the liabilities to be valued.

The first step in the valuation of policy liabilities is the selection of expected experience assumptions and the policy elements (e.g., premiums, death and surrender benefits; policyholder dividends in connection with dividend-paying policies; insurance and expense charges in connection with universal life policies) consistent therewith (see 6 *The Canadian Asset Liability Method*).

When policy elements are fixed by contract, the actuary need only consider whether representations, sales or administrative practices may have created policyholders' reasonable expectations that augment the insurer's contractual obligations. When policy elements are not fixed, several factors may serve as a guide to the actuary in selecting the assumed policy elements. One is to consider the insurer's policy, if any, for the adjustment of policy elements. Another is to consider the insurer's past practice with respect to adjusting policy elements. The actuary should also consider what representations and communications have been made to policyholders with respect to the adjustment of those policy elements.

In the simplest case, the insurer will consistently apply a clear formula to the adjustment of policy elements. For example, the rate of interest credited to the policy is always equal to the rate earned on the allocated assets less a specific margin. If the insurer has a well-established practice of applying the formula, has expressed no plans for changing the formula (e.g., by increasing the margin) and has been careful to see that policyholder communications have been consistent with the application of the formula, then the application of the principle is straightforward: the assumed policy elements will be consistent with the expected experience and with the continued application of the formula.

A slightly more complex case is one where the insurer has consistently applied a clear formula and policyholder communications have always been consistent with it, but intends to change the formula. The actuary should inquire as to whether the insurer intends to communicate the change to policyholders. If no other form of disclosure is contemplated, the actuary should seek to have the change disclosed in notes accompanying the financial statements.

Deviations from the application of an express policy deserve the actuary's close attention and should be brought to the attention of the Board. The actuary should inquire as to whether the insurer plans to restore a practice consistent with its policy. If so, the actuary should set assumed policy elements that reflect management's plan, including the time that will be required to implement it. If not, the actuary should consider whether expectations have reasonably been created that the insurer has, in fact, modified the formula, and, if so, how, and should set the policy elements accordingly. In such circumstances, the same disclosure is appropriate as in the case of the prior paragraph.

In more complex cases, there will be no set formula, or it will have been inconsistently applied, or policyholder communications will have been loosely controlled. In such cases, the actuary should consider what expectations might reasonably have been created by past practices and policyholder communications when setting the assumed policy elements.

Usually, policyholders' reasonable expectations relate to the application of an experience-related formula or policy. However, in some cases, they will instead relate to specific dollar amounts. For example, the insurer might have made no adjustment for many years to policy elements, notwithstanding its contractual right to do so, or it might have no clear intention of doing so. In an extreme case, policyholder communications may have been so loosely controlled or representations may have been made that, in the opinion of the actuary, the risk of legal action cannot be ignored. In all such cases, the actuary should consider whether the insurer has created reasonable expectations among policyholders that such policy elements are, in fact, not adjustable, and value the policy liabilities as though they had been undertaken on fixed terms.

In the worst case, or where legal proceedings have actually been instituted by one or more policyholders, this may not be enough. The actuary should obtain the appropriate advice in estimating the additional liability, including expenses, that the insurer might face as a result. In general, by satisfying GAAP accounting standards for recognition of contingent liabilities, no additional amount need be added to the policy liabilities, but the actuary should be satisfied that appropriate provisions are being held.

4.7 Classes of Policy Liabilities

Policy liabilities may be grouped into five broad classes:

- liabilities for future claims;
- liabilities for claims already incurred at the valuation date;
- liabilities for future policyholder dividends and experience rating refunds;
- liabilities for amounts on deposit; and
- other policy liabilities.

The classification is intended to generally reflect the valuation presentation required by regulatory authorities in Canada and is not intended to be rigorous. For example, some types of deferred annuity liabilities may be classified as either future claim liabilities or deposit liabilities; settlement annuity liabilities may be classified as liabilities for claims already incurred or liabilities for future claims; the liability for all future policyholder dividends may be included in the liabilities for future claims, or some may be shown separately.

Items presented elsewhere on the balance sheet may affect the valuation or interpretation of the amounts shown in the policy liabilities.

It is the actuary's responsibility to ensure that the manner in which the policy liabilities have been classified and how they are affected by other accounting items in the financial statements are clear to the user.

Liabilities for future claims pertain to the claims and other benefit payments and expenses, offset by future premiums, in respect of insured events that have not yet occurred but may occur during the term of the liability (see 4.8 *Term of the Liability*).

The incurred claims liabilities are the insurer's liabilities with respect to insured events that have occurred on or before the valuation date, including those where the amounts of future claim payments are known, whether or not payment is due, and those where they are uncertain.

The liability for future experience rating refunds typically arises in connection with retrospectively rated group or reinsurance contracts with stipulated contractual provisions governing the determination of experience surplus or deficits.

Liabilities for amounts on deposit may be due and unpaid items, which do not require actuarial valuation. Premiums paid in advance may be the same as deposit liabilities, or, if subject to certain conditions, they may more closely resemble future claim liabilities.

4.8 Term of the Liability

The valuation of liabilities is appropriately determined by an explicit prospective analysis of the asset and liability cash flows pertaining to those insured events that are included in the valuation.

The expression "term of the liability" is used to identify those insured events to be included in the valuation. That is, the insured events that are included in the valuation are those that occur on or prior to the end of the term of the liability. Once an insured event has occurred or has been assumed to occur, the projection of asset and liability cash flows associated with the event extends to the date the last liability cash flow occurs. For example, in a group LTD contract, all claims incurred during the term of the liability are included in the valuation, and, for each of these claims, the cash flows are projected to the date of the last disability payment.

The term of the liability should be long enough to encompass all material policy-related obligations arising from commitments the insurer has made on, or before, the valuation date. However, the term of the liability should not be longer than necessary to encompass those material obligations. Extending the term of the liability in order to front-end profits would not be consistent with GAAP.

The term of the liability will generally, though not always, be the term of the contract. In case of doubt, the term of the contract expires at the latest possible date to which the policyholder, beneficiary, or participant can prolong the coverage without requiring the consent of the insurer, whether or not the conditions of coverage will remain the same throughout the term.

4.8.1 Examples of Term of the Liability

The following examples demonstrate application of the principles underlying the actuary's determination of the term of the liability. They are not intended to provide an exhaustive list of circumstances or considerations.

- The term of the liability for a traditional participating or non-participating individual life policy is the maturity date of the contract.
- The term of the liability for an individual life or accident and sickness policy that is renewable (at the option of the policyholder) to a certain age is that limiting age, whether or not the benefits and/or premiums are adjustable.
- "Optionally renewable" policies are an individual form of accident and sickness insurance with restricted cancellation rights (e.g., the insurer may not have the right to cancel coverage for one policyholder without cancelling the coverage for all policyholders under the same form or in the same class). Thus, each policyholder enjoys the right of self-selection by voluntarily withdrawing from the class and the insurer is exposed to risk from antiselective lapsation for as long as each policyholder may remain a member of the class. In such cases, unless the insurer has already given notice of termination at some earlier date (in which case the term should be taken to end on that date), the term of the liability should be applied separately to each policyholder in the class and extended to the maximum age to which coverage may be provided, without the specific consent of the insurer.

- The term of the liability for a general account single premium deferred annuity or deposit contract that is essentially treated as a new sale at the end of the interest guarantee period is the interest guarantee period. However, if, for example, the insurer has undertaken to renew the contract at a minimum guaranteed rate of interest, the actuary should test the liability with the term extended for the duration of the guarantee, and if higher liability value results, then the term of the liability should be so extended.
- The term of the general account liability associated with a segregated fund deferred annuity or deposit contract with no material guarantees is zero. However, if, for example, guaranteed minimum values are provided on death, at a certain duration, or maturity of the contract, the actuary should test the liability with the term extended for the duration of the guarantee, and if a higher liability value results, then the term of the liability should be so extended.
- The term of a universal life policy liability is the maturity date of the contract unless, in the opinion of the actuary, the contract is substantially a deferred annuity or deposit contract rather than a life insurance contract. In that case, the term of the liability is determined as for a deferred annuity or deposit contract above.
- The term of the liability for group insurance contracts is discussed in 4.10 *Special Considerations Applicable to Group Contracts.*

4.9 The Deferral of Acquisition Expenses

Under GAAP, it may be appropriate for the insurer to explicitly defer and amortize recoverable acquisition expenses. The unamortized balance would be presented in an asset account. The actuary should explicitly test the recoverability of the unamortized balance, and make an adjustment to the value of the policy liabilities if required to serve the objective of the valuation.

In testing the recoverability of the unamortized balance, the actuary should only give consideration to excess margins on future premiums or other revenue that the insurer expects to receive beyond the term of the liability. Future premiums or other revenue that the insurer expects to receive over the term of the liability are already recognized in the valuation of policy liabilities.

4.10 Special Considerations Applicable to Group Contracts

4.10.1 General

Group insurance includes employee group insurance, association group insurance and creditor group insurance. Group insurance is an arrangement whereby the members of a group, and sometimes their dependents, are insured under a master policy or contract. Each insured member typically receives a certificate of insurance.

In group insurance, where contracts are often the result of negotiation between the group policyholder and the insurer, it is especially important that the actuary be familiar with the provisions of each contract, so that all risks may be appropriately reflected in the valuation of policy liabilities.

4.10.2 Term of the Future Claim Liability

Once the term of the future claim liability is established, the valuation should include premiums and general administrative expense cash flows to the end of the term of the liability, and all benefit and expense cash flows (to the end of the benefit period) associated with claims incurred up to the end of the term of the liability.

For most group life and health policies, the term of the future claim liability is the next policy renewal date except in the case of longer-term rate guarantees, where the term of the liability would extend to the end of the rate guarantee period.

Usually, the term of the liability for an administrative services-only contract would be zero. However, if, for example, expense charges have been guaranteed by the insurer, the actuary should test the liability with the term extended for the duration of the guarantee, and if higher liability value results, then the term of the liability should be so extended.

For some types of group and for some types of contracts or coverage, the term of the future claim liability is longer than the end of the rate guarantee period. The essential distinguishing feature of these groups, contracts or coverages is the element of choice available to individual members of the group.

Association and creditor group cases of both life and accident and sickness insurance may be indistinguishable from optionally renewable individual accident and sickness policies, the insurer restricting its right of cancellation to the entire class (i.e., the group), while the participants enjoy the right of terminating their participation at any time. In such cases, the term of the liability should be extended and applied as for an individual optionally renewable policy (see 4.8 *Term of the Liability*).

In other group cases, judgment is required. Examples include the additional voluntary insurance offered in employer plans and "cafeteria plans." Whether it is appropriate to value the future claims liability for a given coverage for each life separately will depend upon the circumstances. It is not appropriate if antiselection by the participant is essentially negated through crossrating or by employer contributions to the cost of coverage since the insurer is thereby shielded from loss due to antiselection. Nor is it appropriate where the participant has no choice but to accept rate increases as long as the master contract remains in force.

The costs of conversion upon termination of employment may be conveniently treated as part of the claim costs that occur during the term of the future claim liability. In addition, the actuary should make an appropriate provision for the risk of policy termination *without replacement* at the end of the term and the costs of conversion associated therewith. In a healthy economic climate and group insurance market, that risk will usually not be sufficiently great to justify an explicit material provision.

The term of the experience rating refund liability is the same as that of the corresponding future claim liability since the impact of future claims, expenses and premiums on one liability will have a minor effect on the other.

4.10.3 Deposit liabilities

Deposit liabilities may include amounts that have fallen due for payment under the terms of an experience-rating agreement, any special deposit accounts, and any other amounts that are currently collectible by the policyholder.

In contrast to liabilities for future experience-rating refunds, deposit liabilities include only amounts which are unaffected by experience that develops after the valuation date. Moreover, the mere fact that a deposit is credited with interest, even where the interest rate depends upon experience, does not render a deposit liability a liability for future experience-rating refunds.

4.10.4 Funding Arrangements

Various arrangements exist for the financing of the costs of group insurance programs, the extremes being fully insured and fully self-insured. The insurer's liability will depend on the financing arrangements.

Administrative services-only contracts generally do not require policy liabilities, unless the actuary believes that such a contract exposes the insurer to risk. For example, there might be an exposure to expense risk in situations where expense charges are guaranteed beyond the valuation date.

The establishment of appropriate valuation assumptions should be independent of any negotiated policyholder valuation basis used for prospective rate setting or the establishment of experience-rating refunds. However, the policyholder valuation basis might affect the appropriate GAAP liability to be held, particularly the liability for future experience-rating refunds (see 6.4.6 *The Valuation of Future Experience Rating Refunds*).

In valuing the future claim liability for a capping or stop-loss agreement, the provisions for adverse deviations required with respect to claims in excess of the cap may be much greater than the actuary's estimate of expected claims. Moreover, the actuary should take into consideration not only the net or residual liability that may accrue to the insurer, but also the insurer's legal liability in the event of the inability of the policyholder to pay claims.

Terminal premium or similar arrangements are designed to allow minimum funds to accumulate in the hands of the insurer. In effect, the point of such an arrangement is that the insurer carry no invested assets to support incurred claim liabilities on a policyholder basis. Incurred claim liabilities are required for GAAP in these circumstances, but may be offset by a terminal premium receivable on the asset side of the balance sheet. The amount of the receivable should be consistent with the conditions of the contract and with the basis agreed upon with the policyholder or, if there is none, the valuation basis for the incurred claims liabilities. The amount of the receivable should be adjusted downward to the degree that recovery is uncertain.

4.11 Materiality

Under GAAP, materiality is the term used to describe the significance of financial statement information to decision makers. An item of information, or an aggregate of items, is material if it is probable that its omission or misstatement would influence or change a decision. Materiality is a matter of professional judgment in the particular circumstances. In the actuary's work, considerations of materiality influence the actuary's advice to management with respect to the sound operation of the enterprise. The actuary should discuss with both management and auditor the way in which the actuary has considered materiality in the valuation.

Quantitative rules of thumb are sometimes used by accountants to set materiality levels; however, rules of thumb are only a first step in selecting a materiality level. Ultimately, for both accountants and actuaries, materiality is considered a matter of professional judgment and there are no quantitative measures that provide a "safe harbour" to relieve the professional of responsibility for the exercise of that judgment.

As the attainable degree of precision in measuring the item decreases, the amount of deviation that is considered material increases. Thus, for example, it is appropriate to apply a more rigorous level of materiality to calculation and data errors than it is to the choice of valuation basis or the use of approximations.

As a preparer of items for inclusion in financial statements, the actuary should take reasonable steps on an ongoing basis to ensure that the results of the valuation are consistent with the actuary's valuation basis, and that deficiencies or errors in the data or production system are corrected. The actuary should also put in place appropriate measures to detect such deficiencies or errors. In doing so, the actuary should be aware of the degree of precision that management seeks for other items in the financial statements. Usually, the degree of precision will be less than, but close to, 100% and will take time, cost and other pragmatic considerations into account.

Similar cost-benefit tradeoffs should be taken into consideration in the use of approximations. For approximations, materiality should be judged in light of the feasibility of performing more precise calculations. The more feasible the more precise alternative, the more closely the materiality level should resemble that selected for errors in data and calculations.

With respect to the choice of valuation bases, it must be recognized that, generally speaking, policy liabilities are complex estimates. Because such estimates generally involve the contemplation of a large number of pertinent factors for many years in the future, there will almost certainly be material differences between what the actuary assumes in the valuation and what will actually take place in the distant future. For that reason, the actuary should review the assumptions regularly. The changes that the actuary makes in the choice of valuation bases from one valuation date to the next will often make a material difference to the financial statements. Immaterial changes may be postponed.

The actuary should strive to be consistent without being unreasonable in the application of professional judgment from one valuation date to the next, in the manner of developing expected cash flow assumptions and in providing for adverse deviations.

5. VERIFICATION OF DATA

The actuary should be familiar with the procedures for the administration and accounting of the insurer's business.

The actuary should be satisfied that suitable control procedures are in place to verify that the valuation data for both assets and liabilities are complete and consistent with: the terms of the insurer's insurance, annuity and commission contracts; the deeds, contracts and documents of title that support its investments; reinsurance treaties; other source data; the record keeping system; and the insurer's accounting practices, and make any necessary adjustments.

The actuary should verify the consistency of the current valuation data with the previous valuation data, with the financial statements, with the business in-force data, and with the records of policy movements. The actuary should also verify that the assumptions and methods are applied correctly in the calculation of the policy liabilities.

6. THE CANADIAN ASSET LIABILITY METHOD

6.1 Overview

The Canadian Asset Liability Method may be described in four separate steps:

1. Select the expected experience scenario, which produces the liability without provision for adverse deviations (PFAD).
2. Add PFAD for all but interest rate risk by applying margins to cash flow assumptions.
3. Add PFAD for interest rate risk through scenario testing of the cash flow assumptions modified in step 2.
4. Adjust the PFAD from steps 2 and 3 for the impact of any policyholder pass-through features. For policies with substantial pass-through features, steps 2, 3, and 4 may be combined.

The total PFAD is the difference between the liability determined in the above manner and the liability determined in accordance with the expected experience scenario.

To determine the liability value corresponding to the expected experience scenario or any other set of experience assumptions, cash flows are first projected and then rolled forward to the end of the cash flow projection period (which is the date of the last liability cash flow) using the interest rate scenario assumptions. Next, adjustments are made to the starting assets in order to produce zero surplus at the end of the projection. The liability value is equal to the statement value of the assets so determined.

6.2 Steps of the Canadian Asset Liability Method

6.2.1 Step 1 – The Expected Experience Scenario

The first step in the valuation is for the actuary to establish the expected experience scenario, which consists of:

- the base interest rate scenario;
- the actuary's best estimates of future experience with respect to contingencies pertinent to the valuation; and
- the policy elements and cash flows consistent with those estimates and with the base interest rate scenario.

Unless otherwise prescribed by the Canadian Institute of Actuaries, the base interest rate scenario should reflect the persistence of the current structure of interest rates by term, quality and type. The current structure is that prevailing at the valuation date.

To the extent that asset and liability cash flows are sensitive to influences other than interest rates, the actuary should formulate suitable expected assumptions for the future cash flows. In the case of certain assets, it may be appropriate for the actuary to use the work of another professional in estimating the future cash flows. The asset cash flows should reflect derivative instruments.

Policy elements include premiums; death, surrender, and maturity benefits; dividends; cost of insurance charges; and other benefits and charges. Any of these may be adjustable by the insurer in a given case, either in a manner determined by contract or purely at the discretion of the insurer.

In the case of certain policies, such as universal life policies, the premiums may also vary, often within limits, at the discretion of the policyholder. There is also an additional policy element, the "fund balance," which is central to the insurance mechanism. While not themselves adjustable, fund balances are the net result of premium payments, crediting rates and charges, each of which may vary with experience, so that the fund balances will vary with experience.

For further discussion of asset and liability cash flow assumptions, see 7 *Selecting the Cash Flow Assumptions*.

6.2.2 Step 2 – Margins for Adverse Deviations

For experience factors other than interest rates, appropriate margins for adverse deviations should then be applied to the expected experience assumptions, resulting in a different projection of asset and liability cash flows.

For further discussion of appropriate levels of margins for adverse deviations to apply, see 7 *Selecting the Cash Flow Assumptions*.

Asset and liability cash flows that depend upon prevailing interest rates should be allowed to vary with the interest rate scenario (see 6.2.3 *Step 3 – Providing for Interest Rate Risk*). To the expected experience assumptions for such cash flows, appropriate margins may be required to reflect uncertainty in determining the relationship between the cash flows and the interest rates. For example, with respect to mortgage prepayments, the actuary would develop an expected prepayment pattern under the base interest rate scenario, and then apply a margin to that expected pattern that is less favourable to the insurer. Alternative interest rate scenarios should be handled consistently.

The actuary should ensure that the application of margins for adverse deviations results in an increase to the value of the liability. Care is required when a margin affects more than one assumption. For example, a lapse rate margin on renewable term insurance may also influence mortality rates, through antiselective lapsation.

6.2.3 Step 3 – Providing for Interest Rate Risk

The actuary should make provision for interest rate risk through scenario testing of the cash flows modified in Step 2. That is, determine a provision for adverse deviations from the base interest rate scenario.

Scenario testing involves projection of asset and liability cash flows under a variety of interest rate scenarios (see 6.3 *Interest Rate Scenarios*). Each projection should roll the cash flows forward to the end of the cash flow projection period using the actuary's interest rate scenario assumptions. Adjustments are made to the starting assets in each scenario in order to produce zero surplus at the end of the projection.

Any sale or asset transfer in the projection should be assumed to occur at market value on the date of sale or transfer, using the prevailing rates of interest consistent with the interest rate scenario.

The asset and liability cash flows are affected by the course of future interest rates in several ways. Borrower and policyholder options may be exercised at a different time or in a different manner than assumed in the base interest rate scenario. Assets may be reinvested and disinvested at different prevailing interest rates. Expense cash flows may vary with assumed rates of inflation.

Asset and liability cash flows are also affected by factors other than interest rates and related investment choices. Uncertainty arising from these other factors is reflected in the valuation through the application of margins for adverse deviations, rather than through scenario testing (see 6.2.2 *Step 2 – Margins for Adverse Deviations*). If there is uncertainty about the timing of future cash flows, this will create interest rate risk. The actuary should ensure that these margins for adverse deviations are adequate to provide for the interest rate risk associated with uncertainty of cash flow timing.

The uncertainty associated with the insurer's future management of the asset cash flows is part of general management risk and should not be provided for in the liabilities. This implies that investment choices related to future interest rate scenarios should reflect management actions that are within the insurer's current investment policy. In the absence of a definite plan, the actuary should not reflect management action that would either increase or decrease the current degree of risk.

The PFAD for interest rate risk from the base interest rate scenario is added by the actuary after considering the results of scenario testing. The provision should be at least as great as that which results from the prescribed scenario that produces the highest liability. Depending on the extent of the testing, the liability determined by the scenario testing may or may not be based on the scenario that produces the highest liability.

The most refined method of testing would be a stochastic process with a sufficient number of trials to arrive at a reliable probability distribution, and the liability then set to cover a reasonable range of the scenarios tested. If only a few additional scenarios have been tested, then the scenario producing the highest liability should be used.

6.2.4 Step 4 – Reflecting Policyholder Pass-Through Features

Where the cost of adverse experience can be passed through to policyholders, the policy elements should be adjusted appropriately taking into account any delays in, or limitations on, the insurer's freedom, ability and propensity to take advantage of such pass-through features. The resulting provisions for adverse deviations should consequently be lower than those for liabilities undertaken on fixed terms.

The assumed pass-through of adverse experience should take policyholders' reasonable expectations into account (see 4.6 *Policyholders' Reasonable Expectations*). This includes consideration of:

- the insurer's dividend policy and the insurer's formal or informal policy for making changes to other policy elements;
- the extent of the insurer's freedom to make changes to policy elements in response to emerging experience, including contractual and practical limits on that freedom;
- any illustrations and representations that may have been made by the insurer to the policyholders;
- the insurer's recent practice in adjusting policy elements for the class of policies in question or similar policies;
- market conditions that might limit the freedom of the insurer to make changes to policy elements in response to emerging experience; and
- delays that are likely to emerge between the emergence of adverse experience and the insurer's ability or willingness to make corresponding changes to policy elements.

Certain of these considerations, (e.g., the delay in recognizing emerging experience) are assumptions in their own right. This suggests that the actuary might consider them as having both an expected and a margin component.

6.3 Interest Rate Scenarios

The elements of the interest rate scenarios should include:

- risk-free interest rates for all relevant terms for all relevant future points in time;
- spreads over risk-free rates for asset quality;
- spreads over risk-free rates for asset type;
- rates of general price inflation;
- reinvestment and disinvestment strategies consistent with the insurer's investment policy; and
- other investment strategies consistent with insurer's investment policy.

Since no actuary is in a position to know which interest rate scenario is more likely than any other, it is appropriate that at least some interest rate scenarios be prescribed (see 6.3.1 *Prescribed Scenarios)*. However, these prescribed scenarios are not sufficient to properly determine the interest rate risk provision, since each block of business may have unique characteristics. Therefore, additional scenario testing should be done.

To develop a broad understanding of interest rate risk exposure may require testing a large number of interest rate scenarios. A greater number of scenarios should be tested when:

- the expected experience scenario cash flow patterns are such that there is greater uncertainty as to what pattern of interest rate movements would be adverse;
- the cash flows are particularly sensitive to prevailing interest rates and other elements of the interest rate scenario;

- the range of present values of the net cash flows is large, suggesting greater exposure to mismatch risk;
- the investment policy does not include tight controls on the level of mismatch risk to which the insurer may be exposed;
- the asset/liability relationship is loosely managed; or
- the insurer's flexibility to manage either assets or liabilities is limited.

When choosing interest rate scenarios to test, the actuary should consider the asset and liability cash flow patterns of the portfolio and the assumed reinvestment and disinvestment strategies. For example, if there is a large net cash flow expected in a particular year, then the actuary should pay special attention to the yield curve assumed for that year.

Where material, interest rate scenarios should be consistent across any asset/liability portfolios that are being tested independently. That is, the provision for interest rate risk should be appropriate for the insurer as a whole.

When considering changes in the shape of the yield curve, the actuary should, as a minimum, define a short-, medium-, and long-term interest rate that can each move independently. Both parallel and non-parallel shifts in the yield curve (e.g., flattening, steepening, and pivots) should be considered.

The reasonableness of degrees of change of interest rates is largely dependent on the period of time being considered. For example, testing a 3% shift in risk-free rates over one quarter may be unrealistic, but over five years is definitely realistic. Reasonable boundaries for the degree of change of risk-free interest rates in Canada would be +/-1% over a quarter of a year; +/-2% over one year; +/-4% over five years; and +/-5% over 10 years for short-, medium-, and long-term rates.

A reasonable range for absolute values of risk-free interest rates in Canada in the long run would be 3% to 10% for short-term rates and 5% to 12% for long-term rates. If current rates are near or outside the limits of these ranges, then scenarios may include rates that, in the near term, are outside the ranges. In such cases, extending the range to 50% of the current rate for low rates and to 125% of the current rate for high rates would be reasonable.

If interest rates in countries outside Canada are required for the valuation, the actuary should reflect an appropriate spread between Canadian risk-free rates and those of the country in question. However, if foreign interest rates show little or no correlation with Canadian interest rates, then foreign interest rates should themselves become an element of the scenario testing.

In the long run, scenario interest and inflation rates should reflect their long-term historical relationship.

When considering spreads over risk-free rates for asset quality and/or asset type, the actuary should include scenarios that test spreads that are one-half and twice that of current spreads. In simple reinvestment/disinvestment situations, this could be combined with the risk-free interest rate scenarios to eliminate one dimension of the scenario testing.

6.3.1 Prescribed Scenarios

The following interest rate scenarios, which pertain to Canada, are prescribed. These scenarios are not sufficient to properly determine the interest rate risk provision since each block of business may have unique characteristics, and, therefore, additional testing should be done.

All prescribed scenarios use the reinvestment strategy specified in 6.3.1.1 *Scenario 1*.

6.3.1.1 Scenario 1

- the yield curve for reinvestment at the valuation date reflects the then current structure of interest rates by term, quality and type for the mix of new investments then being made by the insurer;
- the (ultimate) risk-free yield curve 20 years and more following the valuation date is flat, with all points in the term structure equal to 5% in Canada;
- the insurer's reinvestment strategy for net cash flows occurring 20 years and more after the valuation date is to invest exclusively in risk-free coupon bonds with terms to maturity of 15 years or less;
- a uniform transition over 20 years from all points of the reinvestment yield curve at the valuation date to all points of the ultimate yield curve;
- a uniform transition over 20 years in the term to maturity of current reinvestments to 15 years or less; and
- a uniform transition over 20 years from other asset types to coupon bonds.

6.3.1.2 Scenario 2

This scenario is identical to Scenario 1, except that the ultimate yield curve is based on 12% instead of 5%.

6.3.1.3 Scenario 3

The long-term rate changes by 1% per year. This rate shifts from the initial long-term rate until it reaches 12%. It then decreases over the next seven years to 5%. It then continues to alternately increase and decrease between 12% and 5%.

The short-term rate shifts from the initial short-term rate to 60% of the long-term rate over a reasonable period of time (generally not longer than three years), and thereafter remains at 60% of the long-term rate. All other points on the yield curve should maintain a reasonable relationship to the short- and long-term rates.

6.3.1.4 Scenario 4

This scenario is identical to Scenario 3, except that the long-term rate first shifts to 5% instead of 12%.

6.3.1.5 Scenario 5

The long-term rate pattern is the same as that of Scenario 3. The short-term rate moves between 40% and 120% of the long-term rate. The first movement is an increase to the nearest of 40%, 60%, 80%, 100% or 120%. Each year thereafter, the short-term rate moves up or down by 20% per year within the range of 40% to 120%, in a similar manner to how long-term rates move in scenarios 3 and 4.

6.3.1.6 Scenario 6

The long-term rate pattern is the same as that of Scenario 4. The short-term rate pattern is the same as that in Scenario 5, except that the first movement is a decrease to the nearest of 120%, 100%, 80%, 60%, or 40%.

6.3.1.7 Scenario 7

The yield curve at the valuation date is the same as that described in Scenario 1. Future interest rates are derived from the forward rates implied by the yield curve at the valuation date.

6.4 Special Considerations

6.4.1 Policy Premium Method

Present value methods are methods of calculation that involve the projection of liability cash flows only, which are then discounted at assumed rates of interest which may be different in each relevant future period. When the present value method is applied to the future liability cash flows with all factors treated explicitly, it is referred to as the "policy premium method" (PPM).

The PPM conforms to the Canadian Asset Liability Method if appropriate rates of interest are used for discounting. Appropriate rates of interest to use for discounting rates depend on the yields on existing assets, which in turn are based on asset cash flows in relation to the statement value of assets. Discount rates also depend on the interest rate scenario assumed, and, therefore, scenario testing is required to determine the appropriate discounting rates (see 6.4.3 *Seriatim Valuations*).

6.4.2 Discounted Net Cash Flow Techniques

Discounted net cash flow techniques involve the projection of asset and liability cash flows and the discounting of net cash flows using spot rates of interest. These techniques are helpful in the analysis of interest rate risk, for example, by testing the impact of "shocking" the current yield curve.

These techniques do not directly conform to the Canadian Asset Liability Method with respect to providing for interest rate risk, and may produce materially different liabilities. For most interest rate scenarios, the roll-forward methodology of the Canadian Asset Liability Method cannot be replicated by a shock to the current yield curve. Also, discounted net cash flow techniques generally do not consider elements of the interest rate scenarios other than interest rate movements.

6.4.3 Seriatim Valuations

A *seriatim* valuation is one that is performed with respect to each claim or contract, or, where appropriate, certificate under a group contract. It is possible to produce a seriatim value for a policy liability based on interest rates derived from the base interest rate scenario, or any other interest rate scenario. However, it is good practice to determine the provision for interest rate risk in the aggregate, through a process of testing a variety of interest rate scenarios. Therefore, the seriatim policy liability which includes an appropriate provision for interest rate risk depends upon an appropriate allocation of the total provision. The allocation may be made by converting the aggregate provision to an interest rate margin that is applied to portfolio interest rates derived from the base interest rate scenario, or in some other reasonable way.

6.4.4 Other Valuation Methods

Other methods of valuing certain liabilities may be appropriate in limited circumstances. For example, the liability for contested claims may be estimated by conferring with the legal department (an example of the so-called examiner's method). To take another example, during the early stages of a line of business, an approach of multiplying earned premiums by a claims ratio (that includes a margin for adverse deviations), then subtracting claims paid to date, may be the only practical approach available for estimating the total liability for both future and incurred claims.

In some circumstances, it may be convenient to provide for adverse deviations by direct addition to the amount of liability otherwise determined.

6.4.5 Gross Liabilities and Reinsurance Ceded

Liabilities should be valued on both a gross basis and a net of reinsurance ceded basis. Except in some cases (e.g., unlicensed reinsurance), the insurer maintains no assets backing the excess of the gross liabilities over the net liabilities. Hence, the Canadian Asset Liability Method cannot be strictly applied. Any method may be used to value the gross liability that produces results that are reasonable in relation to the net liabilities. For example, a series of interest rates may be derived to reproduce the net liability by the PPM and the same series of interest rates is then used to produce the gross liability by the PPM. Similar reasoning applies to insolvent insurers whose assets are insufficient to cover their policy liabilities.

The actuary should also consider the reasonability of the reinsurance credits in the liabilities in relation to the liabilities held by the reinsurer.

Recoveries from a reinsurer depend upon the continuing solvency of the reinsurer. Therefore, in order to take full credit for reinsurance, the actuary should be reasonably satisfied as to the financial strength, investment policy and valuation practices of the reinsurer and those of its retrocessionaires. For assessing such matters with respect to retrocessionaires, the actuary may rely on the actuary of the reinsurer to the extent that such reliance is justified.

6.4.6 The Valuation of Future Experience Rating Refunds

Liability cash flows for experience rating refunds include all payments anticipated with respect to insured events incurred up to the end of the term of the liability, whether those payments are anticipated to be made before or after the term of the liability.

Accrued policy experience surplus is determined according to the methods and assumptions specified in the experience-rating agreement or by the insurer's common practice (the "policyholder basis"). It is normally determined at the policy renewal date. Where that date does not coincide with the valuation date, an estimate should be made of the experience surplus for the expired portion of the policy year.

The estimated experience surplus at the valuation date should be adjusted as appropriate to reflect the financial agreement with the policyholder. Considerations in determining the appropriate adjustments include:

- the experience assumed in the valuation for insured events that will occur to the end of the term of the experience-rating refund liability (which is the same as the term of the future claim liability), including incurred but not reported claims (note that margins for adverse deviations included in the valuation of these events will reduce somewhat the amounts for future experience-rating refunds);
- potential anti-selection by the policyholder in cases where the policyholder has the right to terminate the experience-rating agreement without terminating the insurance contract;

- differences between the policyholder liabilities and statement liabilities for incurred claims. In determining the impact of differences in basis, the actuary should consider potential antiselection associated with any existing contractual provisions related to policyholder access to experience surplus and the policyholder's options/obligations on termination of the contract (including any right to transfer assets/liabilities to another insurer and any unusual "final accounting" or post-termination experience-rating provisions);
- for groups where future claim liabilities are material and affect the experience-rating refund calculation, differences between the policyholder liabilities and statement liabilities for future claims;
- any cross-rating provisions in the contract (may allow offsetting an experience deficit in one coverage against an experience surplus in another coverage);
- interest rate risk related to the interest to be credited in the policyholder experience-rating calculation particularly where contractual guarantees exist; and
- other than for interest rate risk, a provision for adverse deviations in the liability for future experience rating refunds only if necessary to provide for uncertainty as to the manner in which the experience rating refund is to be determined.

The liability for future experience rating refunds should not have a negative value, unless the insurer is holding another liability (e.g., a claims fluctuation reserve) for the group and has a contractual right to reduce that liability to offset the experience rating deficit. The negative experience rating refund liability would be limited to the amount so recoverable.

Under GAAP, it might be appropriate to recognize a receivable on the asset side of the balance sheet with respect to an accrued experience deficit. Such a receivable would be associated with margins on future premiums or other revenue that the insurer expects to receive beyond the term of the liabilities. The actuary should explicitly test the appropriateness and recoverability of the amount recognized as receivable, and make an adjustment to the value of the policy liabilities if required to serve the objective of the valuation. Care should be taken to ensure that there is no double counting of future margins, for example, with margins used to recover unamortized acquisition expenses (see 4.9 *The Deferral of Acquisition Expenses*).

6.4.7 Stochastic Methods

Due to its essentially deterministic nature, the Canadian Asset Liability Method, as described in sections 6.1 to 6.3, does not readily lend itself to the valuation of liabilities associated with certain product features, such as investment performance guarantees on segregated funds. The distinguishing characteristic of such product features is the high degree of skewness of the associated cost distribution compared to the distribution of the underlying valuation assumption.

For example, consider a guarantee to return at least the amount deposited after 10 years on an equity-index segregated fund. The expected value of the cost of this guarantee is much higher than the cost of the guarantee assuming the expected value of equity index returns. Even if a reasonable margin for adverse deviations is applied to the expected equity returns, the cost of the segregated fund guarantee under that assumption would be lower than appropriate for the valuation.

Another example is certain stop-loss arrangements, where the insurer is obligated to pay an amount only if experience is very adverse, say, worse than two standard deviations above the mean. A valuation assumption equal to the expected value (mean) plus a margin for adverse deviations would likely produce a cost that is too low for the purpose of the valuation.

In these situations, the actuary will need to employ other valuation methods to serve the objective of the valuation. Stochastic methods may be appropriate, particularly for segregated fund guarantees, where the costs are linked to the performance of assets.

7 SELECTING THE CASH FLOW ASSUMPTIONS

7.1 General

The actuary should discuss the insurer's current and projected policy with the officers responsible for investments, underwriting, claims, marketing, pricing, policyholder dividends and administration.

The actuary should be familiar with the risk characteristics of each investment, insurance, reinsurance, annuity or intermediary remuneration contract so that these may be appropriately reflected in the liabilities.

The actuary should recognize the impact of the external environment on future cash flows. Specific considerations include economic factors such as inflation or recession and the judicial, regulatory, legislative and political environment.

The methods described elsewhere in the consolidated standards of practice for estimating claim cash flows that will arise in the future may also be suitable for personal insurance provided through contracts of indemnity. Contracts of indemnity are those that provide benefits that are not scheduled but depend upon proof of loss, usually subject to certain limits.

7.1.1 Use of Prior Experience

To the extent possible, expected assumptions about future experience should be based upon actual past experience. The most reliable experience is recent, fully credible experience for the same cohort of risks for which the assumption is to be made.

Where the experience of the cohort lacks full credibility, the actuary should construct assumptions by weighting the experience of the cohort with other experience that is more credible. This may be industry experience in the same country, which is preferable, or from elsewhere. A number of useful models exist for assessing the credibility of experience data of various kinds.

Before relying on a published table, the actuary should give consideration to the characteristics of the table, including the makeup of the cohort of risks whose experience forms the basis of the table, the exposure period and the valuation margins, if any are present. The actuary should be aware of assumptions and methods used in developing published tables and should make modifications where appropriate. However, the actuary should exercise caution in making such modifications, and, in the absence of reliable evidence, an expected assumption more favourable than industry average should not be used.

In developing cash flow assumptions for the expected experience scenario, the actuary must apply judgment to determine the extent to which prior experience is a guide to future experience. In particular, the actuary should consider the opportunities present for antiselection by borrowers, policyholders and others, and the extent to which such antiselection may affect future experience.

For example, where a policyholder may create, prolong or stop a policy benefit; or a borrower may extend or pre-pay a loan; or a ceding insurer may recapture business reinsured with the insurer, the actuary should assume that those who benefit from doing so will tend to act to the insurer's detriment, to the extent that they benefit. The insurer's exposure to antiselection on business that has not been tested for AIDS is another example.

As a rule, the actuary's appraisal of recent experience should be independent of the insurer's management of dividend scales and other adjustable policy elements. For one thing, there may be fewer factors underlying the dividend scale, or fewer variable policy elements, than there are risk factors pertinent to the liability valuation. Moreover, management's assessment and use of emerging experience for dividend or pricing purposes may differ from the actuary's assessment of emerging experience for valuation purposes.

7.1.2 Trends

Where pertinent, the actuary should use cash flows that reflect emerging trends in experience. It is recognized that it takes time to discern trends in emerging experience, and to distinguish them from random fluctuations. On the other hand, long-term averaging of past experience is usually inappropriate: liability values should reflect emerging trends.

In analyzing experience data, it is appropriate to remove the effects of statistical fluctuations and cyclical influences. To the extent that the experience so adjusted reveals an underlying trend, the actuary should apply judgment to the projection of that trend in setting the expected assumption. Even where no such trend is revealed, it may be appropriate to project either an improvement or deterioration in the future in the expected assumption.

For valuation purposes, unless prescribed otherwise (e.g., see 7.2.1 *Insurance Mortality)*, it is appropriate to project a favourable trend for a limited period beyond the valuation date only to the extent that there is reliable evidence that the experience will continue to improve throughout the period.

It is also appropriate for the actuary to apply judgment as to the cyclical influences on future expected experience. However, the actuary should exercise caution before deciding to project a temporary improvement in conditions beyond the valuation date.

7.1.3 Margins for Adverse Deviations

The cash flow assumptions for the expected experience scenario reflect the actuary's judgment applied to recent experience. They should be appropriate to the circumstances of the insurer and the existing assets and liabilities. The next step in the valuation is the application of margins for adverse deviations. The choice of margins for adverse deviations should appropriately reflect the degree of uncertainty of the expected assumption.

General considerations leading to a higher margin for a particular assumption include the following:

- the actuary has projected a favourable trend;
- the assumption pertains to experience that is farther in the future;
- there is a lack of reliable experience data (e.g., no industry experience; insurer experience outdated or inappropriate);
- the cohort of risks lacks homogeneity;
- the experience is likely to be affected by cyclical influences;
- the experience is subject to large fluctuations over time, making determination of the expected assumption more uncertain;
- the class of assets or liabilities for which the assumption is being made reflects new terms and conditions; or changes in approach to distribution, underwriting, or marketing. These changes may make past experience less useful a guide to future experience;
- the insurer is slow to protect itself against changes which adversely affect it; and
- internal and external factors present at the valuation date contribute to an increase in uncertainty about future experience.

For specific considerations leading to a higher margin for particular assumptions, see 7.2 *Liability Cash Flow Assumptions* and 7.3 *Asset Cash Flow Assumptions*.

The standard range of margins applied to expected experience assumptions varies by assumption (see 7.2 *Liability Cash Flow Assumptions* and 7.3 *Asset Cash Flow Assumptions*). For assumptions not specifically discussed, the standard range of margins is 5% to 20% of the expected experience assumption if a positive margin increases the liability, or -5% to -20% if a negative margin increases the liability.

For some assumptions, it may not be reasonable to apply a margin for adverse deviations in the usual manner of modifying the expected assumption by a particular percentage. In such cases, the margin for adverse deviations would be applied by substituting an alternative choice for the assumption that increases the liability. The actuary should use judgment in choosing a reasonable alternative assumption, appropriate to the degree of uncertainty of the expected assumption.

Exclusive reliance on industry experience provides grounds for the selection of the high margin. While prior industry experience may be a reliable guide to future industry experience, there may be little resemblance between industry experience and that of the insurer.

There may be circumstances where an adequate valuation would require the use of a margin in excess of the high margin. For example, the degree of uncertainty associated with a particular assumption may be unusually high, or the standard range may produce an insufficient PFAD given the size of the expected assumption. For example, margins to be applied to low frequency rates of loss, such as default rates on interest-bearing securities or mortality rates at young ages, may be too low if selected from within the standard range. The assumption selected should, nevertheless, be reasonable.

Only in very unusual circumstances would it be appropriate to apply a margin smaller than the low margin.

In situations where it is reasonable to expect that changes in one assumption would be correlated with changes in other assumptions, the actuary should take care to ensure that the overall provision for adverse deviations resulting from the combined application of margins for adverse deviations is appropriate.

7.2 Liability Cash Flow Assumptions

7.2.1 Insurance Mortality

The following considerations may affect the selection of expected assumptions for future insurance mortality experience:

- age, gender, smoking habits of the life insured;
- health, lifestyle of the life insured;
- duration since issue of policy;
- plan of insurance and the benefits provided (especially where antiselective lapsation is a factor; see 7.2.5 *Anti-selective Lapsation*);
- underwriting practices;
- presence of discounts (e.g., group discounts offered where several individual policies are sold at once may involve less stringent medical or financial underwriting);
- size of policy; and
- distribution system and other marketing practices.

It is appropriate, tempered by materiality considerations, for expected mortality for reinsurance received to reflect the underwriting of the ceding insurer for automatic treaties and the underwriting of the assuming insurer for facultative treaties.

Mortality at all ages has exhibited a long-term decreasing trend in developed countries. Since no actuary is in a better position than another to judge whether this general trend will persist, at what rate, and for how long, it is appropriate for the trend to be prescribed. It is hereby prescribed that expected insurance mortality rates should not reflect improvement beyond the valuation date.

The expected effects of antiselection, and, in particular, antiselective lapsation, on mortality and morbidity should be taken into account before the application of margins for adverse deviations. Individual life insurance, in particular, tends to be a long-term product. Thus, any factor that has had, or may have, the effect of attracting the better risks away from the cohort could contribute to an unfavourable trend.

The standard range for margins for adverse deviations on insurance mortality is an addition to the expected assumption of 3.75 to 15 per 1000 divided by the curtate expectation of life, starting at the life insured's attained age.

In addition to the general considerations outlined in 7.1.3 *Margins for Adverse Deviations*, specific considerations leading to a higher margin for insurance mortality include:

- a recent change in underwriting standards or method of classification;
- antiselection by the sales force;
- a policy of internal replacement is favourable to rotation of the old business; and
- unfavourable medical developments.

7.2.2 Annuitant Mortality

The following considerations may affect the selection of expected assumptions for future annuitant mortality experience:

- age and gender of the annuitant;
- smoking habits, health, lifestyle of the annuitant;
- size of premium;
- registered or nonregistered;
- source of funds;
- group or individual contract;
- underwriting class (e.g., structured settlements); and
- plan characteristics and amount of benefits.

Annuities with no guarantee period may be combined with insurance contracts in a "back-to-back" package. These annuities may exhibit lower mortality due to the underwriting on the insurance contract.

The actuary should take into account any potential antiselection caused by the degree of choice available to the annuitant as to timing, form, or amount of payments at the time annuity payments commence.

If substandard mortality is assumed (e.g., for disabled lives), the actuary should consider the extent to which healthy annuitants may be included in the group of lives.

Antiselection can occur if commutation of survival dependent benefits is permitted after regular payments have started.

Mortality at all ages has exhibited a long-term decreasing trend in developed countries. Since no actuary is in a better position than another to judge whether this general trend will persist, at what rate, and for how long in any particular territory, it is appropriate for the trend to be prescribed.

It is prescribed that industry expected annuitant mortality rates should reflect the persistence of a general trend beyond the valuation date in accordance with the most recent reliable industry projection scale available. The Canadian Institute of Actuaries will recommend the basis to be used from time to time.[1]

The standard range for margins for adverse deviations on annuitant mortality is -5% to -15% of the expected assumption.

In addition to the general considerations outlined in 7.1.3 *Margins for Adverse Deviations,* specific considerations leading to a higher margin for annuitant mortality include:

- valuation data are not gender distinct; and
- annuity payment controls are inadequate.

7.2.3 Morbidity

The following considerations may affect the selection of expected assumptions for incidence and termination of future disability and other types of morbidity experience (i.e., accident and sickness claims):

- age, gender, smoking habits, and occupation of the life insured and the industry in which the life insured works;
- health, lifestyle of the life insured;
- definition of disability;
- cause of disability;
- elimination period, guarantees, deductibles, coinsurance, policy limits, offsets, and other policy features;
- administrative and claims adjudication practices;
- duration since issue of policy;
- seasonal variations;
- environmental factors (e.g., changes in government offsets or health care programs; levels of unemployment);
- interest rate scenario and other economic factors (e.g., cost of living adjustments);
- presence of discounts (e.g., group discounts offered where several individual policies are sold at once may involve less stringent medical or financial underwriting);
- amount of insurance;
- benefit type (e.g., a coverage that indemnifies a loss may not have as much potential for antiselection as a scheduled policy payment);
- return of premium features; and
- participation rate (in group insurance).

For some group coverages, the recent experience of the group may be sufficiently reliable to form the basis of the expected morbidity assumption.

Waiver of premium should be included in the expected disability experience if recovery has the potential to return the insured to active status.

[1] The current recommendation is Projection Scale AA, published in May 1994 "Exposure Draft of the Society of Actuaries Group Annuity Valuation Table Task Force." This projection table is appropriate for both individual and group annuitants, and is to be applied from the valuation date onward.

In considering cyclical influences on morbidity experience, the actuary should not necessarily assume that higher than expected incidence rates in poor economic conditions will lead to more rapid recovery than expected.

For disability insurance in North America, there is a presumption that, in the absence of reliable experience, it is not appropriate for the actuary to select expected claim termination rates at claim durations beyond duration 10 that are more favourable than those found in the most recent reliable industry table. The Canadian Institute of Actuaries will recommend the basis to be used from time to time.[2]

The standard range for margins for adverse deviations on disability incidence rates is 5% to 20% of the expected assumption. The standard range for margins for adverse deviations on termination rates is -5% to -20% of the expected assumption. In cases where it is reasonable to expect that an increase in incidence rates would be positively correlated with an increase in termination rates, the actuary may need to choose lower margins (than if a correlation were not expected) in order to avoid the result of an excessive provision for adverse deviations.

In addition to the general considerations outlined in 7.1.3 *Margins for Adverse Deviations*, specific considerations leading to a higher margin for future morbidity experience include:

- disability experience studies monitor claim costs but not incidence and continuance rates separately;
- trend has been unstable or difficult to estimate, or is not monitored in sufficient detail;
- business is concentrated in a few industries, professions or geographic areas;
- underwriters or claims personnel are trained primarily for other lines of business;
- the underwriting, claims and rehabilitation functions are not well managed; and
- the potential antiselection by insurance agents is high (e.g., may give their best risks to their regular insurer and broker the rest).

7.2.4 Lapsation (and Partial Withdrawal)

The liability cash flows should incorporate lapse and/or partial withdrawal assumptions where the insurer is exposed to risk from the fact that the policyholder has the option to withdraw or persist, or to select the timing or the amount of withdrawal.

The following considerations can affect the selection of expected assumptions for future lapsation and/or partial withdrawal experience:

- plan of insurance and the benefits and options provided;
- policy duration or attained age;
- premium frequency and payment method;
- premium paying status;
- size of policy;
- relative advantages of lapsation/withdrawal and persistency to the policyholder, including consideration of any tax implications ;
- surrender charges and/or persistency bonuses;
- sophistication of policyholder and intermediary;

[2] The current recommendation is the 1987 CGDT basic table for Group LTD, and the 1985 CIDA basic table for individual disability insurance.

- competitive situation for the product (e.g., relationship between credited interest rates and externally available interest rates for universal life contracts);
- interest rate scenario and other economic factors; and
- distribution system and other marketing practices (e.g., commission practices; conversion or replacement programs; marketing emphasis on withdrawal flexibility).

Insurance policies may be combined with annuity policies in a "back-to-back" package. These insurance policies can be expected to experience low lapse rates due to the automatic premium payment provided by the annuity.

Lapse rates associated with reinsurance received depend upon the features of the direct product.

Credible and pertinent lapse experience tends to develop quickly. When the actuary has access to such experience, there is generally no difficulty with the selection of expected assumptions. In the absence of reliable experience data for the class of risks under consideration (e.g., new products, later durations of policies for which reliable experience is available only at early durations), the actuary should proceed with caution in selecting the expected assumptions unless the policy liability is insensitive to variations in lapse experience.

A "cliff" may result from: maturity of the policy or benefit; a sudden substantial increase in the level of non-forfeiture values provided; or a sudden decrease in the level of surrender charges. In the absence of reliable experience data, in the presence of a cliff, there is a presumption that the lapse rate should grade to zero over a period of years prior to attainment of the cliff and should be zero for a short period immediately preceding the cliff.

On a paid-up policy with no cash surrender values, there is a presumption that a non-zero lapse rate is inappropriate.

For return of premium benefits in life insurance, considerations are similar to those that apply to cliffs. Return of premium benefits in accident and sickness insurance are often conditional upon zero claims to that point, or they may be reduced by claims paid to date. In such circumstances, the considerations relating to cliffs may be inapplicable, in whole or in part.

The standard range for margins for adverse deviations on rates of lapse and partial withdrawal is 5% to 20% of the expected assumption. For each duration, the direction of the margin should result in an increase in the liability net of reinsurance. Any reasonable grouping of policies can be applied for this purpose (e.g., it would generally not be appropriate to group lapse-supported products with non-lapse-supported products). Sensitivity testing may be required to determine the proper application of the margin for adverse deviations. Moreover, the proper application of the margins may be different for different interest rate scenarios.

For partial withdrawals, it is not necessary to apply a margin to the assumption about the amount withdrawn in addition to the margin on the probability of partial withdrawal.

In addition to the general considerations outlined in 7.1.3 *Margins for Adverse Deviations*, specific considerations leading to a higher margin for lapsation and partial withdrawal experience include:

- the liability is with respect to deposits or deferred annuities without market value adjustments on withdrawal;
- the economic environment has been unstable in the recent past;
- the remuneration policy favours policyholder behaviour that is disadvantageous to the insurer; and
- the marketing practices favour policyholder behaviour that is disadvantageous to the insurer.

7.2.5 Antiselective Lapsation

Antiselective lapsation may be defined as either lapsation (by the better risks) or non-lapsation (by the worse risks) that occurs among the members of a class of risks in such a way as to give rise to a deterioration in the mortality or morbidity claims experience of the persisting cohort.

The deterioration in claims experience is more severe as the lapse rate increases among the better risks or decreases among the worse risks. It is unlikely that antiselective lapsation can be observed in practice, since that would require underwriting or study of the subsequent claims experience of those who lapse. As a result, assumptions about antiselective lapsation will always rest upon general reasoning.

Examples of situations that may involve antiselective lapsation of better risks include:

- premium increases on renewable term;
- renewal underwriting on re-entry term;
- premium increases or benefit reductions on adjustable insurance;
- cost of insurance increases on minimally funded universal life contracts;
- dividend reductions on participating insurance;
- replacement programs;
- non-forfeiture value spikes;
- policies remaining after creation of a new underwriting class; and
- downgrade of the insurer's credit rating.

Examples of situations that may involve antiselective non-lapsation of worse risks include:

- policyholders in a high risk group (e.g., AIDS); and
- exercise of extended term non-forfeiture options.

The following considerations may affect the selection of expected assumptions for antiselective lapsation:

- the relative advantage of lapsation for better risks or non-lapsation for worse risks;
- sophistication of the policyholder and intermediary;
- distribution system and other marketing practices (e.g., commission practices);
- underwriting practices (e.g., for re-entry term); and
- competitive situation for the product.

In the absence of reliable experience, the actuary should not assume that the non-lapsation of better risks will improve the claims experience of the persisting cohort.

7.2.6 Expenses

Assumptions are required with respect to the future expenses associated with insurance obligations arising from commitments the insurer has made on, or prior to, the valuation date. Other expenses incurred by the insurer should be ignored.

Where future premiums are a factor in the determination of the liabilities, expenses related to the premiums should also be taken into consideration. These include premium-based insurance and annuity sales compensation and related expenses, as well as premium tax.

In addition to the expenses of administering investments, expenses relating to investment earnings should also be taken into consideration. These may include deferred fees or commissions associated with the acquisition of certain assets as well as direct taxes on investment revenues. Interest on money borrowed to purchase the investment is another expense to consider.

Certain taxes may be classified and accounted for by the insurer as income taxes even though the underlying basis of tax is not income or profit. One example is the investment income tax (Part XII.3 of the *Income Tax Act* (Canada)). Other examples would include Canadian capital taxes (federal and provincial), U.K. taxes in the I - E basis and Hong Kong taxes where the underlying basis of taxation is premium income. To the extent that such taxes are attributable to the existing policies and the assets supporting them and to the extent that they are not recoverable or offset against income taxes related to those policies and assets, the taxes should be provided for in determining the policy liabilities (see 7.2.8 *Income Taxes*).

Transfers to shareholders in connection with policyholder dividends on participating contracts should not be treated as expenses and should not be reflected in the policy liabilities.

Where an insurer occupies a property that it owns, it is inappropriate to ignore the occupancy cost that the insurer would otherwise incur as a tenant. Rental income on the property at a consistent level should also be recognized in determining the policy liabilities.

As with any other cash flow assumption, assumptions about future expenses will be based on existing experience data. Unlike claims and lapse experience data, expense data are affected by the manner in which the insurer's expenses are allocated. The actuary should be familiar with the manner in which the expenses are allocated. The actuary should also ensure that expenses pertinent to the valuation include both direct expenses and an appropriate provision for general overhead expenses reasonably allocable thereto.

In some circumstances, such as start-up or wind-down of an insurer, or where the allocation of expenses is unusual, the experience data may not serve as an appropriate basis for future expense assumptions. The actuary should examine the experience data carefully, and ensure that the resulting assumptions provide for a reasonable level of expenses that do indeed pertain to the administration of investments and policy benefits, and serve the objective of the valuation.

The actuary should exercise caution in projecting improvements in economies of scale beyond the valuation date. Fast growing operations and concrete initiatives such as the recent or planned acquisition of a portfolio may justify the projection of improvements for a temporary period. The improvement should be projected only for a period for which there is reliable evidence that the favourable trend will persist.

The standard range for margins for adverse deviations on expenses is 2.5% to 10% of the expected assumption. Margins for adverse deviations are not required for expenses, such as premium taxes, where the rate of expense is known.

In addition to the general considerations outlined in 7.1.3 *Margins for Adverse Deviations*, specific considerations leading to a higher margin for expenses include the following:

- the actual expense allocation is not an appropriate basis for the expected expense assumption;
- the rate of change in the asset or liability portfolio is unstable;
- expense rates vary among different distribution systems, and the distribution of business among distribution systems varies;
- the expense experience has been volatile; and
- cost controls are inadequate.

Future expense cash flows should be assumed to vary with assumed rates of general price inflation in a reasonable manner. General inflation rates are part of the interest rate scenarios (see 6.3 *Interest Rate Scenarios*), and therefore provision for future inflation rates different from those in the expected experience scenario is included within the provision for interest rate risk. Separate margins for adverse deviations on rates of future general inflation are not required.

7.2.7 Premiums and Other Policyholder Options

The selection of assumptions for future premiums is straightforward for contracts where the amount and timing of future premium payments is fixed.

For contracts where the policyholder has the option to select the timing or amount of premium payment, assumptions are required about the timing and amount of future premiums. In general, liability cash flows should incorporate assumptions about policyholder behaviour whenever the insurer is exposed to risk from the fact that the policyholder has the option to choose from a number of alternatives.

The following considerations may affect the selection of expected assumptions for policyholder behaviour:

- plan of insurance and the benefits and options provided;
- policy duration or attained age;
- historical premium payment patterns;
- method of premium payment (e.g., pre-authorized chequing);
- relative advantages and disadvantages of various behaviours to the policyholder;
- sophistication of policyholder and intermediary;
- competitive situation for the product;
- interest rate scenario and other economic factors; and
- distribution system and other marketing practices (e.g., commission practices; marketing emphasis on premium flexibility).

Consistent with policyholder's reasonable expectations, it should not generally be assumed that choices that are currently available to the policyholder will be withdrawn by the insurer in the future (see 4.6 *Policyholder's Reasonable Expectations*).

The actuary should provide for adverse deviations by choosing alternative assumptions about policyholder behaviour that will increase the liabilities (see 7.2.3 *Margins for Adverse Deviations*). Testing may be required to determine the proper application of margins for adverse deviations and to ensure that the margins increase the value of the liability. Moreover, the proper application of the margins may be different for different interest rate scenarios.

7.2.8 Income Taxes

Under the valuation basis (including PFAD), statement income in all future accounting periods would be zero. Therefore, if taxable income were equal to statement income, there would be no need to provide for future taxes in the valuation.

However, taxable income is not necessarily equal to statement income. There may be permanent differences and/or existing and future temporary differences between statement and tax values. Income taxes in respect of such differences should be recognized in determining the policy liabilities.

Moreover, on the same valuation basis, there may be future non-income taxes attributable to the existence of the policy liabilities and the specific assets that support those liabilities (e.g., some capital taxes in Canada). To the extent that future non-income taxes are not recoverable or offset by future income taxes related to those policies and assets, the policy liabilities should provide for such taxes. Conversely, to the extent that future non-income taxes are recoverable or offset by such future income taxes, they affect the timing of the income taxes and this should be recognized in the valuation.

Thus, it is appropriate in projecting the asset and liability cash flows to make explicit assumptions about the effects of future taxes on those cash flows, including income taxes and non-income taxes related to policy liabilities and the assets that support those liabilities. For this purpose, it is necessary to make assumptions about future taxable income, consistent with cash flow assumptions including margins for adverse deviations. More refined assumptions would provide for the effects of the applicable carryback or carryforward rules.

When considering the impact of future differences on the cash flows, tax losses may arise in the future. The actuary should use future tax losses to reduce the liability only to the extent the benefits of those tax losses are recoverable (on the valuation basis) from within the insurer based on the projected tax position of the company overall. To the extent there is uncertainty about the ability to realize the benefit of future tax losses, a margin for adverse deviations would be appropriate. The future release of provisions for adverse deviations is not a legitimate source of recovery of the benefit of future tax losses.

The resulting policy liabilities would thus incorporate the effect on the cash flows of existing and future permanent and temporary differences, and of future non-income taxes attributable to the policy liabilities and to the specific assets supporting those policy liabilities.

In order to avoid double counting, the actuary should adjust the resulting policy liabilities by the amounts of future tax liabilities and assets (net of any accounting valuation allowances) relating to those policy liabilities and their supporting assets, that are required to be reported elsewhere on the balance sheet. The adjustment would be to subtract such future tax liability and to add such future tax asset. The policy liabilities so adjusted are appropriate for presentation in life insurer financial statements prepared in accordance with GAAP.

7.2.9 Policyholder Pass-Through Features

For some plans of insurance, the insurer may have the flexibility to vary policy elements such as policy dividends, premiums, cost of insurance charges, credited interest rates, and expense charges. These mechanisms are generally used to pass-through the impact of changes in experience to the policyholder.

The actuary should make assumptions about future policy elements that are consistent with the other assumptions in the experience scenario. The important considerations in choosing assumptions about policyholder pass-through features are described in 6.2.4 *Step 4 - Reflecting Policyholder Pass-Through Features*.

In many cases, it may be appropriate to use an implicit approach to estimating future cash flows, by assuming that neither experience factors nor policy elements change. The actuary should use caution in taking this approach, ensuring that the limitations on the insurer's ability to pass-through adverse experience are properly reflected in the value of the liability (see 6.2.*4 Step 4 - Reflecting Policyholder Pass-Through Features).*

7.2.10 The Valuation Dividend Scale

The valuation dividend scale refers to the policyholder dividends reflected in the expected experience scenario.

Qualitatively, the valuation dividend scale encompasses policyholder dividends of the following types:

- regular, periodic dividends; and
- terminal and other deferred dividends.

Ownership dividends (see below) are specifically excluded from the valuation dividend scale.

Quantitatively, the valuation dividend scale consists of those dividends that are consistent with the insurer's past experience (if relevant), expected future experience and the objective of providing for policyholders' reasonable expectations (see 4.6 *Policyholders' Reasonable Expectations*).

The valuation dividend scale should include policyholder dividends only and not shareholder dividends, nor should it include transfers to shareholders associated with policyholder dividends.

The existence of policyholders' reasonable expectations with respect to dividends does not directly depend upon the type of dividend, whether annual, deferred or terminal; or the source of the dividend, whether the base policy, margins in other policy liabilities both participating and nonparticipating, or surplus.

The actuary will normally be able to rely on the existence of current dividend scales and to refer to marketing practices, both current and historical, for periodic dividends and for terminal dividends. For dividends deferred many years after issue on a new product, marketing practices may be sufficient to establish reasonable expectations on the part of policyholders that such dividends will be paid in the right circumstances.

In addition to accrued investment income and the carrying value of assets, the statement value of assets also reflects provisions for deferred gains and losses that are not netted against asset values but appear on the right-hand side of the balance sheet. If future policyholder dividends are related to capital gains that are being deferred, it would be inappropriate to assign a value to that portion of the liability that is greater than the statement value of the assets that support it.

7.2.10.1 Regular Dividends

In the case of regular dividends, typically paid annually, the actuary should assume, as the valuation dividend scale, the scale of policyholder dividends that is consistent with policyholders' reasonable expectations and the expected experience.

In some cases (e.g., where the current dividend scale has been set in anticipation of a future deterioration in experience), it is appropriate to assume that the dividend scale will not change as future experience deviates from current experience in the expected manner.

In other cases (e.g., where dividend scale changes have been briefly delayed), it may be appropriate to assume that the dividend scale will change even if future experience does not deviate from current experience, in order to reflect the insurer's plan to rectify the situation. The actuary should be satisfied that the insurer, by its delay, has not effectively changed policyholders' reasonable expectations.

7.2.10.2 Dividend Options

The form in which dividends are received by policyholders may have a material bearing on the liability. It would normally be appropriate for the actuary to recognize the cash equivalent of all dividend options on the current conversion basis, provided that the actuary is satisfied that the current basis fairly reflects the value of all such options. If that is not the case, the actuary should either apply an appropriate basis to convert non-cash dividends to cash, or else value the dividend options in their actual form. Where significant differences in value exist, it may be appropriate for the actuary to assume that a higher proportion (than that which is reflected in historical experience) of policyholders will opt for the more valuable benefits.

7.2.10.3 Attaching Benefits

The actuary may value riders attached to participating policies explicitly, including these additional benefits and the corresponding premiums and related expenses in the expected experience scenario, and adding a provision for adverse deviations to the whole policy that reflects its participating nature.

A commonly applied acceptable alternative is for the actuary, after giving due consideration to the issue of materiality, to value such riders independently, often applying provisions for adverse deviations that are appropriate for nonparticipating business. If the insurer's dividend scale expressly includes a component related to the release of provisions for adverse deviations on riders, the actuary should ignore that component in formulating the valuation dividend scale in order to be consistent with the valuation of the riders. Care should be taken to ensure that the reduction applies only over the term of the rider, which is often shorter than that of the base policy.

7.2.10.4 Ownership Dividends

Some portion of policyholder dividends may be viewed as ownership dividends (i.e., dividends in the nature of shareholder dividends). Such dividends may be ignored in formulating the valuation dividend scale provided that:

- the insurer has a distinct policy for ownership dividends;
- the insurer has never included such ownership dividends in illustrations prepared for the policyholder; and
- such dividends do not arise from the experience of the class of policies for which the dividend is to be paid.

Interest on, and payments out of, surplus that have arisen from the experience of the class of policies in question are considered, for the purposes of these standards, to have arisen from the experience of that class of policies.

The actuary should be convinced that the characterization of policyholder dividends as ownership dividends is not purely artificial. For example, it would be contrary to the spirit and intent of these standards to so value the liabilities as to allow an insurer to accumulate surplus under one class of policies and use it to pay ownership dividends under a second class of policies, and vice versa, thereby artificially reducing its participating policy liabilities and increasing its surplus.

7.2.11 Reinsurance Cash Flows

The actuary should be familiar with all features of the reinsurance treaties ceding risks included in the gross policy liabilities. In particular, the actuary should ensure that all risks transferred, and only the risks transferred, are recognized in determining the benefit costs saved and that the cash flows reflect all premiums, allowances or other adjustments, including dividends or experience-rating credits and any volume, experience or other bonuses.

Where the insurer participates in underwriting pools or associations, the actuary should be aware that the claims management and other operating practices for such business might differ from those of the insurer. The actuary should ensure that appropriate liabilities are held for the insurer's participation in this business.

Reinsurance ceded cash flows assumed for valuation purposes should be consistent with direct cash flows. For example, the mortality including margins for adverse deviations that is assumed for the direct portion of a policy should also be assumed for the ceded portion.

The following should be consistent with the scenario assumptions with, in the case of primary liabilities undertaken on fixed terms, margins for adverse deviations applied to the direct cash flow assumptions:

- the amount of dividends, experience-rating refunds or bonuses payable by the reinsurer to the ceding insurer; and
- the assumed future recapture, if full control over recapture does not rest with the ceding insurer, and recapture is not forced at a specific future date.

If full control over recapture does not rest with the ceding insurer and depends upon factors not recognized in the scenario assumptions, the actuary should make an expected assumption about the timing of the recapture, then, in order to provide for adverse deviations, make a different assumption that will increase the liabilities.

7.3 Asset Cash Flow Assumptions

7.3.1 Projected Asset Cash Flows

7.3.1.1 Fixed Income Assets

Fixed income assets generally involve contractually promised cash flows, and the initial projection of those cash flows is usually straightforward. Considerations of credit risk (see 7.3.2 *Credit and Related Risk*) and option risk (see 7.3.3 *Option Risk*) will modify the projections as appropriate.

The actuary should decide how far to extend the projection of future cash flows. As a general rule, cash flows for fixed interest investments are projected to the end of the interest guarantee period, and cash flows for variable interest investments are projected to the final repayment of the loan.

For some fixed interest investments, the interest guarantee does not expire at the same time that the investment is reimbursed. A loan may be extendible by the borrower, or it may be callable. These matters are considered in 7.3.3 *Option Risk and 6.2.3 Step 3 – Providing for Interest Rate Risk.*

The projected asset cash flows should be modified to reflect the impact of off-balance sheet derivative instruments.

7.3.1.2 Non-Fixed Income Assets

Many assets do not involve the promise of a future payment. These include common stocks, real estate, and many derivatives. In such cases, the actuary must make assumptions about the expected future cash flows, and then modify those assumptions in order to provide for adverse deviations.

For many non-fixed income investments, the expected future cash flows include income such as dividend income and rental income. The remainder of the expected future cash flows requires assumptions for rates of future capital appreciation/depreciation and assumptions of when investments are sold or otherwise recovered.

In setting the expected assumptions for income and rates of capital appreciation/depreciation, the actuary should seek appropriate expert advice. The rates chosen should be appropriate to the portfolio of non-fixed income assets held, and if applicable, expected rates of return would not exceed the long-term average rate of return on the recognized published index that best matches the characteristics of the portfolio. Margins for adverse deviations on income and rates of capital appreciation/depreciation are discussed in 7.3.2. *Credit and Related Risk.*

Assumptions about the sale or other recovery of the investment should be made in a manner that is consistent with the interest rate scenario testing (see 6.2.3 – *Step 3 – Providing for Interest Rate Risk*).

7.3.2 Credit and Related Risk

7.3.2.1 Fixed Income Assets

Credit risk on fixed income assets is the risk of nonpayment, reduced payment, and/or delayed payment of contractually promised cash flows. It includes loss of interest, loss of principal, and extraordinary expenses associated with managing credit loss events. The actuary should provide for credit risk by making an appropriate reduction to the cash flows otherwise receivable under the contracts. This should include both expected credit loss and appropriate margins for adverse deviations.

Considerations affecting the selection of expected assumptions for credit losses include the following:

- asset type and credit quality;
- liquidity of the asset;
- term of the asset and/or time elapsed since issue or origination of the asset;
- credit underwriting standards;
- degree of diversification within the asset class;
- industry credit loss experience in an asset class;
- insurer's own credit loss experience in an asset class, though it is emphasized that historical experience is not necessarily a reliable guide to future experience;
- full or partial credit risk guarantees (e.g., NHA mortgages);
- opportunities for borrowers to anti-select (e.g., high loan-to-value ratio on mortgages); and
- interest rate scenario and other economic factors.

In making assumptions about future credit losses for a class of assets, a useful guide is the quality rating of that asset class and the related spread earned by that class of assets over a government security of the same term and structure. However, the actuary should not assume that the expected cost of credit losses is necessarily less than or equal to that spread.

Future credit losses should be assumed both for assets that are impaired at the valuation date as well as the other assets, since they may become impaired in the future. The actuary should keep in mind that the policy liabilities are expressed in terms of the statement value of the assets whose cash flows support the liability. Statement values are affected by writedowns and loss provisions. Future asset cash flows in the valuation are affected by the actuary's assumptions about credit losses. Therefore, it is important for the actuary to understand the asset-side action that has been taken and to communicate the financial reporting implications of the actuary's assumptions to management and to the auditor.

The actuary should ensure that the asset cash flows reflect the full cost of credit losses until ultimate repayment or disposal of the assets. For example, a mortgage is repayable when the interest guarantee period expires, but this may not coincide with the end of the amortization period. If a borrower is unable to reimburse the loan when the interest guarantee period expires and the insurer is forced to renew a mortgage, there is a credit loss event. If appropriate (i.e., if it doesn't materially affect the interest rate risk), the actuary would collapse the loss associated with the credit loss event to a lump sum at the expiry of the interest guarantee period.

The standard range for margins for adverse deviations on credit losses on fixed income assets is 25% to 100% of the expected credit losses. However, for assets with very low rates of expected credit losses, it may be appropriate to apply a higher margin (see 7.1.3 *Margins for Adverse Deviations*). Margins for adverse deviations are normally not required for the debt of national governments denominated in their own currencies.

In addition to the general considerations outlined in 7.1.3 *Margins for Adverse Deviations*, specific considerations leading to a higher margin for credit losses include the following:

- internal credit risk management practices are weak and/or poorly controlled;
- inexperience or lack of familiarity with a particular asset class (e.g., mortgage-backed securities, derivatives);
- a relatively high proportion of the asset class is invested in noninvestment grade issues and/or junior issues;
- past credit loss experience for the asset class has generally been much different than the industry average; and
- growth of the asset class has been rapid compared with the industry average.

7.3.2.2 Non-Fixed Income Assets

Credit and related risk on non-fixed income assets is the risk that the expected cash flows will not materialize. This may be caused by nonpayment, reduced payment, and/or delayed payment of expected income amounts, or by reduced rates of capital appreciation. Provision for these risks is considered to be part of the provision for adverse deviations.

Provision for adverse deviations on expected income, such as dividend income or rental income, is made through the application of margins for adverse deviations. The standard range for margins for adverse deviations on income is 5% to 20%.

Provision for adverse deviations on expected capital appreciation/depreciation is made through the application of a margin for adverse deviations to the expected rates of capital appreciation/depreciation, together with the assumption of a drop in the value of the investments.

The standard margin for adverse deviations on rates of capital appreciation/depreciation is 20% of the expected assumption. The standard range for the drop in the value of the investments is 25% to 40%, where 30% is intended to be applicable to a diversified North American common stock portfolio.

The drop in the value of investments should be assumed to occur when such a drop would be most adverse. This will generally, though not always, be the point in time when the non-fixed income portfolio is the largest. Sensitivity testing may be required to determine the appropriate timing of the drop in value of investments.

If there are significant policyholder pass-through features, it could be possible for a drop in the value of investments to cause a reduction in the value of the liabilities. In such situations, the actuary should apply judgment to determine the appropriate application of margins for adverse deviations.

In addition to the general considerations outlined in 7.1.3 *Margins for Adverse Deviations*, specific considerations leading to higher margins for adverse deviations include the following:

- higher volatility of the asset portfolio;
- lack or loss of expertise in setting expected cash flows;
- lack of diversification in the asset portfolio;
- relative illiquidity of assets in the portfolio; and
- high turnover frequency of the asset portfolio.

7.3.3 Option Risk

Asset cash flows should incorporate call and prepayment assumptions where the insurer is exposed to risk from the fact that the borrower has the option to select the timing or the amount of repayment.

The actuary should select expected assumptions, which may vary with the interest rate scenario, and then in order to provide for adverse deviations, make a different assumption that increases the liabilities. Any penalties associated with mortgage prepayments or other discharges should be reflected in the asset cash flows.

See 6.2.3 *Step 3 – Providing for Interest Rate Risk*.

7.3.4 Currency Risk

Currency risk exists when the currency of liabilities is not the same as the currency of the assets backing those liabilities. The expected assumption for future currency exchange rates is prescribed to be the rates prevailing at the valuation date or, if a devaluation is imminent, a less favourable assumption. A margin for adverse deviations should be applied to the currency exchange rates in a manner that increases the liabilities.

7.3.5 Investment Expenses

See 7.2.6 *Expenses*.