



AMERICAN ACADEMY *of* ACTUARIES

Updated Actuarial Guideline PBR-VAL from the American Academy of Actuaries' Life Reserves Work Group

Presented to the National Association of Insurance Commissioners' Life and Health Actuarial Task Force

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ACTUARIAL GUIDELINE PBR-VAL

[Drafting note: It may be that some of the material presented in this document would be better placed or restated in an Actuarial Standard of Practice (ASOP). The [Life Reserve\(s\) Work Group of the American Academy of Actuaries \(LRWG\)](#) has been in contact with the Actuarial Standards Board (ASB) to discuss the need for one or more ASOPs to complement this effort. While the right to issue Actuarial Standards of Practice and to determine their content rests exclusively with the ASB, we anticipate that the ASB will be willing to work cooperatively with the work group and the NAIC to develop appropriate ASOPs to support principles-based reserving.]

DETERMINING VALUATION ASSUMPTIONS FOR PRINCIPLES-BASED LIFE INSURANCE PRODUCTS

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I. Purpose

- A. Purpose. The purpose of this Actuarial Guideline is to specify the requirements and methods to establish valuation assumptions used to determine reserves for policies subject to the Principles-~~based~~-[Based](#) Reserves for Life Products Model Regulation (referred to throughout this document as the “Model Regulation.”). Valuation assumptions for Individual Life Policies, supplemental benefits, and riders on these policies that are not directly identified in the scope are to be determined on a basis that is consistent with the principles and methodologies defined in this Guideline.
- B. The company is expected to provide the Qualified Actuary with the necessary information sufficient to permit the actuary to fulfill the responsibilities set forth in this Guideline and responsibilities arising from applicable guidelines and Actuarial Standards of Practice.

II. Definitions

~~NGE Re-determination Margin: The margin or spread between Best Estimate assumptions and the anticipated future non-guaranteed elements. At issue, the Re-determination Margin is equal to the pricing margin used to develop non-guaranteed elements. After issue, the Re-determination Margin may change based on current Best Estimate assumptions and the Company's current non-guaranteed element practices.~~

~~[Drafting Note: add definitions from PBR—Model Regulation when finalized]~~ Capitalized terms used herein and not otherwise defined herein shall have the meanings ascribed to such terms in Model Regulation, promulgated with the NAIC, dated _____ . Terms used in this Guideline not defined in the Model Regulation include:

- A. Credibility Adjusted Mortality Table. The set of mortality rates resulting from the credibility procedure described in ~~the~~ Subsection IV to blend company experience mortality rates with the Industry Mortality Table rates.
- B. Industry Mortality Table. An NAIC approved mortality table (without valuation margins) used for credibility weighting purposes to blend with the company's experience mortality rates when the company's experience is less than 100% credible.
- C. Mortality Segment. A group of Policies used as the basis for a company's mortality experience studies.
- D. Subcategory. A subset of policies within each Mortality Segment used for credibility weighting purposes, based on such things as gender, age, duration, and risk class.
- E. Subcategory Credibility Factor. For each subcategory of each Mortality Segment, a factor used to determine the credibility adjustment for mortality as described in Subsection IV.D.4.(a).
- F. Total Credibility Factor. For all policies in each Mortality Segment, a factor used to determine the credibility adjustment for mortality as described in Subsection IV.D.4.(a).
- G. Valuation Mortality Table. An NAIC approved mortality table (with valuation margins) that is to be used as the Prudent Best Estimate Assumption for mortality following the process defined in Subsection IV.

III. General Considerations

- ~~A. Best Estimate Assumptions. The Best Estimate assumption is the actuary's expectation of future experience for a Risk Factor given all available, relevant information pertaining to the assumption being estimated and set in such a manner that there is an equal likelihood of the actual value being greater than or less than the expected value. The actuary shall use company experience, if relevant and credible, to establish a Best Estimate assumption for any Risk Factor. To the extent that company experience is not available or credible, the actuary may use industry experience or other data to establish the Best Estimate assumption, making modifications as needed to reflect the actuary's expectation of the risk.~~
- ~~B. Margin for each Risk Factor. When setting the Margin on each Risk Factor, the actuary shall provide for adverse deviations and estimation error as a result of influences which the actuary does not anticipate.~~

~~The Margin does not take into account of the possibility of catastrophe or other major adverse deviations which are implausible in usual operations:~~

~~A larger Margin is appropriate if~~

- ~~1) the actuary has less confidence in the best estimate assumption, or~~
- ~~2) an approximation with less precision is being used, or~~
- ~~3) the event assumed is further in the future, or~~
- ~~4) there is uncertainty in the assumption and the Reported Reserve is more sensitive to the assumption due to the presence of tail risk, or~~
- ~~5) the occurrence of the event assumed is more subject to statistical fluctuation.~~

~~The need for a higher Margin arises when there is considerable doubt about the reliability of the expected assumption such as, but not limited to inadequate or unreliable experience data, recent changes in circumstances, or changes in company policies:~~

Examples of where a larger Margin shall be used is when a) the available experience is not yet mature; b) the experience is not directly applicable due to changes in approaches, product benefits, asset types; c) there is concern that past behavior of the economy or its sectors cannot be relied on as a good guide to the future, d) there is uncertainty due to cyclical patterns, e) there are anti-selection opportunities embedded in financial instruments.

In setting the Margin, the actuary shall examine the sensitivity of results around the Risk Factor to which the Margin is being applied to understand the materiality of making alternate assumptions.

The actuary should ensure that the application of a Margin results in an increase to the Reported Reserve.

~~C. Aggregate Margin. The Margin for each Risk Factor is to be set such that when taken in aggregate, the Margins for each Risk Factor produce an appropriate and reasonable level of conservatism in the Reported Reserve that is consistent with the solvency objective of statutory reserve reporting. In instances where Margins for individual Risk Factors are adjusted based on aggregate results, the actuary shall document and be able to demonstrate numerically the rationale for this adjustment.~~

[Drafting Note: Examples include “covariance” of risks and reduction in required Margins due to benefits of diversification]

III. General Considerations ~~CTE Level~~

A. Deterministic Reserve Valuation Assumptions. All valuation assumptions used in the Deterministic Reserve that are not prescribed shall be based on Prudent Best Estimates. Prescribed Deterministic Reserve assumptions include:

1. Interest Rate movements (i.e., Treasury interest rate curves)
2. Net Spreads (net of default costs and investment expenses) over Treasuries for Reinvestment Assets
3. Equity performance (i.e., S&P 500 returns and other returns of other equity investments)

B. Stochastic Reserve Valuation Assumptions. All valuation assumptions used in the Stochastic Reserve calculation that are not 1) prescribed or 2) modeled stochastically shall be based on Prudent Best Estimate Assumptions.

1. Unless stated otherwise, Prudent Best Estimate assumptions used in the Stochastic Reserve shall be the same as those used in the Deterministic Reserve.
2. Prescribed assumptions include net spreads (net of default costs and investment expenses) over Treasuries for reinvestment Assets.
3. Risk Factors that are required by the Model Regulation to be modeled stochastically are:
 - a. Interest Rate movements (i.e., Treasury interest rate curves)
 - b. Equity performance (i.e., S&P 500 returns and returns of other equity investments)
4. The actuary may elect to stochastically model other Risk Factors in addition to the Risk Factors listed in 3 above. If so elected, the requirements in the Guideline for determining Prudent Best Estimates for the Risk Factor would not apply.

C. Granularity Considerations.

1. In establishing valuation assumptions, the actuary shall choose between setting a separate assumption specific and appropriate to each individual policy being valued, a single assumption to be applied to all policies being valued, or an assumption with some degree of granularity within these two endpoints. In making that choice, the actuary shall balance the volume of work in establishing a separate assumption specific and appropriate to each individual policy against the possible loss of precision and appropriateness in applying an assumption over a broader group of policies. For example, the application of a single assumption for premium payment patterns over a group of policies may lead to the unintended premature cessation of projected benefits.

2. The actuary shall estimate and disclose the effect of the choice of granularity in the Actuarial Report. The appropriate degree of granularity in the assumptions will be determined by the sensitivity of the results to different levels of granularity. Assessing the acceptability of the level of granularity and estimating the effect of a less granular model may be performed on a date other than the Projection Start Date, and need not be updated every year, unless the actuary determines that such an update is appropriate.

[Drafting note: further guidance on assessing the acceptability of the level of granularity may be provided by an ASOP, subject to approval by the ASB.]

D. CTE Level. The Stochastic Reserve is based on a <<insert risk level>> CTE (Conditional Tail Expectation) level, which is determined by taking the numerical average of the <<insert 1 minus the risk level>> percent largest values of the Scenario Reserves.

[Drafting note: LHATF will need to establish the CTE risk level]

V.IV. Specific Guidance and Requirements for Setting ~~Prudent Best Estimate~~ Mortality Assumptions

A. Background

The ~~v~~Valuation ~~m~~Mortality ~~rates~~ ~~Table~~ used in the reserve calculation will equal the current Commissioners' Standard ("CS") mortality table for the class of business being valued based on company experience, adjusted for the credibility of this experience as described below and further adjusted with a Margin. The approach described in this Section ~~must~~ shall be followed to determine the Valuation Mortality Table and used as the ~~develop~~ a Prudent Best Estimate mortality assumption for the Deterministic Reserve and the Stochastic Reserve.

B. Overview

~~1. Description: The guidance and requirements in this section apply to determining the Valuation Mortality Table used when calculating the Stochastic Reserve and the Deterministic Reserve. The actuary shall determine the vValuation mMortality Table assumptions by applying steps (a) to (e) below. A Mortality Segment is defined as a grouping of policies used to determine experience mortality rates. The actuary may define one Mortality Segment to include all policies subject to the regulation, or may define multiple Mortality Segments for subsets of policies. The actuary shall determine the Valuation Mortality Table for each Mortality Segment (or subcategory of each Mortality Segment, as described below) by applying steps (1) to (5) below. Intent: The guidance and requirements in this section apply to setting the valuation mortality rates when determining the Stochastic Reserve and the Deterministic Reserve. The intent is for valuation mortality rates to be based on facts, circumstances and appropriate actuarial practice (where more than one approach of appropriate actuarial practice exists, the actuary should select the practice that the actuary deems most appropriate under the circumstances).~~

~~2.~~

1. Using the guidance and requirements specified in Subsection C below, develop experience mortality ~~curves~~ rates based on either a company's own available experience or other relevant experience.
2. Blend ~~Adjust~~ the experience mortality ~~curves~~ rates with an Industry Mortality Table as provided in Subsection D below to reflect the ~~if~~ level of credibility of the mortality experience. of the experience used to determine the experience mortality curve and M ~~mortality~~ improvement may be reflected up to, but not beyond, the Projection Start ~~Valuation~~ Date.

[Drafting Note: There are two types of tables which the NAIC will need to approve for use. The first are CS tables. These are ~~V~~valuation ~~T~~ tables that include valuation Margins. The second are ~~I~~industry ~~Mortality T~~ tables, and the associated adjustments. These tables reflect experience prior to the addition of Margins. ~~Adjustments to the Industry Tables for recent industry experience will also need to be approved for use by the NAIC. These tables~~ Industry Mortality Tables are used ~~to develop the mortality assumption to~~ select the Valuation Mortality Table to be used.

Steps (e3) and (d4) assume that the CS tables ~~are~~ is constructed by applying an appropriate margin formula to the weighted average of a set of ~~valuation basic tables~~ Industry Mortality Tables, with each ~~valuation basic table~~ Industry Mortality Table reflecting the mortality of

a specified risk class. If the procedure ultimately adopted for the construction of the CS table is different than assumed, Steps (3e) and (d4) should be appropriately revised.]

e. Adjust the credibility adjusted mortality rates in step (2) mortality curves to include a reasonable Margin as provided in Subsection E.

3.

4. Adjust the rates produced in step (3) for impaired lives or to reflect any reasonable expectation that policyholder behavior will lead to mortality results which vary from underlying mortality table as determined in step (3). An example of the latter would be increased mortality due to high lapses following a significant increase in policyholder costs. Subsection F below provides guidance and requirements for making these adjustments.

~~d.5.~~ Choose the CS-Valuation tTable that produces an aggregate Seriatim Reserve closest to, but not less than, the aggregate Seriatim Reserve calculated using the adjusted experience mortality curves-rates produced in step (4), as provided in Subsection G.

~~e.~~ Adjust the valuation mortality rates produced in step (d) for impaired lives or to reflect any reasonable expectation that policyholder behavior will lead to mortality results which vary from underlying valuation table as determined in step (d). An example of the latter would be increased mortality due to high lapses following a significant increase in policyholder costs. Subsection E below provides guidance and requirements for adjusting valuation mortality rates.

C. Determination of Experience Mortality CurvesRates

1. Actual Experience Data: In determining experience mortality curves-rates the actuary shall use the company's actual experience data directly applicable to the business segment (i.e., the company's actual data); if it is available, ~~and other than direct experience~~ if own the company's actual directly applicable experience data is not available ~~or not fully credible, then the company may use data other than directly applicable experience as described in~~ paragraph 2 below ~~for additional considerations~~. Finally, if there ~~is~~ are no data, the actuary shall use the applicable Industry Mortality tTable, as defined in subsection ~~FD.1-2~~ below. The company's Aactual directly applicable experience data shall be measured and updated every 3 years, or more frequently based on company practice. Whenever experience data are updated, the actuary shall reflect changes in experience promptly once changes have been determined to be significant, and are expected to continue into the future. it must be used to determine experience mortality curves. More frequent updates of experience data may be prudent for newer blocks of business or blocks of business with greater uncertainty.

The following considerations must be met shall apply when using the company's directly applicable experience:

- a. Actual experience data may be determined by individual risk class or ~~by~~ aggregating experience for multiple risk classes. The latter would typically result in higher overall credibility for the study. The ~~tIndustry mMortality tTable rates~~ Industry Mortality tTable rates must be consistent with the choice of aggregation. Once a method is chosen the actuary may change the methodology for aggregating experience, but must disclose the rationale and the impact on reserve levels of such change.
- b. It is permissible to group experience by issue age group, gender, risk class and policy duration. Grouping by issue age groups can be no broader than 10-year age groupings. Grouping by policy duration can be no broader than 5 years. The purpose is to use a company's experience when significant, yet require the use of industry experience where little or no experience exists.

~~In developing the experience mortality ratescurves, iIndustry Mortality Table ratesexperience curves shall be used where little or no experience exists. [Drafting Note: Further guidance may be given in an ASOP regarding how to determine these groupings, subject to approval by ASB] these and when other company data can be used when company experience also exists]~~

2. Data-Using Other than Directly Applicable Actual Experience. If experience mortality curves-rates for a business segment are being determined using data consistent with the business segment, but is not based on the actual experience directly applicable to the business segment (whether or not the business segment is from the company), the actuary shall document any similarities or differences between the two business segments (e.g., type of underwriting, marketing channel, average policy size, etc.). For an actuary to use

~~data~~ other than directly applicable actual direct experience, ~~only, the data~~ rates developed must reflect through direct measurement of mortality data may be used. Rates ~~experience rather than be~~ developed from extrapolation of other mortality data or studies may not be used. For ~~example, instance,~~ if mortality data has been developed with extrapolated rates beyond a certain age, this portion of the data may not be used in developing the actuary's experience mortality ~~curves~~ rates.

Additionally, the actuary shall document the following:

- a. Source of data including a detailed explanation of the appropriateness of the data, the underlying source of data, including how the mortality ~~tables~~ rates were developed, graduated and smoothed.
 - b. The number of deaths and death claim amounts by major grouping no broader than those allowed for direct company data and including: age, gender, risk class, policy duration and other relevant information.
3. No Experience Data Exists: In the situation where little or no experience exists, the experience mortality ~~curve~~ rates shall be set to the ~~Industry~~ Mortality ~~curve~~ Table rates appropriate for the underlying business reflecting the underwriting associated with the risk classes.
4. Adjustments to Experience Data: The actuary may also reflect the effects of risk selection and underwriting practices not reflected in the underlying experience when supported by relevant published medical and clinical studies. The following conditions must be met when making such adjustments:
- ~~a. No adjustment should be made beyond the duration supported by these studies.~~
 - ~~b.~~
 - a. The actuary may only reflect the effectiveness of such risk selection and the anticipated incremental benefits over prior risk selection techniques. The actuary must disclose the rationale and support for the adjustment.
 - ~~e.~~b. The actuary may not use a study unless the actuary has reviewed the underlying ~~techniques~~ scope used to develop the study and concluded that the study is appropriate for use. The actuary ~~must~~ shall disclose the rationale used to reach this conclusion.
 - c. Any adjustment must be approved for use by the commissioner.

[Drafting Note: It is anticipated that such adjustments to experience will rarely be made. Since these adjustments are expected to be rare, and since it is difficult to anticipate the nature of these adjustments, the Guideline requires that the commissioner determine the level of documentation or analysis that would be required to approve such adjustments. The NAIC may want to consider whether approval by a centralized examination office would be preferable to approval by the commissioner.]

D. Adjustment for Credibility

~~Industry Mortality Table. The Industry Mortality Table rates have the presumption of being 100% credible. As such, the Industry Mortality Table rates prescribed.~~

1. The Industry Mortality Table to be used for credibility weighting is defined as the 2001 VBT table (or other tables adopted by the NAIC for this purpose) adjusted in a manner approved for use by the NAIC to reflect the most recent Society of Actuaries intercompany study approved for use by the NAIC, adjusted for mortality improvement from the effective date of the Industry Mortality Table to the experience weighted average date underlying the data used to develop the experience mortality rates.^{1,2}

[Drafting Note: It is anticipated that the NAIC will adopt sets of rates reflecting a range of underwriting criteria associated with the Industry Mortality Table. Also, this approach requires the NAIC to periodically approve a set of mortality improvement factors. Currently, there are no such approved factors.]

¹ ~~This approach would require the NAIC to periodically approve a set of mortality improvement factors. Currently, there are no such approved factors.~~

² This approach would require the NAIC to periodically approve the use of recent SOA intercompany studies in order to reflect emerging experience. As such, the NAIC may wish to set up procedures to update on a regular basis.

2. Selection of Industry Mortality Table rates. The Industry Mortality Table rates have the presumption of being 100% credible. As such, the method used to identify the Industry Mortality Table rates for credibility weighting shall be prescribed.

[Drafting Note: The Joint American Academy of Actuaries/Society of Actuaries preferred mortality group is developing a methodology which, once finalized will be incorporated into the guideline to facilitate the selection of the appropriate set of rates of Industry Mortality Table rates. It is anticipated that for a given Industry Mortality Table there will be sets of rates reflecting a range of underwriting criteria as well as the methodology for selection of the Industry Mortality Table rates. It is anticipated that Industry Mortality Table rates may be selected for each risk class, or at the option of the actuary, Industry Mortality Table rates may be selected for individual or combinations of risk classes. The latter approach would typically be used when the company experience data has been compiled by combined risk class.]

3. Adjustment for Credibility: The experience mortality curves rates determined in subsection (C)e) above shall be adjusted based on the credibility of the experience data used to determine the curves rates in order to arrive at credibility adjusted experience mortality curves rates. The adjustment for credibility shall result from blending the experience mortality curves rates with the Industry Mortality Table. The industry mortality table is the 2001 VBT table (or other tables adopted by the NAIC for this purpose) adjusted in a manner approved for use by the NAIC to reflect the most recent Society of Actuaries intercompany study approved for use by the NAIC.³

[Drafting Note: These are anticipated to include new industry tables as well as the methodology for use of new industry tables.]

- ~~2. Selection of the Industry Mortality Table. The actuary shall select an industry mortality table appropriate for the underlying business. The selection of the industry mortality table is a critical assumption in selecting the CS table used in calculating the final Reported Reserve. This table has the presumption of being 100% credible. As such, the selection of the industry mortality table is prescribed; however, the actuary may use an industry mortality table different than that prescribed if the actuary believes the table is more appropriate for the underlying business and results in a Reported Reserve no less than what would have resulted had the prescribed table been used.~~

~~An industry mortality table may be selected for each risk class or at the option of the actuary an industry mortality table for combined risk classes may be selected. The latter approach would typically be used when the company experience data has been compiled by combined risk class.~~

- ~~3. Adjustment of Industry Mortality for Improvement: Before the adjustment for credibility is applied, the industry mortality table must be adjusted for mortality improvement, provided such adjustment will result in a Reported Reserve that is higher than what would have resulted had the table not been adjusted for mortality improvement. Such adjustment shall reflect applicable published industrywide experience from the effective date of the respective industry mortality table to the experience weighted average date underlying the data used to develop the experience mortality curves (discussed in subsection C).⁴~~

[Drafting Note: as written, mortality improvement would not be reflected unless industry experience is published and available for use. It may be necessary to revise this language to allow other sources.]

4. Credibility Procedure: The statistical credibility of internal mortality data decreases as the number of subcategories of the internal data increase. For example, a table based on aggregation of all experience from a block of business is more credible than one that breaks down experience by gender, duration or underwriting class. Credibility factors must be applied to the aggregated internal data, as well as reflecting weighting to subcategories.

A Total Credibility Factor will be determined for each Mortality Segment, as defined below.

³ This approach would require the NAIC to periodically approve the use of recent SOA intercompany studies in order to reflect emerging experience. As such, the NAIC may wish to set up procedures to update on a regular basis.

⁴ This approach would require the NAIC to periodically approve a set of mortality improvement factors. Currently, there are no such approved factors.

The actuary must also define subcategories of policies within each Mortality Segment for credibility weighting purposes, based on such things as gender, age, duration, and risk class. Each subcategory can be no broader than 10-year age groupings. Grouping by policy duration can be no broader than 5 years. A Subcategory Credibility Factor will be determined for each subcategory of policies, as defined below.

When applying credibility to determine combined mortality curves by sub-categories, the actuary shall reflect the portion of business in each sub-category to the extent known, or an estimate if not known. The actuary may also reflect mortality differentials by sub-category due to underwriting practices and requirements.

The credibility procedure used shall be based on a Poisson Distribution with a 90% probability of being correct within a 5% margin of error. Using this definition, the number of claims needed for full credibility by number of policies is 1083 prior to a required adjustment for the distribution of face amounts. This distribution provides for full credibility based upon amount, if the underlying experience mortality study is ~~for~~ The number of claims needed for by amount for full credibility reflecting the face amount distribution is (1083) times the following factor "F", where, "F" equals one plus (the standard deviation of face amounts divided by the average face amount)^2. "F" will vary for each segment of business being evaluated. The credibility weighting factor for experience mortality data is found by taking the square root of (N/nnn) times the factor F, where N is the number of deaths in the underlying experience mortality study and nnn is the number of deaths representing full credibility.

The "Total Credibility Factor" is determined by the calculation described above for the policies in each Mortality Segment, where N is defined as the number of deaths in the Mortality Segment. Each "Subcategory Credibility Factor" is determined by the calculation described above for the policies in each subcategory within each Mortality Segment, where N is defined as the number of deaths in each subcategory with each Mortality Segment.

[Drafting Note: The NAIC would need to must specify the probability and margin of error. The numbers above are included to engage discussion. Also, discussions around the credibility methods continue and may result in additional changes. LHATF may wish to consider allowing other credibility methods, in particular a credibility method based on exposures rather than claims.]

- a. To determine the ~~C~~credibility ~~A~~adjusted ~~M~~weighted ~~m~~mortality ~~T~~Table ~~e~~curves ~~f~~for each Mortality Segment, the actuary ~~shall perform~~ ~~would do~~ the following steps (this approach is based on the Normalized Approach as described in the Canadian Institute of Actuaries' Educational Note, Expected Mortality: Fully Underwritten Canadian Individual Life Insurance Policies, July 2000, section 550, page 18.)¹⁵:
 - i. Identify the appropriate ~~i~~Industry ~~M~~Mortality ~~T~~Table ~~r~~rates as described in Subsection IV.D.(2) above.
 - ii. Use experience mortality ~~curves~~ ~~data~~ to determine the Mortality Segment ~~Total Company~~ A/E ratio (actual to expected) ~~(A/E) ratios~~ based on amounts insured, where the ~~i~~Industry ~~M~~Mortality ~~T~~Table ~~r~~rates ~~identified above~~ ~~is~~ ~~are~~ used as the expected basis.
 - iii. Determine ~~the~~ Total Credibility Factor for each Mortality Segment as described above ~~based on the Poisson Distribution as stated above.~~
 - iv. Calculate the blended eExpected mMortality rRatio for each Mortality Segment, equal to $[(1) \times (2)] + (3)$, where:
 1. equals the Total Credibility Factor as determined in step iii above;
 2. equals the Mortality Segment A/E ratio as determined in step ii above; and
 3. equals one minus the Total Credibility Factor.

¹⁵ Based on the Normalized approach as described in the CIA Educational Note, Expected Mortality: Fully Underwritten Canadian Individual Life Insurance Policies, July 2000, section 550, page 18.

v. Calculate the blended expected claim amount for each Mortality Segment equal to (1) x (2) where:

1. Equals the blended expected mortality ratio for each Mortality Segment as determined in step iv above; and
2. Equals the expected claims for the Mortality Segment using the Industry Mortality Table rates.

vi. For each Subcategory of policies within each Mortality Segment, use experience mortality data to determine Subcategory A/E ratios based on amounts insured, where the Industry Mortality Table rates are used as the expected basis.

~~iv-vii.~~ For each Subcategory of policies, calculate the Subcategory Credibility Factor for the portion of the business, determine the credibility weighting based on the number of claims in each subcategory using the Poisson Distribution as stated as described above.

viii. For each Subcategory of policies, calculate the blended expected mortality ratio equal to (1) x (2) + (3) where:

1. equals the Subcategory Credibility Factor as determined in step vii above;
2. equals the Subcategory A/E ratio as determined in step vi above; and
3. equals one minus the Subcategory Credibility Factor.

For any Subcategory with no experience, the Subcategory blended expected mortality ratio is set equal to one.

ix. For each subcategory calculate the Subcategory blended expected claim amount, which equals (1) x (2) where:

1. Equals the Subcategory blended expected mortality ratio as determined in step viii above and
2. Equals the expected claims for the Subcategory using the Industry Mortality Table rates.

x. Calculate the total Subcategory expected claim amount as the sum of each subcategory expected claim amount determined in step ix above for each subcategory.

~~v.~~ Determine the Blended Expected Mortality Ratio for each subcategory equal to (1) x (2) + (3) x (4) for each subcategory, where:

- ~~1.~~ Is the A/E ratio based on actual claim amounts.
- ~~2.~~ Is the subcategory credibility factor shown determined in (iv) above.
- ~~3.~~ Is the percent of the industry table for full credibility.
- ~~4.~~ Is one minus the subcategory credibility factor determine in (iv) above?

~~vi.~~ Determine the expected total number of claims based on the Blended Expected mortality ratios.

~~vii.~~ Determine the Normalized Blended Mortality Ratios equal to (1) x (2)/(3), where:

- ~~1.~~ is the blended Expected Mortality Ratio for each subcategory as determined in (v) above.
- ~~2.~~ is the total number of claims based on Actual Experience.
- ~~3.~~ is the total number of claims based on Blended Expected Mortality as determined in (vi) above.

xi. Determine the normalized Subcategory A/E ratios as (1) x (2)/(3) where:

1. Equals the Subcategory blended expected mortality ratio as determined in step viii above;
2. Equals the blended expected claim amount for each Mortality Segment as determined in step v above; and
3. Equals the total Subcategory expected claim amount as determined in step x above.

~~viii. For the portion of the business with no or little or no experience, the Normalized Blended Mortality ratios are set to zero.~~

~~ix. Determine the final credibility weighted mortality curves by multiplying the subcategory Normalized Blended Mortality Ratios times the Industry Mortality rates.~~

~~xii. Using the resulting Normalized Subcategory A/E Ratios Determine the Credibility Adjusted Mortality Table rates by multiplying the Normalized Subcategory A/E Ratios as determined in step xi above by the Industry Mortality Table rates.~~

- b. The actuary may smooth the results in step xii. above such that they are reasonable in the professional judgment of the actuary. The actuary must document any smoothing adjustments made. When making such smoothing adjustments, the actuary must take into account both the level of aggregate claims and the shape of the resulting mortality ~~rates~~curve.
- c. The actuary may separate the ~~C~~final credibility ~~A~~weighted ~~adjusted~~ ~~m~~Mortality Table ~~curves~~rates by risk class by developing separate mortality ~~curves~~rates for each risk class. In doing so, the actuary must disclose the underwriting differentials used by class and must conserve the total number of deaths in the aggregate. For practical purposes and for consistency across companies, lapses and surrenders shall be ignored in this process.

[Drafting Note: Further guidance on how to split the Credibility Adjusted Mortality Table rates by risk class is needed.]

- ~~d.~~ d. The ~~C~~credibility-~~A~~adjusted Mortality Table ~~rates~~ must be further adjusted for mortality improvement up to the Projection Start Date based on applicable published industry-wide experience when such adjustment increases the Reported Reserve. An adjustment may be made for mortality improvement up to the Projection Start Date based on applicable published industry-wide experience when such adjustment decreases the Reported Reserve. The adjustment made shall be for the period from the experience weighted average date underlying the company experience used in the credibility process to the Projection Start ~~Valuation~~-Date.

~~f.e.~~ f.e. The ~~final~~ set of rates after applying the adjustments in Subsection D.4. (b), (c) and (d) above is defined as the Credibility Adjusted Mortality Table.

- ~~6.5.~~ Any adjustment for mortality improvement shall not be allowed beyond the Projection Start ~~Valuation~~-Date unless such an adjustment would serve to increase the resulting Reported ~~Stochastic Reserve or~~ Deterministic Reserve.

E) Margins

~~The Credibility Adjusted Mortality Table rates are adjusted by adding a Margin shall be included in the mortality assumption whether experience comes from external studies or internal company studies.~~

The Margin shall be expressed as a constant divided by the curtate expectation of life, where the curtate expectation of the life is calculated without the expectation of future mortality improvements. This constant can vary by business segment or policy type due to differences in benefits or policyholder behavior. ~~The minimum Margin shall be one death per thousand divided by the curtate expectation of the policy life.~~

{Drafting Note: the choice of only allowing a single constant is to provide one framework to facilitate the review of the Margin by regulators and peer reviewers.}

To develop the Margin, the actuary shall perform sensitivity testing of reserve levels to changes in the underlying mortality assumption.

The method and factors used to determine the Margin ~~are should~~ shall be consistently applied on each Valuation Date. Any changes in the method or factors used shall be documented, including the reason for the change.

When setting the Margins, the actuary shall consider applying a higher Margins to the experience mortality ~~curves rates~~ in situations of uncertainty including but not limited to the following:

- ~~1. The Reported Reserve is materially sensitive to the mortality assumption.~~
- ~~2. Adjustments made to reflect differences between the business segments.~~
- ~~3.1. The credibility of the company's experience studies is low.~~
- ~~4.2. The underwriting or risk selection risk criteria have changed on includes untested refinements.~~
- ~~5. New types of benefits are included.~~
- ~~6. New methods of distribution are being used.~~
- ~~7.3. There is a lack of homogeneity of in the underlying data being used.~~
- ~~8.4. Unfavorable environmental or health developments are unfolding and are expected to have a material and sustained impact on the insured population.~~
- ~~9. The company's data is not credible and the premium structure does not recognize mortality differences as precisely as is common in the remainder of the market.~~
- ~~10.5. Anti-selection occurs by the sales force or secondary markets.~~
- ~~11.6. Constraints in the modeling of the liability limit an effective reflection of mortality risk.~~

~~E)F)~~ Additional Adjustment to the Credibility Adjusted Mortality Table rates.

- 1) Credibility Adjusted Mortality Table rates shall be adjusted to reflect the mortality differences associated with impaired lives or mortality differences due to policyholder behavior not reflected in the underlying experience. These include adjustments for policy provisions or policyholder behavior that suggest mortality anti-selection.
- 2) Examples of the types of items for which the actuary must consider an adjustments include: term conversions, table shave programs, level of premiums and changes in premium patterns, exchange programs, and high withdrawal rates to the extent not reflected in the underlying experience. These adjustments will typically be made within the projection since the adjustments may vary by Scenario.
- 3) Such adjustments to the Credibility Adjusted Mortality Table rates may only be made if the Reported Reserve is equal to or greater than the Reported Reserves assuming no adjustment was made.

~~E)G)~~ Valuation Mortality Assumption

1. The Valuation Mortality ~~Assumption Table shall will~~ be the most recent Commissioner's Standard table.

[Drafting Note: For Principles-Based reserves, the valuation mortality ~~rates assumption~~ should closely reflect company experience to the extent credible. Given the large number of risk classes available on current life insurance products and qualification and underwriting requirements that

vary significantly by company, having sub-tables of a Commissioner's Standard Table for use by Companies with varying experience is preferred which provide for varying company experience is preferred.

Only a single sub-table will be used for all issue ages and durations within a defined business segment. However, different sub-tables may be used for each business segment such as gender, risk class, plan type.]

2. ~~The Valuation Mortality Table rates (or sub-table rates) to be used for reserve policy valuation are shall be the mortality sub-table rates. Once a Prudent Best Estimate mortality assumption is determined, the actuary must determine the Commissioner's Standard mortality table (or sub-tables) which results in the sum of the Seriatim Reserves using this table being is closest to, but not less than, the sum of the Seriatim Reserves using the resulting Credibility Adjusted Mortality Table rates determined in of Subsection F with all of the other assumptions the same. The determination of the Valuation Mortality Table rates (or sub-table rates) to be used for reserve valuation is required to shall be updated completed at least once every three years or more often if significant changes to the Credibility Adjusted Mortality Table were made.~~

H) "Best Estimate" Mortality Assumption for the Purpose of Margin Disclosure Amount

The Regulation requires the disclosure of Margins for each material Risk Factor and in the aggregate. For purposes of these disclosures the "best estimate" mortality assumption will be set equal to the Credibility Adjusted Mortality Table rates determined in Subsection F above without the Margins determined in sSubsection E above and reflecting future mortality trends beyond the Projection Start Date not to exceed 1.00% improvement per year through age 60, grading linearly to zero by attained age 85.

[Drafting Note: the 1.00% prescribed cap on mortality improvement to determine the Margin disclosure amount needs further discussion and analysis.]f

G) Additional Adjustment to Mortality Curves

~~Additional adjustment to the valuation mortality assumption shall be made to reflect the mortality associated with impaired lives or increases in mortality due to extreme policyholder behavior not reflected in the underlying experience. These include adjustments for policy provisions or policyholder behavior that suggest mortality anti-selection. The actuary must at least consider the adjustments for the following: term conversions, table shave programs, level of premiums and changes in premium patterns, exchange programs, and high withdrawal rates.~~

VI.V. Guidance and Requirements for Setting Policyholder Behavior Assumptions

[Drafting Note: More work is needed with LHATF and the LRWG to determine the most appropriate PH behavior assumptions (similar to the discussion the VARWG has been having).]

A. Best Estimate Policyholder Behavior Assumptions Overview

[Drafting Note: Guidance on setting best estimate assumptions may be provided in an ASOP.]

1. General Considerations. The actuary should develop anticipated policyholder behavior assumptions for the Cash Flow Models including but not limited to assumptions for premium payment patterns, premium persistency, surrenders, withdrawals, transfers between fixed and separate accounts on variable products, benefit utilization, and other option elections.

When establishing these assumptions, the actuary should consider that anticipated policyholder behavior may be expected to vary according to such characteristics such as gender, attained age, issue age, policy duration, time to maturity, tax status, level of account and cash value, surrender charges, transaction fees or other policy charges; distribution channel, product features and whether the policyholder and insured are the same person or not. The actuary shall develop anticipated policyholder behavior assumptions that are appropriate for the block of business being valued. The actuary shall give due consideration to other assumptions of the valuation model and to the Scenarios whose results are likely to contribute to the Reported Reserve when deriving anticipated policyholder behavior.

The actuary should not constrain anticipated policyholder behavior to the outcomes and events exhibited by historic experience when that experience is not relevant to the product being modeled. The actuary should determine whether recent historical experience is relevant for the current models, especially when modeling policyholder behavior of a new product benefit or feature.

The actuary may ignore certain items that might otherwise be explicitly modeled if the inclusion of such items would not have a significant effect on the results.

2. Options. Options embedded in the product, for example, term conversion privileges or policy loans, may impact policyholder behavior. The actuary should consider that as the value of a product option increases, there is an increased likelihood that policyholders will behave in a manner that maximizes their financial interest in the contract (e.g., lower lapses, higher benefit utilization, etc.). The actuary may ignore options that are not significant drivers of results.
3. Lack of Data. Unless there is clear evidence to the contrary, anticipated policyholder behavior assumptions should be consistent with relevant and credible past experience and reasonable future expectations. At any duration for which relevant data do not exist, the actuary should determine what action will maximize the financial value of the policy from the point of view of the policyholder (i.e. lapse the policy, persist, take out a loan, etc.). The actuary should then use judgment to estimate the percentage of policyholders who will take that action. Since some policyholders may act to maximize the financial value of the policy, the actuary should not assume this percentage is zero. However, since some policyholders may place value on factors other than maximizing the policy's financial value (for example, convenience of level premiums, personal budget choices, etc.) and since the policy's full economic value to the policyholder depends not only on its currently realizable value but also on factors not available for analysis (such as the health of the insured and the financial circumstances of the beneficiaries and policyholder) it is also reasonable for the actuary to assume that the percentage is less than 100.

(Drafting Note: When there are no relevant, credible data available, the NAIC may want to prescribe an assumption for this percentage.)

level premiums, personal budget choices, etc.), and since the policy's full economic value to the policyholder depends not only on its currently realizable value but also on factors not available for analysis such as the health of the insured and the financial circumstances of the beneficiaries and policyholder, it is also reasonable for the actuary to assume that the percentage is less than 100.

4. Dynamic Assumptions. The actuary should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model or other scenario-dependent formulation for anticipated policyholder behavior. Risk factors that are modeled dynamically should encompass the reasonable range of future expected behavior consistent with the economic scenarios and other variables in the model. In the absence of evidence to the contrary, it may not be necessary to model extreme or "catastrophic" forms of behavior. However, the actuary should test the sensitivity of results to understand the materiality of making alternate assumptions.

Intent. The guidance and requirements in this section apply for setting Prudent Best Estimate Policyholder Behavior assumptions when determining the Stochastic Reserve or the Deterministic Reserve. The intent is for Prudent Best Estimate policyholder behavior assumptions to be based on facts, circumstances and appropriate actuarial practice (where more than one approach to appropriate actuarial practice exists, the actuary should select the practice that the actuary deems most appropriate under the circumstances) with only a limited role for unsupported actuarial judgment. Policyholder behavior assumptions encompass actions such as, but not limited to lapses, withdrawals, allocations of premiums between accounts within indexed products, transfers between fixed, indexed, or separate accounts on indexed or variable products, recurring deposits, benefit utilization, and option election. Policyholder behavior is difficult to predict and behavior assumptions can significantly impact the results. In the absence of relevant and fully credible empirical data, the actuary should set behavior assumptions on the conservative end of the plausible spectrum (consistent with the definition of Prudent Best Estimate).

2) Granularity Considerations. In setting a behavior assumption the actuary needs to consider the appropriateness of that assumption as it pertains to the policy or block of policies being valued. The actuary will need to make a choice between setting a separate assumption specific and appropriate to each individual policy being valued, a single assumption to be applied to all policies being valued, or some degree of granularity within these two endpoints. In making that choice, the actuary needs to balance the volume of work in establishing a separate assumption specific and appropriate to each individual policy against the possible loss of precision and appropriateness in applying an assumption over a broader group of policies. The application of a single assumption over a group of policies may lead to the unintended premature cessation of projected benefits. The appropriate degree of granularity in the assumptions will be determined by the sensitivity of the results to the level of granularity. The actuary should establish behavior assumptions at a sufficient level of granularity that a higher level of granularity will not materially impact the results. The actuary should be prepared to justify his/her choice of granularity and should retain sufficient documentation supporting that choice.

B. Policyholder Behavior Considerations:

1) General Considerations. Policyholder behavior is difficult to predict and behavior assumptions can significantly impact the results. In setting behavior assumptions, the actuary should evaluate, but not be limited by the considerations listed below.

- a. Behavior can vary by product, market, distribution channel, fund and policy performance, time/product duration, etc.
- b. Options embedded in the product may impact behavior.
- c. Options may be elective or non-elective in nature.
- d. Elective policyholder options may be more influenced by economic conditions than non-elective options.
- e. As the value of a product option increases, there is an increased likelihood that policyholders will behave in a manner that maximizes their financial interest (e.g., lower lapses, higher benefit utilization, etc.).
- f. Options that are ancillary to the primary product features may not be significant drivers of behavior. Whether an option is ancillary to the primary product features depends on many things such as:
 - i. For what purpose was the product purchased?

- ii. Is the option elective or non-elective?
- iii. Is the value of the option well known?

g. The impact of behavior can vary by product, time period, etc. Sensitivity testing of assumptions will usually be necessary in establishing the Prudent Best Estimate.

h. It may be acceptable to ignore certain items that might otherwise be explicitly modeled in an ideal world, but the resulting reserve shall be at least as great as it would be if the item were not ignored.

i. The underlying model assumptions may differ according to the attributes of the policy being valued. This means that policyholder behavior and persistency may be expected to vary according to such attributes which include, but are not limited to:

- i. Gender
- ii. Attained age
- iii. Issue age
- iv. Policy duration
- v. Time to maturity
- vi. Tax status
- vii. Level of account and cash value
- viii. Surrender charges, transaction fees or other policy charges
- ix. Distribution channel
- x. Product features

[Drafting Note: more guidance may need to be given.]

j. Unless there is clear evidence to the contrary, policyholders' behavior should be consistent with relevant past experience and reasonable future expectations

Where relevant data does not exist, the actuary should set behavior assumptions reflecting the most efficient policyholder behavior. The actuary should determine what the efficient policyholders' action would be (i.e., lapse the policy, persist, take out a loan, etc.) and determine his or her Prudent Best Estimate rate for that action. The actuary should then project the Prudent Best Estimate of the policyholder's actions. To the extent company experience is only partially credible, a blend of the experience and an industry benchmark assumption should be used. For policyholder behavior, assumptions should grade toward optimal plausible behavior for later durations where experience is not yet available.

[Drafting Note: more discussion needs to take place with regard to how efficiency is determined and how optimal plausible is defined and demonstrated.]

k. Ideally, policyholder behavior would be modeled dynamically according to the simulated economic environment and/or other conditions. However, it is reasonable to assume a certain level of non-financially motivated behavior. The actuary need not assume that all policyholders act with 100% efficiency in a financially rational manner. Neither should the actuary assume that policyholders will always act irrationally.

[Drafting note: Further guidance on the degree to which rational, financially efficient behavior should be reflected in the Prudent Best Estimate may be required by an Actuarial Standard of Practice (ASOP)].

l. The behavior assumptions should be logical and consistent, both individually and in aggregate, especially in the scenarios that govern the results. In other words, the actuary should not set behavior assumptions in isolation, but give due consideration to other elements of the model. The interdependence of assumptions (particularly those governing customer behaviors) makes this task

difficult and by definition requires professional judgment, but it is important that the model risk factors and assumptions:

- i. Remain logically and internally consistent across the scenarios tested;
- ii. Represent reasonably expected outcomes; and
- iii. Lead to appropriate, but not excessive, asset requirements.

The actuary should remember that the continuum of “reasonability” should not be confined or constrained to the outcomes and events exhibited by historic experience.

Companies should attempt to track experience for all assumptions that materially affect its risk profile by collecting and maintaining the data required to conduct credible and meaningful studies of policyholder behavior.

- 2) Dynamic Behavior. The actuary should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model or other scenario dependent formulation for behavior. Dynamic assumptions are required where there would be a material impact from using dynamic assumptions versus static assumptions.

Risk Factors that are modeled dynamically should encompass the reasonable range of future expected behavior consistent with the economic scenarios and other variables in the model. In the absence of evidence to the contrary, it may not be necessary to model extreme or “catastrophic” forms of behavior. However, the actuary is encouraged to test the sensitivity of results to understand the materiality of making alternate assumptions and recommend ongoing monitoring of material risk factors.

- 3) Consistency of Prudent Best Estimate and the CTE Measure. All behaviors (i.e., dynamic, formulaic and static) should be consistent with the scenarios used in the CTE calculations. To maintain such consistency, it is not necessary to iterate (i.e., successive runs of the model) in order to determine exactly which scenario results are included in the CTE measure. Rather, in light of the products being valued, the actuary should be mindful of the general characteristics of those scenarios likely to represent the tail of the loss distribution and consequently use Prudent Best Estimate assumptions for behavior that are reasonable and appropriate in such scenarios. The actuary should examine the results that occur when the base assumption, Margins and dynamic formula are brought together for the different policyholder behavior assumptions. It is expected that the assumptions used would cause the results to fall within a loss distribution consistent with CTE risk level.

Margin—Policyholder Efficiency. Where relevant and fully credible empirical data does not exist, the actuary should set behavior assumptions reflecting the most optimal plausible behavior. The actuary should determine what the efficient policyholder’s action would be (i.e. lapse the policy, persist, take out a loan, etc.) and determine his or her best estimate rate for that action. The actuary should then project the policyholder’s utilization rate as per the policyholder’s efficient action, but need not deviate by more than, and may not deviate by less than, X percentage points (additive or subtractive) from his or her best estimate. An addition or subtract of X percentage points is considered the extent of plausibility of policyholder behavior relative to projected estimates.

- 5) Prescribed Requirements. Prudent Best Estimate premium assumptions are determined by following the requirements in subsection C. Prudent Best Estimate withdrawal assumptions are determined by following the requirements in subsection D.

B. Best Estimate Premium Payment Assumption.

1. An important element of the Cash Flow Model is the set of assumptions about the amount of premium to be paid in each future period on policies remaining in force, and assumptions about premium persistency, the probability that a premium will be paid in a particular period. While historical experience, when available, is often a good basis for such assumptions, the actuary should exercise care about assuming that past behavior will be indefinitely maintained. For example, market or environmental changes can make historical experience less relevant. The actuary should also consider varying premium payment assumptions by interest rate scenario.

2. The actuary should consider the desirability of making multiple premium payment assumptions, by subdividing the cell of business into several projection cells, each with a separate payment pattern assumption. If this is not done, and the actuary decides to use one average pattern for the cell, the actuary should consider making use of sensitivity testing, which may help to determine whether the estimates of reserves or risks are significantly impacted by the use of such an approach.

3. For policies with fixed future premiums, the actuary should assume that future premium payments on inforce policies will be in accordance with the policy provisions. In other situations, the actuary, in formulating assumptions about future premium payments, should consider taking into account such factors as the limitations inherent in the policy design, the amount of past funding of the policy, and the marketing of the policy. Marketing factors that may lead to low premium payments include:

- ~~(i)~~ Marketing emphasis on coverage (as opposed to savings accumulation);
- ~~(ii)~~ Marketing emphasis on premium flexibility; or
- ~~(iii)~~ Illustrations featuring quick-pay premiums.

Marketing factors that may lead to high premium payments include:

- ~~(i)~~ Marketing emphasis on savings accumulation or tax advantages;
- ~~(ii)~~ Pre-authorized transfers; or
- ~~(iii)~~ Bonuses for higher premiums or assets.

4. In selecting multiple premium patterns for modeling purposes, the actuary may consider using one or more of the following patterns: target premium, illustrated premium, billed premium, minimum premium, and/or continuation of past premium levels.

†) General Considerations. An important assumption in the valuation is the future premium deposit assumption. Depending upon the product structure, future premiums may be fixed, may be flexible at the discretion of the policyholder, or may be adjustable subject to discretion of the company.

For policies with fixed future premiums, no assumption is necessary as to variations in the future premium deposit stream. In other situations, a premium persistency assumption is needed, subject to the limitations specified in the policy design.

A key consideration of the future premiums for a given policy is whether the policy was sold to primarily affect permanent coverage, or to primarily effect the accumulation of savings. For policies sold as permanent coverage it would be expected that the policyholder would tend to pay the minimum premium at the latest possible date to keep the policy in force to maturity. For policies sold as a savings vehicle it would be expected that the policyholder would tend to pay more than the minimum amount.

When premiums are not fixed, the future premiums that are assumed may produce significant differences in liabilities for different assumptions. The assumption chosen should be consistent with the information available from the policy administration system. The actual premium received could be compared to the amount of premium that would have been generated by the future premium assumption applied to the prior period in force policies. This analysis may be valuable in determining the appropriateness of the future premium assumption.

When premiums may be allocated between fixed, indexed or separate accounts of indexed and/or variable products, the future premiums and allocations assumed among available accounts may produce significant differences in liabilities for different assumptions. The assumption chosen should be consistent with the information available from the policy administration system and anticipated to be paid.

~~2) Premium Persistency. In determining the future premium persistency for a particular policy, the actuary should consider that low premium persistency rates could be expected if the following are present:~~

- ~~a. Marketing material places emphasis on premium flexibility;~~
- ~~b. Sales illustrations feature quick-pay premiums (which could lead to low premium persistency rates in later years);~~
- ~~e. Presence of large lump-sum premiums in the past; or~~
- ~~d. Credited rates in the near future are expected to be less than market rates.~~

~~High premium persistency rates could be expected if the following are present:~~

- ~~a. Most business is through pre-authorized transfers~~
- ~~b. Marketing material places emphasis on credited interest rates, tax advantages and savings aspects of the plan;~~
- ~~e. Interest rate crediting is based on portfolio rates and new money rates decrease;~~
- ~~d. the existence of persistency bonuses; or~~
- ~~e. the existence of other policyholder incentives to not reduce premium levels.~~

~~For policies with regular periodic premiums required for the policy to remain in force, premium persistency should be consistent with expected future lapse rates and include policies moving to non-forfeiture options where applicable. **Best Estimate Allocation Assumption.** -The actuary ~~must~~ shall set an assumption for the allocation of premiums and account balances among fixed, indexed or separate accounts of indexed or variable products.~~

- ~~C. When premiums may be allocated between fixed, indexed or separate accounts of indexed and/or variable products, the future premiums and allocations assumed among available accounts may produce significant differences in liabilities for different assumptions. The actuary should use sensitivity testing to understand the importance of this assumption and follow the guidance provided in Subsection V.F. below [\[What Section is this?\]](#)~~

Best Estimate Partial Withdrawal and Surrender Assumptions

~~D.~~

- ~~3) 1. Historical Data.—All future projections of premiums should be based on historical premium payments, where available. However, the actuary should exercise caution in assuming that current behavior will be indefinitely maintained. For example, it might be appropriate to assume that future behavior will differ from historical experience to the extent that market, environmental or other changes make historical experience less relevant.~~
- ~~4) Data Lacking.—When historical experience is lacking, the future premium assumption may be derived in a reasonable and appropriate manner from actual experience and past trends in experience of other similar classes of business either in the same company, of other companies, or from other sources, generally in that order of preference.~~

~~For universal life policies and other flexible premium policies, illustrated premiums or target premiums can be used but the actuary should exercise caution in assuming the target premium will be paid for all years in the future. For flexible premium policies with long-term guarantees and secondary guarantees, the level of future expected~~

premiums can have a large effect on reserves. The actuary should consider assuming the minimum premium to keep the policy in force is paid (either the stipulated premium or the minimum amount required to provide for a positive shadow account). Excess funding of universal life policies with secondary guarantees will tend to decrease the liability amount and should only be used where such specific policyholder behavior has previously been observed.

- 5) **Sensitivity Testing.** The actuary is required to examine the sensitivity of results to understand the materiality of making alternate assumptions. For example, the actuary must examine, but not be limited by the following, premium assumptions:
- a. **Minimum premium scenario.** At any point in the policy's lifetime, the policy provisions define a future stream of minimum premium payments that will keep the policy in force until policy expiry. The pattern of premium payments may depend on the policy design, and could be level or annually increasing or a combination of the two. The sensitivity test should be performed to determine the impact on reserves assuming that the policyholder pays the minimum premium required by the policy terms to keep the policy in force each year.
 - b. **Non-payment of premiums.** When the minimum premium is greater than zero, it is reasonable to assume that some policyholders fail to pay the minimum premium, especially when the minimum premium for the current year is greater than the premium actually paid in the prior year. If the minimum premium is increasing substantially compared to the prior year premium, it is reasonable to assume a "shock lapse", for example, where the minimum premium has been zero for a period of years and the next minimum premium is substantial. These non-payment lapse assumptions should be consistent with lapse experience on policies where no nonforfeiture option is available.
 - c. **Pre-payment of premiums—Single premium case.** Policyholders may elect to pay all of their premiums ahead of schedule. In this case the minimum premium will be zero and no non-payment lapses would be assumed. However, if the value of the cash surrender value is roughly equivalent to the value of the future death benefits (assuming no further premiums), then it would be reasonable to assume some policyholders will elect to surrender their policies. If the cash surrender value is substantially less than the value of the death benefits, as is often the case with policies with shadow accounts, it would be reasonable to assume that few or none would surrender their policies.
 - d. **Pre-payment of premiums—Level premium case.** Policyholders may elect to pay a level premium that is guaranteed to keep the policy in force until the policyholder's death. Typically, in this case, the minimum premium will be zero followed by annually increasing premiums. However, it is reasonable to assume that some policyholders will continue the premium pattern that they have already established. It will be important to consider both of these premium payment scenarios since the value of the pre-payment option will depend on future interest rates compared to the interest rates guaranteed in any shadow account. Whenever the minimum premium is zero, surrender assumptions would be similar to those described for the single premium case.
 - e. Policyholders may elect to allocate premiums among fixed, indexed or separate accounts of indexed or variable products. Consideration should be made for the impact of alternative premiums allocation assumptions based on policyholder behavior.

Where the results are highly sensitive to the assumed premium assumptions, the actuary must consider the results of the sensitivity test in determining the Prudent Best Estimate.

[Drafting note: More guidance or processes are needed regarding how the reserves may be increased to reflect results being highly sensitive to the premium pattern]

- 6) **Margin for premium pattern.** Underlying the establishment of the Prudent Best Estimate Assumption, the actuary is required to examine the sensitivity of results to understand the materiality of making alternate assumptions. The actuary is specifically required to examine the four premium patterns defined above. It may be appropriate to examine other premium patterns. Where the results are highly sensitive to the assumed premium pattern, the actuary must consider the results of the sensitivity test in determining the Prudent Best Estimate and Margin. The actuary needs to consider both the severity and likelihood of the premium assumptions. The greater the severity and likelihood of a given premium assumption, the more likely that the given premium assumption forms the Prudent Best Estimate.

~~7) Margin for premium persistency. A Margin should be included in valuation premium persistency assumptions. A lower Margin would be appropriate where premium persistency assumptions are supported by credible historical company experience. A higher Margin is appropriate where the following are present:~~

- ~~—the company’s premium persistency experience is not credible,~~
- ~~—the assumption relates to an event further in the future, and~~
- ~~—sensitivity testing determines that the reserve is sensitive to the premium persistency assumption.~~

~~The Margin applied to the premium persistency assumption must be identifiable and applied in either the dynamic behavior adjustment or the base assumption as appropriate.~~

~~D)C) — Best Estimate Withdrawal Assumption~~

~~The actuary should use a dynamic model for partial withdrawal and surrender assumptions reflecting factors such as the projected interest rate environment, funding level, premium increases, and benefit triggers when it would be more appropriate than using a static assumptions.~~

- ~~2. In setting partial withdrawal and surrender assumptions, the actuary should consider the insured's age and gender, and the existence of surrender charges. In addition, the actuary should consider taking into account such factors as the policy’s competitiveness, surrender charges, interest or persistency bonuses, taxation status of the policyholder, premium frequency and method of payment, emergence of life settlement and viatical markets, and any guaranteed benefit amounts.~~
- ~~3. The actuary should consider the fact that rates of surrender can decline dramatically prior to a scheduled sharp increase in surrender benefit (sometimes known as a “cliff”) caused by a decrease in surrender charge, a bonus or a maturity benefit, and rates of surrender can rise significantly after such an event.~~
- ~~4. Whenever the minimum premium required to keep the policy in force increases substantially, an appropriate shock lapse assumption must be incorporated in the modeling.~~
- ~~5. Whenever the minimum premium to keep the policy in force is zero and the cash surrender benefits are small in relation to the premiums paid, the actuary must assume that there are no surrenders.~~

E.

~~1) General Considerations. Withdrawal assumptions would typically be deterministic in nature rather than stochastic. However, the withdrawal assumption would typically have a dynamic component in response to the current interest rate environment, funding level, premium increases, and benefit triggers.~~

~~The actuary should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model for behavior. Dynamic assumptions are required where there would be materially higher reserves resulting from using dynamic assumptions versus static assumptions. Risk factors which are not scenario tested, but could reasonably be expected to vary according to (a) a stochastic process, or (b) future states of the world (especially in response to economic drivers) may require additional Margins and/or signal a need for higher Margins for certain other assumptions.~~

~~In setting a withdrawal assumption, the actuary should consider items such as but not limited to:~~

- ~~a. policy plan and options;~~
- ~~b. the policy’s competitiveness, surrender charges, interest bonuses, persistency bonuses, taxation upon withdrawal and other incentives and disincentives to withdrawal;~~
- ~~c. the life insured’s attained age, gender and duration since issue of the policy;~~

- ~~d. premium paying pattern;~~
- ~~e. method of payment and frequency of premiums;~~
- ~~f. policy fund value;~~
- ~~g. policy tax status;~~
- ~~h. investment options (both internal to policy and external);~~
- ~~i. guaranteed benefit amounts;~~
- ~~j. policyholder and sales representative sophistication;~~
- ~~k. the company's distribution system and its commission conversion replacement and other marketing practices;~~
- ~~l. the interest rate scenario;~~
- ~~m. external influences on withdrawals, e.g. emergence of viatical/life settlement companies;~~
- ~~n. future increased sophistication of policyholders and sales representatives and~~
- ~~o. the effect of any anti-selection.~~

—[Drafting Note: further guidance as to the establishment of Best Estimate may be needed]

- ~~2) Cliff. A “cliff” is a sudden significant increase in the benefit available at withdrawal. That increase may result from an increase in the cash value, a decrease in the surrender charge, or the availability of a maturity benefit or persistency bonus. Unless there is pertinent persistency experience data to the contrary, the actuary's Best Estimate withdrawal rates would grade to zero as the cliff approaches and remain at zero for an interval before the cliff is reached.~~
- ~~3) Paid-Up Policies. The actuary's Best Estimate withdrawal rate would be zero for a paid-up policy with little nonforfeiture benefit relative to the premiums paid.~~
- ~~4) Consistency with Other Assumptions. It is important that the withdrawal assumptions are consistent with the other projection assumptions such as premiums, policyholder behavior and mortality deterioration.~~
- ~~5) Sources and use of withdrawal data for setting valuation withdrawal assumptions.~~
 - ~~a. Internal studies should be used as input to the valuation withdrawal assumptions if such studies are statistically credible, whether the results of the internal study are more or less favorable than external studies.~~
 - ~~b. If no relevant and statistically credible internal studies exist, external withdrawal studies should be considered to set valuation withdrawal assumptions.~~
 - ~~c. If a company's product design or other criteria are inconsistent with the product being valued in the external withdrawal study, then the external withdrawal study should be adjusted for the purpose of establishing valuation withdrawal assumptions.~~
 - ~~d. Internal studies may be combined with external information based on the relevance of experience and its degree of credibility. Adjustments shall be applied to reflect differences in the business underlying the underlying internal and external studies.~~

~~D) — M Margins – Policyholder Behavior.~~

- ~~1. Sensitivity testing of assumptions will be required to establish the Margin. These tests should include, but are not limited to, premium payment patterns, premium persistency, surrenders, partial withdrawals, transfers between fixed and separate accounts, benefit utilization, and other option elections.~~
- ~~2. Unless there is clear evidence to the contrary, Margins for policyholder behavior assumptions shall increase over time as it is prudent to assume that the risk of policyholders taking actions that increase the company's liability will increase over time.~~

Where relevant and credible empirical data do not exist, the actuary shall establish a higher Margin in policyholder behavior assumptions to increase the Reported Reserve.

3.

4. In order to ensure that the Margin increases the Reported Reserve, the choice between addition and subtraction may need to vary by scenario, age, policy duration, and other parameters. In the case of partial withdrawal, two assumptions are needed – the amount withdrawn and the partial withdrawal rate. ~~Whenever the minimum premium required to keep the policy in force increases substantially, an appropriate shock lapse assumption must be incorporated in the modeling.~~ ~~Whenever the minimum premium to keep the policy in force is zero and the cash surrender benefits are small in relation to the premiums paid, the actuary must assume that there are no surrenders.~~

5. A higher Margin is appropriate –for partial withdrawal and surrender assumptions where the company’s marketing ⇨

~~a. the company’s withdrawal experience is not credible~~

~~b. there is no market value adjustment at withdrawal which would results in increased sensitivity in the Reported Reserve~~

~~e. and /or administrative practices encourages anti-selection.~~

~~b) In order to ensure that the Margin increases the Reported Reserve, the choice between addition and subtraction may need to vary by scenario, age, policy duration, and other parameters. In the case of partial withdrawal, two assumptions are needed—the amount withdrawn and the partial withdrawal rate. [TC: This should be a consideration for the Margin on all assumptions, not just partial withdrawals and surrenders.]~~

The Margin applied to the withdrawal assumption must be identifiable and applied in either the dynamic behavior adjustment or the base assumption as appropriate.

~~The low and high Margins are to be set at X and Y% respectively of best estimate assumptions; however in no event shall the Margin be less than a 1% addition or subtraction as necessary to the Best Estimate assumption.~~

~~e) 6. The Margin applied to the withdrawal assumption shall take into account the application of any dynamic behavior adjustment, if such adjustment is made, to have the intended effect. After application of the Margin and any dynamic behavior adjustment the resulting withdrawal assumption should be reasonable (e.g., greater than or equal to zero and less than 100%).~~

F. **Sensitivity Testing.** The actuary is required to examine the sensitivity of results to understand the materiality of making alternate policyholder behavior assumptions on the Reported Reserve. Sensitivity testing may be performed using samples of the policies in force; it is not required that the entire valuation be done for each alternate assumption set. Sensitivity testing may be done using data from prior periods when appropriate. The actuary should update the sensitivity tests when appropriate, considering the materiality of the results of the tests and trends in experience data. Less frequent updating of these tests is appropriate when the tests show less sensitivity of Reported Reserve to changes in the assumptions being tested or the experience is not changing rapidly.

With respect to policies which give policyholders flexibility in the timing and amount of premium payments, the actuary must examine, but not be limited by the following, premium scenarios:

1. Minimum premium scenario. At any point in the policy’s lifetime, the policy provisions define a future stream of future minimum premium payments that will keep the policy in force until policy expiry. This pattern of premium payments may depend on the policy design, and could be level or annually increasing or a combination of the two. When the minimum premium is greater than zero, it is reasonable to assume that some policyholders fail to pay the minimum premium, especially when the minimum premium for the current year is greater than the premium actually paid in the prior year. If the minimum premium is increasing substantially compared to the prior year premium, it is reasonable to assume a “shock lapse”, for example, where the minimum premium has been zero for a period of years and the next minimum premium is substantial. These

non-payment lapse assumptions should be consistent with lapse experience on policies where no nonforfeiture option is available. The actuary shall estimate the impact on the Reported Reserve of assuming that all policyholders pay the minimum premium required by the policy terms to keep the policy in force each year.

- 2. No further premium payment Scenario** The actuary shall estimate the impact on the Reported Reserve of assuming that no policyholders will pay premiums after the Projection Start Date. In this scenario it is reasonable to assume that some policyholders will withdraw their funds at the Projection Start Date while other policies will lapse or terminate without value according to the terms of their contracts.
- 3. Pre-payment of premiums – Single premium Scenario.** The actuary shall estimate the impact on the Reported Reserve of assuming that all policyholders will pay all future premiums on the Projection Start Date, to the extent that such pre-payments are permitted under the terms of the policies or by the company’s current practices. In this Scenario no non-payment lapses would be assumed. However, if the value of the cash surrender value is roughly equivalent to the value of the future death benefits (assuming no further premiums), then it would be reasonable to assume some policyholders will elect to surrender their policies. If the cash surrender value is substantially less than the value of the death benefits, as may be the case with policies with secondary guarantees, it would be reasonable to assume that few or none would surrender their policies.
- 4. Pre-payment of premiums – Level premium Scenario.** Some flexible premium policies may permit the policyholder to pay a level premium that is guaranteed to keep the policy in force until the policyholder’s death. This premium could be stipulated in the contract or derived from the terms of the contract. The actuary shall estimate the impact on the Reported Reserve of assuming that all policyholders pay level premiums from the Projection Start Date forward in an amount sufficient to keep the contract in force from the Projection Start Date until the insured’s death (or as long as possible under the terms of the contract). In this Scenario no non-payment lapses would be assumed. However, surrenders and withdrawals might occur as described in Scenario (3).

VII.VI. Guidance and Requirements for Setting Expense Assumptions

A. Overview:

The guidance and requirements in this section apply for setting ~~Prudent-prudent~~ ~~Best-best~~ ~~Estimate-estimate~~ expense assumptions used to determine the Deterministic Reserve or Stochastic Reserve.

B. Expense Assumption Considerations:

Below is a list of considerations for the actuary when determining ~~expenses using~~ ~~Prudent Best Estimate-expense~~ ~~assumptions~~ Assumptions.

1. The expense assumption should reflect all costs associated with the policies being modeled. In other words, the expense assumption should reflect the direct costs associated with the policies being modeled as well as an appropriate portion of indirect costs and overhead (i.e. expense assumptions representing fully allocated expenses should be used.)
2. Expenses categorized in the annual statement as ‘taxes, licenses and fees’ (Exhibit 3 of the Annual Statement) should be included in the expense assumption.
3. Acquisition expenses associated with business in force as of the Valuation Date and significant non-recurring expenses expected to be incurred after the Valuation Date should be included in the expense assumption.
4. Certain ~~Information-information~~ ~~Technology-technology~~ development costs and other capital expenditures may be spread over a reasonable number of years in accordance with accepted statutory accounting principles as defined in the Statements of Statutory Accounting Principles (care should be taken with regards to the potential interaction with the considerations above).
5. Expense assumptions should assume that the company is a going-concern.
6. An appropriate expense basis should be chosen that properly aligns the actual expense to the assumption. For example, death benefit expenses should be modeled with an expense assumption that is per death incurred. If values are not significant they may be aggregated into a different base assumption.

7. In general, expenses should reflect the impact of inflation. Inflation rates should be set in a manner consistent with the Scenario interest rates. Expense assumptions for the deterministic and stochastic Scenarios are expected to be the same except for differences arising from application of inflation rates.~~The inflation assumption should be determined in a manner consistent with asset assumptions used in the model.~~
8. Expense assumptions should not assume future expense improvements.
- ~~9. Since reserves are calculated on a pre-tax basis, The model used to determine reserve levels should be measured assumptions for before Federal federal Income income Taxes taxes and foreign income taxes are not required. — Therefore assumptions needed to determine federal or foreign income tax are not required.~~
9. ~~Margin should be added. The greater the uncertainty of the expense assumption, the greater the Margin.~~
10. Expense assumptions should be consistent with other related assumptions. For example, the manner that investment expenses are handled should be consistent with the manner that asset returns are reflected in the model.

C. Methodology to Determine Prudent Best Estimate Expense Assumptions

1. Best Estimate Assumptions~~General Considerations:~~ ~~Expenses should be set by use of Prudent Best Estimate assumptions. These Best Estimate assumptions Assumptions~~ are based on a company's own experience and derived from careful study that is within the range of actuarial practice. Fully allocated expenses should be used, e.g. the expense assumptions should reflect the direct costs associated with the block of policies being modeled as well as indirect costs and overhead costs that have been appropriately allocated to the modeled policies.

~~Future expense assumptions should also reflect the impact of inflation as part of the Prudent Best Estimate. The inflation rate should be set in a manner consistent with the asset assumptions used in the model. Expense assumptions for the deterministic and stochastic Scenarios are expected to be the same. Differences could occur with the application of the inflation factor.~~

[Drafting note: Further guidance may be ~~given~~ required in an ASOP, subject to approval by ASB.]

- ~~3.a.~~ Expense Allocations: Expense allocations shall be done in a manner that is within the range of actuarial practice and methodology and that is consistent with applicable ASOPs. The allocation method used shall be consistent across company lines of business. Allocations may not be done for the purpose of lowering Reported Reserves. Overhead expenses that are allocated to the acquisition function shall be able to be supported by sound actuarial principles and where possible, by company experience.
- ~~4.b.~~ Significant Expenses due to Non-recurring Events: Most significant, non-IT related expenditures are expected to occur prior to the Projection Start ~~Valuation~~ Date and would therefore not be included in the reserve calculation. However, there may be some types of non-recurring expenses that are expected to occur beyond the Projection Start ~~Valuation~~ Date. An example of this kind of cost would be severance costs anticipated in the next year or legal costs associated with class action suits. These expenses should be reflected in the assumption for the future period that they are anticipated to occur. Significant expenses due to IT related investment should follow statutory accounting principles in determining whether or not they should be capitalized. Capitalized expenses should not receive unique treatment according to this methodology. The depreciation of those expenses is reflected in Exhibit 2 of the statement and captured in the validation tool which is used to verify the reasonableness of the expense assumption

If there is a unique situation that has occurred whereby excessive expenses cannot be reasonably allocated among lines of business, regulatory approval may be sought for a reasonable application of the considerations outlined in subsection IV. B above.

- ~~5.c.~~ Mergers & Acquisitions: Only expense efficiencies that are derived and realized from the combination of blocks of business due to a business acquisition or merger should be reflected in the expense assumption as long as any costs associated with achieving the efficiencies are also recognized. For example, the combining of two similar blocks of business on the same administrative system may yield some expense savings on a per unit basis, but any future cost of the system conversion should also be

considered in the final assumption. If all costs for the conversion are in the past then there would be no future expenses to reflect in the valuation.

2. Margin: ~~Consistent with the definition of Prudent Best Estimate, Margins should be reflected.~~ A lower Margin may be appropriate where expense assumptions are supported by credible historical company experience or for a line of business that is growing quickly (thereby spreading the fixed costs). A higher Margin is required where:
 - a. allocation methods create uncertainty regarding line of business splits - especially as it concerns overhead expenses;
 - b. the company's expense experience is not credible;
 - c. the economic outlook is unstable;
 - d. the company's expenses have not been quantified by a study which follows accepted actuarial practice and principles;
 - e. sensitivity testing determines that the reserve is sensitive to the expense assumption; or
 - f. the regulatory environment is one that creates the likelihood of increased expenses.

The Margin applied to the expense assumption must be identifiable and may be applied ~~in~~ to either the dynamic behavior adjustment or the base assumption as appropriate.

VIII.VII. Guidance and Requirements for Setting Asset Assumptions

A. Overview

The guidance and requirements in this section apply for setting valuation ~~Prudent Best Estimate~~ assumptions related to the projection of asset cash flows and net investment earnings for ~~s~~Starting ~~a~~Assets and reinvestment assets when determining the Stochastic Reserve and the Deterministic Reserve. Modeling of both general account and separate account assets are addressed, as well as modeling of hedge instruments.

B. ~~Income, Default~~ Costs and Other Uncertainty in Timing and Amounts of Cash Flows, Reinvestment Spreads and Other Assumptions

For both the Stochastic Reserve and Deterministic Reserve calculations:

- 1) Default cost assumptions for the various fixed income asset classes should reflect ~~Prudent~~ prudent Best best Estimates estimates of ~~long-term losses~~ default costs over the lifetime of the assets and consistent with the type of asset and quality rating. They are subject to the following required considerations:
 - a. The Best Estimate Assumption for Prudent Best Estimate default cost assumption for a particular asset class should take into consideration the company's own experience, to the extent credible and appropriate, and available insurance industry and broad financial market experience. In general, broader market default cost experience should be a substantial consideration for assets traded in more public and liquid markets.
 - b. As default cost experience is generally observed to be cyclical in nature, Best Estimate Assumptions should be related to historical experience over a period of time long enough to cover both favorable and unfavorable experience years, such that the average historical experience reasonably constitutes an unbiased long-term historical average. The actuary shall generally use a consistent method from one reserve valuation to the next in developing the supporting historical experience.
 - c. If the actuary consolidates quality rating categories for purposes of setting the default cost assumptions, the resulting default costs should be consistent with those that would have resulted had the more refined recognition of rating categories been used.
 - d. The actuary may use level default cost assumptions over time that are equivalent to the expected default costs over the projected lives of the corresponding assets.
 - e. Default cost assumptions should be consistent for similar asset classes within both the ~~s~~Starting ~~a~~Assets and reinvestment assets. Inconsistencies may be maintained that arise from adjustments made to comply with any additional requirements herein.
 - f. A Margin shall be added to the Best Estimate ~~a~~Assumption applied to each asset class. The actuary shall apply higher Margins (when expressed as a percentage of the credit exposure on the corresponding assets,

commonly known as a “basis points charge”) in situations of greater uncertainty including but not limited to the following:

1. Greater historical variability in the default rates, recovery rates, or both. Generally, the expectation is that lower quality assets will have higher Margins than higher quality assets with similar maturities.
2. Material exposures to newer asset structures that have limited historical experience:

~~An explicit Margin shall be added to the expected default costs.~~

~~The default cost assumptions for the various asset classes should be consistent for starting assets and reinvestment assets.~~

~~2) Spreads over Treasuries reflected in the purchase yields of reinvestment assets are to be Prudent Best Estimates. The types, quality and maturities of such reinvestment assets should be consistent with the company’s current investment strategy for the block of business being valued.~~

~~3) Any uncertainty in the timing and amounts of asset cash flows related to the paths of movements in interest rates, equity returns, or other economic values contained in the various Scenarios shall (e.g., prepayment risk) should be reflected directly in the projection of asset cash flows under the various scenarios within the Stochastic Reserve calculation model and under the Deterministic Scenario within the Deterministic Reserve calculation model. For example, the impact on cash flows of embedded prepayment, extension, call and put options features should be specifically modeled in a manner consistent with current asset adequacy analysis practice.~~

~~[Drafting Note: Guidance on equity-type assets, such as common stock, equity real estate, and Schedule BA assets must be determined. Additional guidance for establishing Margins for default costs and investment expenses is also needed.]~~

C. ~~Cap on Aggregate Spread on Prescribed Spread Paths on~~ Reinvestment Assets. (To be determined.)

~~The Model Regulation requires that the spread over Treasuries on the fixed income portion of the reinvestment assets for each Projection Interval be subject to a prescribed cap. The aggregate cap could be determined as follows:~~

~~1) After applying the Prudent Best Estimate assumption for asset defaults and investment expense to the gross earned rate for each reinvestment asset, the resulting net asset earned rate for each reinvestment asset can then be expressed as a Treasury Rate plus a spread.~~

~~2) The weighted average spread over Treasuries for all assets for each Projection Interval cannot exceed a prescribed level of X bps. If this occurs, the spread over the Treasury rate for each reinvestment asset would be proportionally reduced for each Projection Interval to produce a weighted average aggregate cap equal to X bps, and the Prudent Best Estimate assumption for asset defaults and investment expenses would be adjusted accordingly.~~

~~[Drafting Note: other approaches to define the aggregate cap may be acceptable.]~~

D. The Deterministic Scenario

1. Prescribed U.S. Treasury Interest Rates Path. The path of U.S. Treasury rates used to determine the Deterministic Reserve will begin with the market yield curve on the Projection Start Date ~~Valuation Date~~ (based on Treasury yields reported by <<insert source>>). The yield curve 120 months or more after the Projection Start Date ~~Valuation Date~~ will be the “ultimate” yield curve shown below. The yield curve on any date between the Projection Start ~~Valuation~~ Date and 120 months after the Projection Start ~~Valuation~~ Date will be linearly interpolated between the starting yield curve and the “ultimate” yield curve.

These rates ~~shall be~~ are based on the ~~based on the 65 CTE statistic from the~~ distribution ~~of Treasury rates from 1954-2003 and approximate the 65 CTE of the distribution~~ of yield curves obtained from the recalibrated C3 Phase I generator (where the CTE is measured at the low end of the distribution of rates). The yield rates shown below for the ultimate yield curve are annual effective rates (not coupon rates or bond-equivalent yields) for a bond with semi-annual coupons.

1yr or less	x%	11	x%	21	x%
2	x%	12	x%	22	x%
3	x%	13	x%	23	x%
4	x%	14	x%	24	x%
5	x%	15	x%	25	x%
6	x%	16	x%	26	x%
7	x%	17	x%	27	x%
8	x%	18	x%	28	x%
9	x%	19	x%	29	x%
10	x%	20	x%	30yrs or more	x%

For example, if the 5-year Treasury rate on the Valuation-Projection Start Date is 2.85%, and the 5-year ultimate Treasury rate from the above table is 4.05%, then the 5-year Treasury rate assumed in the deterministic scenario would increase by 0.01% each month for 120 months and then level off at 4.05% for the remainder of the projection, ~~which is the 5-year treasury rate in the ultimate yield curve shown above~~. The same linear interpolation would be performed for every point on the yield curve.

[Drafting Note: The values in the table above will be determined once the re-calibrated C3 P1 interest rate generator is finalized. Further analysis will be needed to finalize the approach used to determine the interest rates at the CTE 65 level once the C3P1 interest rate generator is finalized ~~was developed assuming LHATF chooses 65 CTE as the reserve risk level. These rates and the methodology may be reviewed by LHATF. Should LHATF choose a different approach or risk level, the table will need to be updated.~~]

2. Prescribed S&P 500 Returns~~Equity Rate Path~~ and Separate Account Fund Performance. The path of equity returns used to determine the Deterministic Reserve will be based on a single path of S&P 500~~path of prescribed~~ returns for both General Account equity assets, ~~and a single set of paths of future fund performances and for~~ Separate Account assets. This path will start with the current 10-year Treasury rate as of the Projection Start Date grading to the ultimate 10-year Treasury rate shown in the table in Subsection D.1 over 10 years using linear interpolation, with the prescribed spread over 10-year Treasures (from Subsection C above) added to each rate.

[Drafting Note: this approach to prescribed equity returns for the Deterministic Scenario is one of many that could achieve the objective of developing a Deterministic Reserve that approximates the Stochastic Reserve for a block of business with normally distributed outcomes. Modeling analysis of this and other approaches in different starting environments is expected to continue before the approach is finalized.]

2. ~~method used to determine these paths will be prescribed.~~

~~[Drafting Note: Further work may be needed to define the approach to determine these paths]~~

E. Stochastic Scenarios

1. Interest Rates Paths. U.S. Treasury rates shall be modeled using:
 - a. The American Academy of Actuaries' C3 Phase I interest rate generator, as recalibrated and adopted by the NAIC, or
 - b. A prescribed set of <<insert description of pre-packaged interest rate scenarios>>, or

[Drafting Note: it is anticipated LHATF will establish a set of pre-packaged set of interest rate scenarios similar to those used for C3 Phase II RBC requirements.]

-
-
- c. Proprietary ~~Predetermined~~ Scenario Sets, or

[Drafting Note: If this option is chosen, then the Stochastic Reserve will be determined using a ~~prescribed~~ weighting of the Scenarios determined by the company, rather than using the CTE metric. Additional guidance is needed to determinate the how the Proprietary ~~Predetermined~~ Scenario Sets will be established.]

-
-
-
- d. An interest rate generator developed by the company as long as the ~~following~~ prescribed calibration standards are met.:

<<insert calibration standards>>

[Drafting Note: it is anticipated that LHATF will establish calibration standards similar to those used for C3 Phase II.]

2. Equity Return Paths. S&P 500 returns and separate account fund performance shall be modeled using:

- a. The << insert prescribed equity return generator and model parameters>>, or
- b. The American Academy of Actuaries' << insert pre-packaged scenarios>>, or

[Drafting Note: it is anticipated LHATF will establish a set of pre-packaged set of interest rate scenarios similar to those used for C3 Phase II RBC requirements.]

-
-
- c. Proprietary ~~Predetermined~~ Scenario Sets, or

[Drafting Note: If this option is chosen, then the Stochastic Reserve will be determined using a ~~prescribed~~ weighting of the Scenarios determined by the company, rather than using the CTE metric. Additional guidance may be needed to determinate the how the Proprietary ~~Predetermined~~ Scenario Sets will be established.]

-
-
-
- d. An equity return model developed by the company as long as the ~~following~~ prescribed calibration standards are met.:

<<insert calibration standards>>

~~[Drafting Note: it is anticipated that LHATF will establish calibration standards similar to those used for C3 Phase II. Although the calibration points in the C3 Phase II requirement only go out 20 years, the requirement provides some guidance for returns beyond 20 years. As the life insurance policies being valued here can have an expected lifetime well in excess of 20 years, LHATF may wish to consider whether this guidance is appropriate for these products. In addition, the pre-packaged scenarios only go out 30 years. As the life insurance policies being valued here can have an expected lifetime well in excess of 30 years, it may be necessary to develop pre-packaged scenarios with a longer time horizon. Alternatively, the existing pre-packaged scenarios could be extended so that they have the same returns as in the first 30 years.]~~

3. Calibration Standards. Interest rate paths and equity return paths used under any of the available choices must meet calibration standards established by the NAIC, except that for Proprietary Scenario Sets, only the full set of Scenarios from which the smaller set is chosen need to meet the calibration standards. The calibration standards are as follows:

~~3.~~ <<insert calibration standards or reference to an AAA report documenting such standards>>

[Drafting Note: It is anticipated that LHATF will establish calibration standards similar to those used for C3 Phase II. Although the calibration points in the C3 Phase II requirement only go out 20 years, the requirement provides some guidance for returns beyond 20 years. As the life insurance policies being valued here can have an expected lifetime well in excess of 20 years, LHATF may wish to consider whether this guidance is appropriate for these products. In addition, the pre-packaged scenarios only go out 30 years. As the life insurance policies being valued here can have an expected lifetime well in excess of 30 years, it may be necessary to develop pre-packaged scenarios with a longer time horizon. Alternatively, the existing pre-packaged scenarios could be extended so that they have the same returns as in the first 30 years.]

4. For considerations as to Other Funds, Correlation of Funds, Number of Scenarios and Efficiency in Estimation, Frequency of Projection and Time Horizon the actuary will use the following:

<<insert requirements>>

[Drafting Note: it is anticipated that LHATF will establish requirements for these items similar to those used for C3 Phase II.]

- 4.5. Integrated Scenarios

[Drafting Note: When developing projections for variable products or general account products which are backed in part by equity assets, it will be necessary to project both equity returns and interest rate paths. LHATF may wish to define acceptable methods for integrating these two types of scenarios, and may want to consider approaches similar to those allowed in C3 Phase II.]

F. “Best Estimate” Assumptions for Risk Factors with Prescribed Valuation Assumptions.

The prescribed “best estimate” assumptions needed to quantify the impact of Margins required by Section 7.B.4 and 5 of the Model Regulation are shown below.

1. “Best estimate” U.S. Treasury Interest Rate Path. The path will begin with the market yield curve on the Projection Start Date (based on Treasury yields reported by <<insert source>>). The yield curve 120 months or more after the Projection Start Date will be the “ultimate” yield curve shown below. The yield curve on any date between the Projection Start Date and 120 months after the Projection Start Date will be linearly interpolated between the starting yield curve and the “ultimate” yield curve.

These rates are based on the mean of the distribution of the recalibrated C3 Phase I generator. The yield rates shown below for the ultimate yield curve are annual effective rates (not coupon rates or bond-equivalent yields) for a bond with semi-annual coupons.

1yr or less	x%	11	x%	21	x%
2	x%	12	x%	22	x%
3	x%	13	x%	23	x%
4	x%	14	x%	24	x%
5	x%	15	x%	25	x%
6	x%	16	x%	26	x%
7	x%	17	x%	27	x%
8	x%	18	x%	28	x%
9	x%	19	x%	29	x%
10	x%	20	x%	30yrs or more	x%

For example, if the 5-year Treasury rate on the Projection Start Date is 2.85%, and the 5-year ultimate Treasury rate from the above table is 4.05%, then the 5-year Treasury rate assumed in the deterministic scenario would increase by 0.01% each month for 120 months and then level off at 4.05%. The same linear interpolation would be performed for every point on the yield curve.

[Drafting Note: The values in the table above will be determined once the re-calibrated C3 P1 interest rate generator is finalized.]

2. “Best estimate” S&P 500 Returns and Separate Account Fund Performance.

[Drafting Note: Further work is needed to define the approach to determine these paths]

E.G. Modeling of Hedges

1. General Considerations

The appropriate costs and benefits of hedging instruments that are currently held by the company in support of the policies falling under the Model Regulation (excluding those that involve the offsetting of the risks associated with products outside of the scope of the Approach) shall be included in the calculation of the Deterministic Reserve and Stochastic Reserve.

If the company is following a Clearly Defined Hedging Strategy (“hedging strategy”), as defined in section 7.E.7 of the Model Regulation, in accordance with an investment policy adopted by the Board of Directors or a committee of Board members, the company is eligible to reduce the amount of the Reported Reserve using projections otherwise calculated. The investment policy must clearly articulate the company’s hedging objectives, including the metrics that drive rebalancing/trading. This specification could include maximum tolerable values for investment losses, earnings, volatility, exposure, etc. in either absolute or relative terms over one or more investment horizons vis-à-vis the chance of occurrence. Company management is responsible for developing, documenting, executing and evaluating the investment strategy, including the hedging strategy, used to implement the investment policy.

For this purpose, the investment assets refer to all the assets including derivatives supporting covered products and guarantees. This is also referred to as the investment portfolio. The investment strategy is the set of all asset holdings at all points in time in all scenarios. The hedging portfolio, which is also referred to as the hedging assets, is a subset of the investment assets. The hedging strategy is the hedging asset holdings at all points in time in all scenarios. The distinction of what is the hedging portfolio and what is the investment portfolio is not in this section. Nor is the distinction between investment strategy and hedging strategy formally made here. Where necessary to give effect to the intent of this section, the requirements applicable to the hedging portfolio or the hedging strategy are to apply to the overall investment portfolio and investment strategy.

This particularly applies to restrictions on the reasonableness or acceptability of the models that make up the ~~cash-Cash flow-Flow model-Model~~ used to perform the projections, since these restrictions are inherently restrictions on the joint modeling of the hedging and non-hedging portfolio. To give effect to these requirements, they must apply to the overall investment strategy and investment portfolio.

The cost and benefits of hedging instruments that are currently held by the company in support of the policies falling under the Model Regulation shall be included in the ~~cash-Cash flow-Flow model-Model~~ used to calculate the Deterministic Reserve and the Stochastic Reserve. If the company is following a Clearly Defined Hedging Strategy, the model shall take into account the cost and benefits of hedge positions expected to be held by the company in the future based on the operation of the hedging strategy.

Before either a new or revised hedging strategy can be used to reduce the amount of the Reported Reserve otherwise calculated, the hedging strategy should be in place (i.e., effectively implemented by the company) for at least three months. The company may meet the time requirement by having evaluated the effective implementation of the hedging strategy for at least three months without actually having executed the trades indicated by the hedging strategy (e.g., mock testing or by having effectively implemented the strategy with a product exhibiting similar risks for at least three months).

These requirements do not supersede any statutes, laws, or regulations of any state or jurisdiction related to the use of derivative instruments for hedging purposes and should not be used in determining whether a company is permitted to use such instruments in any state or jurisdiction.

2)2. Background

The analysis of the impact of the hedging strategy on cash flows is typically performed using either one of two methods as described below. Although a hedging strategy would normally be expected to reduce risk provisions, the nature of the hedging strategy and the costs to implement the strategy may result in an increase in the amount of the Reported Reserve otherwise calculated.

The fundamental characteristic of the first method is that all hedging positions, both the currently held positions and those expected to be held in the future, are included in the ~~cash-Cash flow-Flow model-Model~~ used to determine the Reported Reserve.

The fundamental characteristic of the second method is that the effectiveness of the current hedging strategy (including currently held hedge positions) on future cash flows is evaluated, in part or in whole, outside of the ~~cash-Cash flow-Flow model-Model~~. In this case, the reduction to the Reported Reserve otherwise calculated should be commensurate with the degree of effectiveness of the hedging strategy in reducing accumulated deficiencies otherwise calculated.

Regardless of the methodology used by the company, the ultimate effect of the current hedging strategy (including currently held hedge positions), on the Reported Reserve needs to recognize all risks, associated costs, imperfections in the hedges and hedging mismatch tolerances associated with the hedging strategy. The risks include, but are not limited to: basis, gap, price, parameter estimation, and variation in assumptions (mortality, persistency, withdrawal, annuitization, etc.). Costs include, but are not limited to: transaction, Margin (opportunity costs associated with Margin requirements) and administration. In addition, the reduction to the Reported Reserve attributable to the hedging strategy may need to be limited due to the uncertainty associated with the company's ability to implement the hedging strategy in a timely and effective manner. The level of operational uncertainty varies indirectly with the amount of time that the new or revised strategy has been in effect or mock tested.

No hedging strategy is perfect. A given hedging strategy may eliminate or reduce some but not all risks, transforms some risks into others, introduces new risks or has other imperfections. For example, a delta-only hedging strategy does not adequately hedge the risks measured by the "Greeks" other than delta. Another example is that financial indices underlying typical hedging instruments typically do not perform exactly like the separate account funds, and hence the use of hedging instruments has the potential for introducing basis risk.

3)3. Calculation of CTE Amount (reported)

The company should begin by calculating "CTE Amount (best efforts)" – the results obtained when the Stochastic Reserve is based on incorporating the hedging strategy (including currently held hedge positions) into the stochastic ~~cash-Cash flow-Flow model-Model~~, including all of the factors and assumptions needed to execute the hedging strategy (e.g., stochastic implied volatility).

Because most models will include at least some approximations or idealistic assumptions, CTE Amount (best efforts) may overstate the impact of the hedging strategy. To compensate for potential overstatement of the impact of the hedging strategy, the company must recalculate the Stochastic Reserve reflecting the impact of risks not completely reduced, eliminated or contemplated by the hedging strategy, all of the costs associated with the hedging strategy, the imperfections in the hedging strategy, and any uncertainty over the effectiveness of the hedging strategy. The result so obtained is called "CTE Amount (adjusted)". In some situations the determination of CTE Amount (adjusted) may include both direct and indirect techniques.

Finally, the reported value for the Stochastic Reserve is given by:

$$\text{CTE Amount (reported)} = \text{CTE Amount (best efforts)} + E \times \text{MAX}[0, \text{CTE Amount (adjusted)} - \text{CTE Amount (best efforts)}]$$

The value for E (an "error factor") reflects the actuary's view as to the level of sophistication of the stochastic ~~cash-Cash flow-Flow model-Model~~. As the sophistication of the stochastic ~~cash-Cash flow-Flow model-Model~~ increases, the value for E decreases, subject to minimum of 0.05 (i.e., the greater the ability of the CTE Amount (best efforts) model to capture all risks and uncertainties, the lower the value of E). If the model used to determine the "CTE Amount (best efforts)" is "state of art", the value "CTE Amount (adjusted) – CTE Amount (best efforts)" may be nominal. On the other hand, if the model used to determine the "CTE Amount (best efforts)" is simplistic, the value "CTE Amount (adjusted) – CTE Amount (best efforts)" may be significant.

4)4. Specific Considerations and Requirements

As part of the process of choosing a methodology and assumptions for estimating the future effectiveness of the

current hedging strategy (including currently held hedge positions) for purposes of reducing the Reported Reserve, the actuary should review actual historical hedging effectiveness. The actuary must evaluate the appropriateness of the assumptions on future trading, transaction costs, and other elements of the model, the strategy, the mix of business, and other items that could result in materially adverse results. This includes an analysis of model assumptions that, when combined with the reliance on the hedging strategy, may result in adverse results relative to those modeled. The parameters and assumptions must be adjusted (based on testing contingent on the strategy used and other assumptions) to levels that fully reflect the risk based on historical ranges and foreseeable future ranges of the assumptions and parameters. If this is not possible by parameter adjustment, the model must be modified to reflect them at either ~~Best~~ “best Estimates-estimates” or adverse estimates of the parameters.

A discontinuous hedging strategy is a hedging strategy where the relationships between the sensitivities to equity markets and interest rates (commonly referred to as the Greeks) associated with some guaranteed policyholder options embedded in some products and these same sensitivities associated with the hedging assets are subject to material discontinuities. Any hedging strategy, including a delta hedging strategy, can be a discontinuous hedging strategy if implementation of the strategy permits material discontinuities between the sensitivities to equity markets and interest rates associated with the guaranteed policyholder options embedded in the variable annuities and other in-scope products and these same sensitivities associated with the ~~h~~hedging assets. There may be scenarios that are particularly costly to discontinuous hedging strategies, especially where those result in large discontinuous changes in sensitivities (Greeks) associated with the hedging assets. Where discontinuous hedging strategies contribute materially to a reduction in the Reported Reserve, the actuary must evaluate the interaction of future trigger definitions and the discontinuous hedging strategy, in addition to the items mentioned in the previous paragraph. This includes an analysis of model assumptions that, when combined with the reliance on the discontinuous hedging strategy, may result in adverse results relative to those modeled.

Implementing a strategy that has a strong dependence on acquiring hedging assets at specific times that depend on specific values of an index or other market indicators may not be implemented as precisely as planned.

The combination of elements of the ~~cash-Cash flow-Flow model-Model~~, including the initial actual market asset prices, prices for trading at future dates, transaction costs, and other assumptions should be analyzed by the actuary as to whether the ~~cash-Cash flow-Flow model-Model~~ permits hedging strategies that make money in some scenarios without losing a reasonable amount in some other scenarios. This includes, but is not limited to:

- 1) hedging strategies with no initial investment that never lose money in any scenario and in some scenarios make money; or
- 2) hedging strategies that with a given amount of initial money never make less than accumulation at the one-period risk free rates in any scenario but make more than this in one or more scenarios.

If the ~~cash-Cash flow-Flow model-Model~~ allows for such situations, the actuary should be satisfied that the results do not materially rely directly or indirectly on the use of such strategies. In addition, the actuary should disclose the situations and provide supporting documentation as to why the actuary believes the situations are not material for determining the Reported Reserve. If the results do materially rely directly or indirectly on the use of such strategies, the strategies may not be used to reduce the Reported Reserve otherwise calculated.

In addition to the above, the method used to determine prices of financial instruments for trading in scenarios should be compared to actual initial market prices. If there are substantial discrepancies, the actuary should disclose the material discrepancies and provide supporting documentation as to why the model-based prices are appropriate for determining the Reported Reserve. In addition to comparisons to initial market prices, there should be testing of the pricing models that are used to determine subsequent prices when scenarios involve trading financial instruments. This testing should consider historical relationships. For example, if a method is used where recent volatility in the scenario is one of the determinants of prices for trading in that scenario, then that model should approximate actual historic prices in similar circumstances in history.

IX. Guidance and Requirements for Reflecting Non-Guaranteed Elements

A. Overview:

Non-Guaranteed Elements are to be included in the projection of future cash flows for both the Deterministic Reserve and the Stochastic Reserve. Where Non-Guaranteed Elements are based on some aspect of experience, future changes in the level of Non-Guaranteed Elements can be determined by a model based on the experience assumed in each scenario. This guidance covers procedures used to model the timing and amount of future changes in the level of Non-Guaranteed Elements.

B. Relationship between Non-Guaranteed Elements, NGE Re-determination Margins, valuation assumptions, and valuation Margins:

Where Non-Guaranteed Elements are based on experience, there is normally some difference or spread that is used to set the Non-Guaranteed Element based on the actual experience. This difference or spread will be referred to as the NGE Re-determination Margin. It is the amount added to the actual experience to arrive at the Non-Guaranteed Element. For example, if a company credits interest to policyholders at a rate 1.20% lower than its net investment yield, then the NGE Re-determination Margin on the investment yield is negative 1.20%. NGE Re-determination Margins can be positive or negative. An example of a typical positive NGE Re-determination Margin is the spread between experience mortality rates and the cost of insurance (COI) charges in a Universal Life policy.

Valuation assumptions are those used in the cash flow projections, and include a Margin. This Margin will be referred to as the valuation margin. Conceptually, it is the amount added to Best Estimate assumptions. For example, if a Best Estimate mortality rate is 0.003 and the valuation assumption is 0.0032, the valuation margin is +0.0002. Like NGE Re-determination Margins, valuation Margins can be positive or negative.

Non-Guaranteed Elements are normally set equal to Best Estimate assumptions plus a NGE Re-determination Margin. Since Best Estimate assumptions are conceptually equal to valuation assumptions minus the valuation margin, we have the following:

$$(\text{Non-Guaranteed Elements}) = (\text{valuation assumption}) + [\text{NGE Re-determination Margin} - (\text{valuation margin})]$$

This relationship can be used to set projected Non-Guaranteed Elements in the model for valuation purposes.

Given these definitions and relationships, the following observations can be made:

1. Valuation Margins reflect the risk that full NGE Re-determination Margins will not be earned.
2. NGE Re-determination Margins are set independently of the valuation process, and projected NGE Re-determination Margins should be chosen to be consistent with those underlying the current Non-Guaranteed Elements.
3. Valuation Margins are not always explicitly known and therefore must be estimated by the actuary.

On any Valuation Date, a current level of Non-Guaranteed Elements is payable. The actuary should assume that any changes to this level will be consistent with the terms of the underlying policy and the company's normal practice. As would be the case in actual practice, the projected Non-Guaranteed Elements should not be assumed to change simultaneously with the change in projected experience, but only at the next date following recognition of a change in experience on which the company would normally implement a change.

X.VIII. -Guidance and Requirements for Reflecting Revenue Sharing Assumptions

A. Requirements

Projections may include income from projected future Revenue Sharing (as defined in the Model Regulation and applicable Guidelines and ASOPs) net of applicable projected expenses ("Net Revenue Sharing Income") if the following requirements are met:

1. the Net Revenue Sharing Income is received and controlled by the company⁶;
2. signed contractual agreement or agreements are in place as of the Valuation Date and support the current payment of the Net Revenue Sharing Income; and
3. the Net Revenue Sharing Income is not already accounted for directly or indirectly as a company asset.

B. Revenue Sharing Amounts

The amount of Net Revenue Sharing Income to be used shall reflect the actuary's assessment of factors that include but are not limited to the following (not all of these factors will necessarily be present in all situations):

1. ~~The~~ the terms and limitations of the agreement(s), including anticipated revenue, associated expenses and any contingent payments incurred or made by either the company or the entity providing the net Revenue Sharing as part of the agreement(s);
2. the relationship between the company and the entity providing the Net Revenue Sharing Income that might affect the likelihood of payment and the level of expenses;
3. the benefits and risks to both the company and the entity paying the Net Revenue Sharing Income of continuing the arrangement;
4. the likelihood that the company will collect the Net Revenue Sharing Income during the term(s) of the agreement(s) and the likelihood of continuing to receive future revenue after the agreement(s) has ended;
5. the ability of the company to replace the services provided to it by the entity providing the Net Revenue Sharing Income or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide; and
6. the ability of the entity providing the Net Revenue Sharing Income to replace the services provided to it by the company or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide.

~~7.~~ All expenses required or assumed to be incurred by the company in conjunction with the arrangement providing the Net Revenue Sharing Income, as well as any expenses assumed to be incurred by the company in conjunction with the assumed replacement of the services provided to it (as discussed in subsection B.5 above) shall be included in the projections as a company expense. In addition, expenses incurred by either the entity providing the Net Revenue Sharing Income or an affiliate of the company shall be included in the applicable expenses that reduce the Net Revenue Sharing Income.

C. Margins

The amount of projected Net Revenue Sharing Income shall also reflect a Margin (which decreases the assumed Net Revenue Sharing Income) directly related to the uncertainty of the revenue, including uncertainty regarding the creditworthiness of the provider of the Net Revenue Sharing Income. The greater the uncertainty, the larger the Margin.⁷

⁶ As in other sections of this report, the term "the company" is used exclusively as a reference to the insurance company writing the business falling under the scope of the Model Regulation. The term "entity providing the Net Revenue Sharing Income" is self-explanatory and is used consistently in this subsection.

⁷ Because the uncertainty would be expected to increase over time, it may be necessary to decrease the revenue by larger amounts in later projection periods.

To the extent the agreements(s) guarantees⁸ the payment of Net Revenue Sharing Income to the company, the net revenue may be included in full over the period for which it is guaranteed.⁹

D. Additional Requirements:

The actuary is responsible for reviewing the revenue sharing agreements, verifying compliance with these requirements, and documenting the rationale for any source of Net Revenue Sharing Income used in the projections.

XLIX. Guidance and Requirements for Setting Reinsurance Assumptions

A. Knowledgeable Counterparty

The actuary shall assume that the counterparty to a reinsurance agreement is knowledgeable about the contingencies involved in the agreement and thus likely to exercise the terms of the agreement to its advantage, taking into account the context of the agreement in the entire economic relationship between the parties. Items that should be considered by the actuary for non-guaranteed elements in reinsurance cash flows shall include any limits placed upon the other party's ability to exercise contractual changes in the treaty terms, the usual and customary practices associated with such agreements, past practices by the parties concerning the changing of terms, the ability of the direct-writing company to modify the terms of its policies in response to changes in terms from its reinsurers, and actions that might be taken by a party if the counterparty has financial problems.

1. Consideration of ceding company actions. The assumptions that are used by the ceding companies to determine the Reported Reserve shall take into account any actions that have been or are, in the actuary's judgment, likely to be taken by the ceding company and, if different, the direct-writing company that could affect the expected cash flows of the reinsured business. Examples of actions that could be taken by the direct-writing company include internal replacement programs or special underwriting programs, both of which could have the effect of increasing expected mortality, and changes in non-guaranteed elements in the reinsured policies, which could affect mortality, policyholder behavior, and possibly expense and investment assumptions. Examples of actions that could be taken by the ceding company include the exercise of contractual options in a reinsurance agreement to influence the setting of non-guaranteed elements in the reinsured policies, and to participate in claim decisions.
2. Consideration of assuming company actions. The assumptions that are used by assuming companies to determine the Reported Reserve shall take into account any actions that have been or are, in the actuary's judgment, likely to be taken by the assuming company that could affect the expected cash flows of the reinsured business. Examples of actions that could be taken by the assuming company that could affect the expected cash flows include changes to the current scale of reinsurance premiums or expense allowances, where contractually allowed. The ability of an assuming company to change such rates or allowances in a reinsurance agreement may be thought of as comparable to the ability of a direct-writing company to change non-guaranteed elements on policies. Thus, appropriate assumptions for this option may be dependent on the scenario being tested (analogous to changes in Cost of Insurance Charges). All likely consequences of such actions by the assuming company should be taken into account, including, for example, any potential impact on the probability of recapture by the ceding company.
3. Treatment of ceding company recapture options. A ceding company option to recapture reinsured business shall be taken into account by both the ceding and assuming companies to determine Reported Reserves. The right of a ceding company to recapture is comparable for reinsurers to policyholder surrender options for a direct-writing company. Thus, appropriate assumptions for this option may be dependent on the scenario being

⁸ Provisions such as one that gives the entity paying the Net Revenue Sharing Income the option to stop or change the level of income paid would prevent the income from being guaranteed. However, if such an option becomes available only at a future point in time, and the revenue up to that time is guaranteed, the income is considered guaranteed up to the time the option first becomes available.

⁹ If the agreement allows the company to unilaterally take control of the underlying fund fees that ultimately result in the Net Revenue Sharing Income then the revenue is considered guaranteed up until the time at which the company can take such control. Since it is unknown whether the company can perform the services associated with the revenue sharing arrangement at the same expense level, it is presumed that expenses will be higher in this situation. Therefore, the Net Revenue Sharing Income shall be reduced to account for any actual or assumed additional expenses.

tested (analogous to interest-sensitive lapses). When a recapture is assumed, all associated cash flows should be taken into account, including the payment or receipt of any recapture fees or other termination settlements.

4. Treatment of assuming company termination options. An assuming company right to terminate in-force reinsurance business shall be taken into account by both the ceding and assuming companies to determine Reported Reserves. In many cases, the assuming company's right to terminate is limited to cases of non-payment of amounts due by the ceding company or other specific, limited circumstances. In such cases, the actuary would normally expect this termination option to have insignificant value to either party. However, if a reinsurance agreement contains other termination provisions, the actuary should set appropriate assumptions for this option, perhaps dependent on the particular scenario being tested.

B. Modeling when assets are not in the possession of the company

1. Assets held by another party. If under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the reinsurer or by another party, the actuary must determine whether such assets in that portfolio must be modeled in order to determine either discount rates or projected cash flows. In some situations, modeling of the assets held by the other party may not be necessary. An example would be modeling by a reinsurer of a reinsurance agreement containing provisions, such as experience refund provisions, under which the cash flows and effective investment return to the reinsurer are the same under all scenarios. If a conclusion is reached that modeling is unnecessary, the actuary should document the testing and logic leading to that conclusion.

[Drafting note: Additional work may be needed to address considerations when it is necessary to model the business.]

2. Special considerations for modified coinsurance. Although the Modified bCoinsurance (Modco) Reserve is called a reserve, it is substantively different from other reserves. It is a fixed liability from the ceding company to the reinsurer in an exact amount, rather than an estimate of a future obligation. It might better be referred to as a Deposit. This concept is clearer in the economically identical situation of Funds Withheld. Therefore, the value of the Modified Coinsurance Reserve will generally not have to be determined by modeling. However, the projected Modified Coinsurance Interest may have to be modeled. In many cases, the Modified Coinsurance Interest is determined by the investment earnings of an underlying asset portfolio, which in some cases will be a segregated asset portfolio or in others the ceding company's general account. Some agreements may use a rate not tied to a specific portfolio.

C. Credit Risk

1. Ceded Reinsurance. In forming a judgment and setting Margins to reflect potential uncertainty regarding the receipt of cash flows from the reinsurer, the actuary should take account the ratings, risk-based capital ratio or other available information bearing on the probability of default by the reinsurer, together with the likely impact on cash flows expected to be received from or paid to the reinsurer. In determining the likely impact on cash flows, the actuary should take into account any security posted by the reinsurer or other factor limiting such impact; to the extent such security or other factor is expected to be available to mitigate such impact. In many cases, the provision for reinsurer credit risk in capital requirements will be sufficient, and no Margins will be necessary for this purpose in reserve calculations. However, if a reinsurer is known to have a financial impairment, margin for default by the reinsurer may be necessary.
2. Assumed Reinsurance. In most reinsurance agreements, the reinsurer may terminate the reinsurance upon non-payment by the ceding company. Therefore, a Margin for potential receipt of cash flows from the ceding company will not usually be necessary. If termination of the reinsurance would result in a greater Reported Reserve, the actuary should take into account the items in the preceding paragraph in forming a judgment and setting Margins to reflect potential uncertainty of cash flows from the ceding company.