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**VM-20: REQUIREMENTS FOR PRINCIPLE-BASED RESERVES FOR LIFE PRODUCTS**

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**A. Purpose**

1. The purpose of these requirements is to define the minimum valuation standard for individual life insurance policies subject to a principle-based reserve valuation as defined in VM-0.
2. The method for calculating reserves defined in these requirements constitutes the Commissioner's Reserve Valuation Method (CRVM) for policies to which these requirements are applicable.

**B. Definitions (to be moved to another section)**

**Drafting Note:** CTE is used, but not defined.

1. The term "accumulated deficiency" means an amount measured as of the projection start date and as of the end of each projection year used in the calculation of the scenario reserve.
2. The term "anticipated experience assumption" means the expectation of future experience for a risk factor given available, relevant information pertaining to the assumption being estimated and set in such a manner that it is reasonable to expect that the actual value of the risk factor is as likely to be greater than the assumed value as less than the assumed value.
3. The term "clearly defined hedging strategy" means a derivative program of the company established to hedge risks through the future purchase or sale or opening and closing of derivative instruments and that meets the requirements of a clearly defined hedging strategy as described in C.6.11.
4. The term "credibility segment" means a group of policies subject to the same level of underwriting and same risk classification procedures that are grouped together for the purpose of determining whether the policies qualify for the simplified method to determine prudent estimate mortality assumptions described in subparagraph E.2.1.2.a.
5. The term "deterministic reserve" means the amount determined on a seriatim basis using a single scenario and a set of prescribed and prudent estimate assumptions.
6. The term "margin" means an amount applied to an anticipated experience assumption in order to derive a prudent estimate assumption to provide for estimation error and adverse deviation. The margin should be directly related to the level of uncertainty in the risk factor for which the prudent estimate assumption is made, whereby the greater the uncertainty, the larger the required margin, with the margin added or subtracted as needed to produce a larger minimum reserve than would otherwise result without it.

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7. The term “model segment” means a group of policies and associated assets that are modeled together to determine the path of net asset earned rates. This grouping shall be consistent with the company’s asset segmentation plan, investment strategies, or approach used to allocate investment income for statutory purposes.
8. The term “modified deterministic reserve” means the amount used as a replacement for the portion of the stochastic reserve for those policies which are subject to the stochastic modeling exclusion.
9. The term “mortality segment” means a subset of policies from a credibility segment for which a separate mortality table representing the prudent estimate assumption will be determined.
10. The term “mortality experience cell” means a subset of policies from a mortality segment that are grouped together when determining credibility adjusted experience rates.
11. The term “net asset earned rates” means the path of earned rates reflecting the net general account portfolio rate in each projection interval (net of appropriate default costs and investment expenses). This set of rates is one factor used to determine the amount of benefits, expenses and revenue that depend on the level of interest credited. These are also used as the discount rates.
12. The term “non-guaranteed element spread” or “NGE spread” means the provision that a company uses to adjust actual experience to determine each non-guaranteed element. The NGE spread can be positive or negative. For example, if a company credits interest to policyholders at a rate 1.20% lower than its net investment yield, then the NGE spread is a negative 120 basis points.
13. The term “gross reserve” means the minimum reserve held in the absence of any ceded reinsurance.
14. The term “Principle-Based Reserve Actuarial Report” or “PBR Actuarial Report” means a document prepared by the company that summarizes all of the material decisions, assumptions, and methodologies used to support the calculation of the minimum reserve, as well as the required documentation defined by these requirements and section VM-31 of the Valuation Manual.
15. The term “per policy reserve” means an amount determined for each policy that equals the greater of the cash surrender value and the seriatim reserve.
16. The term “policy” means a life insurance policy included in the scope of these requirements.
17. The term “pretax interest maintenance reserve” or “PIMR” means the statutory interest maintenance reserve liability adjusted to a pre-tax basis for each model segment at the projection start date and at the end of each projection interval. The negative of this amount is treated as an invested asset within these requirements and the amortization of this amount is treated as investment income.
18. The term “proprietary scenario set” means a small number of paths of interest rate and equity performance that are not necessarily a representative sample of a larger set of stochastic paths, but are a sample developed by the company for the purpose of calculating the stochastic reserve on a conservative basis.
19. The term “prudent estimate assumption” means a deterministic assumption, used to represent a risk factor developed by applying a margin to the anticipated experience assumption for that risk factor.
20. The term “reinsurance cash flows” means the net cash or asset equivalents payable between the company and parties to its reinsurance agreements. Positive reinsurance cash flows shall represent amounts payable from the reinsurance partners to the company; negative reinsurance cash flows shall represent amounts payable from the company to its reinsurance partners.

**Drafting Note:** The term “partners” needs additional work.

21. The term “reinsurance aggregate cash flows” means the difference between reinsurance cash flows and reinsurance discrete cash flows, as defined below. Examples of reinsurance aggregate cash flows include experience refunds, or the incremental impact of an overall cap on reinsurance discrete cash flows that would otherwise be payable by the reinsurer.

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22. The term “reinsurance discrete cash flows” means reinsurance cash flows determined by applying reinsurance terms to an individual covered policy, without reference to the circumstances and events of other policies. Examples of reinsurance discrete cash flows would be proportional sharing of one or more items of revenue or expense associated with an underlying reinsured policy, without attempting to take into account the potential impact of an overall dollar cap in the reinsurance agreement, for all covered policies, on the total revenues or expenses shared for policies in the covered group.
23. The term “minimum reserve” means the minimum reserve requirement as of the valuation date for the policies falling within the scope of this section of the valuation manual.
24. The term “scenario” means a single path of outcomes used in the cash flow model, such as a path of future interest rates, equity performance, and separate account fund performance. It could also include outcomes related to policyholder behavior (e.g., lapses) and company experience (e.g., mortality).
25. The term “scenario reserve” means the amount determined in C.3.6 for all policies on an aggregated basis for a given scenario that is used as a step in the calculation of the stochastic reserve.
26. The term “seriatim reserve” means the amount determined in C.2.4 for a given policy that is used as a step in the calculation of the deterministic reserve.
27. The term “stochastic reserve” means the amount determined by applying a prescribed CTE level to the distribution of scenario reserves over a broad range of stochastically generated scenarios and using prudent estimate assumptions for all assumptions not stochastically modeled, plus the modified deterministic reserve for those policies subject to the stochastic modeling exclusion.

### **C. Reserve Methodology**

#### **C.1 General Requirements**

1. The company shall calculate the minimum reserve using the prospective valuation method as defined in this section and following the requirements of a principle-based valuation as defined in section 11.H of the standard valuation law and section VM-0 of the valuation manual.
2. Reserves for supplemental benefits and riders on policies that are subject to VM-20 shall be determined on a basis that is consistent with the approach and methodologies defined in these requirements. Reserves for supplemental benefits may be calculated separately when calculating the deterministic reserve and the stochastic reserve.
3. The company may calculate the minimum reserve as of a date no earlier than three (3) months before the valuation date, using relevant company data, provided an appropriate method is used to adjust the minimum reserve to the valuation date. Company data used for experience studies to determine prudent estimate assumptions are not subject to this 3-month limitation.
4. The minimum reserve shall equal the stochastic reserve as described in C.3, but not less than the deterministic reserve as described in C.2, where the minimum reserve is calculated as the deterministic reserve plus the excess, if any, of the stochastic reserve over the deterministic reserve.
5. If there is separate account business, the minimum reserve shall be allocated between the general and separate accounts according to the following guidelines:
  - a. The amount held in the general account shall not be less than zero and shall include any liability related to contractual guarantees provided by the general account; and
  - b. The amount held in the separate account shall not be less than the sum of the cash surrender values and not be greater than the sum of the account values attributable to the variable portion of all such contracts.
6. The minimum reserve for each contract shall equal the per policy reserve plus the policy’s portion of the excess, if any, of the stochastic reserve over the deterministic reserve.

7. Simplifications and approximations may be used to calculate the minimum reserve required by this section if the company can demonstrate that the impact of such simplifications and approximations does not materially change the resulting reserve. The company shall provide an appropriate justification for the use of such simplifications and approximations.

**Drafting Note:** The reporting requirements for these simplifications and approximations should be reviewed.

**Drafting Note:** It is the intent of this section to allocate the minimum reserve back to the individual policy that gave rise to the reserve. The allocation to individual policies is needed, among other reasons, to allocate assets under the Life and Health Insurance Guaranty Association Model Act. Further work is needed to determine the method to allocate the excess of the stochastic reserve over the deterministic reserves to each policy.

## **C.2 Deterministic Reserve**

1. The deterministic reserve shall be calculated using a seriatim approach based on a projection of cash flows over a single scenario, using prudent estimate assumptions for assumptions that are not prescribed.
2. Use the following steps to calculate the deterministic reserve:
  - a. Determine prudent estimate assumptions as described in C.5.1.
  - b. Project cash flows for each policy and calculate the path of net asset earned rates for each model segment as described in C.6, C.7, C.8 and C.9.
  - c. Calculate the seriatim reserve for each policy using the methodology described in C.2.4.
  - d. Calculate the cash surrender value adjusted for reinsurance for each policy using the methodology described in C.2.5.d.
  - e. Calculate the per policy reserve for each policy as described in C.2.6.
  - f. The deterministic reserve equals the sum of the per policy reserve for all policies.
3. To calculate the seriatim reserve for each policy, use the cash flow model to project the following for each policy:

**Drafting Note:** Use the path of net asset earned rates as appropriate to determine benefits, expenses and revenue that depend on earned rates. For example, earned rates may be needed to determine the level of cash surrender benefits.

- a. The future benefits for each policy (before netting the repayment of any policy loans), including but not limited to death and cash surrender benefits;
- b. The future expenses for each policy, including but not limited to, commissions, general expenses, and premium taxes (Federal income taxes and expenses paid to provide fraternal benefits in lieu of federal income taxes are excluded.);
- c. The future gross premium payments for each policy;
- d. Other applicable revenue for each policy, such as fees and revenue on assets invested in variable subaccounts, and any revenue sharing income;
- e. The future net cash flows to or from the general account from or to the separate account for each Policy;
- f. If policy loans are explicitly modeled per C.6.5.4, the future cash flows related to any policy loans, including loan interest paid in cash, additional loan principal, and repayments of principal including repayments occurring at death or surrender (note that the future benefits in C.2.3.a are before consideration of policy loans);
- g. The future net reinsurance discrete cash flows for each policy;

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- h. The portion of the future net reinsurance aggregate cash flows allocable to each policy, where such allocation shall be performed using the method described in C.2.5.e; and
  - i. The portion of the aggregate derivative liability program net cash flows allocable to each policy, where such allocation shall be performed by the company in a manner that is reasonable and practical.
4. The seriatim reserve for each policy is equal to  $FB+FE+SA+LB-(GP+AF+PL+RD+RA+DL)$ , where:
- a. FB = the present value of future benefits, determined by discounting the future benefits using the path of discount rates for the corresponding model segment;
  - b. FE = the present value of future expenses, determined by discounting the future expenses using the path of discount rates for the corresponding model segment;
  - c. SA = the policy account value invested in the separate account at the valuation date;
  - d. LB = the policy loan balance at the valuation date with appropriate reflection of any relevant due, accrued, or unearned loan interest, if policy loans are explicitly modeled per C.6.5.4;
  - e. GP = the present value of future gross premium payments and/or other applicable revenue, determined by discounting these future premiums and other revenue using the path of discount rates for the corresponding model segment;
  - f. AF = the present value of future net cash flows to or from the general account from or to the separate account, determined by discounting these future net cash flows using the path of discount rates for the corresponding model segment;
  - g. PL = the present value of future net policy loan cash flows determined by discounting these future net cash flows using the path of discount rates for the corresponding model segment, if policy loans are explicitly modeled per C.6.5.4;
  - h. RD = the present value of future net reinsurance discrete cash flows, determined by discounting these future net cash flows using the path of discount rates for the corresponding model segment;
  - i. RA = the present value of the future net reinsurance aggregate cash flows allocated to such policy as described in C.2.5.e, determined by discounting these future net cash flows using the path of discount rates for the corresponding model segment; and
  - j. DL = the present value of the future derivative liability program net cash flows (i.e., cash received minus cash paid) that are allocated to such policy, determined by discounting these future net cash flows using the path of discount rates for the corresponding model segment.
5. Allocation of net reinsurance aggregate cash flows and adjustment of the cash surrender value floor for reinsurance shall be computed as follows:
- a. For each policy  $x$  that the company has reinsured under a given reinsurance agreement, define the following values:
    - H(x) is the value computed in C.2.4.h, namely the present value of the reinsurance discrete cash flows under the agreement.
    - C(x) is the policy's cash surrender value without taking into account the reinsurance.
    - D(x) is the reinsurance discrete cash flow payable to the company by the reinsurer upon policy surrender.
    - P(x) is the greater of H(x) and D(x).
  - b. Define the following values as sums over all policies  $x$  covered by the agreement:



$$E = \Sigma D(x)$$

$$Q = \Sigma P(x)$$

- c. Define the following value that takes into account all features of the reinsurance agreement for the entire group of policies covered by the agreement:

F = the present value of all future net reinsurance cash flows if all covered policies surrender.

- d. The cash surrender value adjusted for reinsurance for each policy x shall be equal to:

$$C(x) - \left( D(x) + (F - E) \times \frac{P(x)}{Q} \right)$$

- e. The portion of the future net reinsurance aggregate cash flows allocable to each Policy, shall be equal to  $P(x)/Q$ .
- f. If a policy is covered by more than one reinsurance agreement, then the company shall allocate to the policy the impacts of all such agreements upon reinsurance cash flows and cash surrender value in a manner that is reasonable, practical and consistent with the approach described in items a through e above.
- g. For assumed reinsurance, the company shall calculate reserves consistent with the allocation procedures in a through f above.

**Drafting Note:** Additional guidance is needed to address aggregate agreements that do not have reinsurance discrete cash flows.

6. The per policy reserve for each policy is equal to the greater of the seriatim reserve and the cash surrender value for the policy adjusted for reinsurance as described in C.2.5.d.

### **C.3 Stochastic Reserve**

1. The stochastic reserve shall be calculated in the aggregate based on a projection of cash flows over a set of stochastically generated scenarios as defined in C.7.2 and then applying a prescribed CTE level. The stochastic reserve may be determined assuming that all, or only some, of the risks underlying the policies are modeled stochastically, but at a minimum, it must assume that interest rate movements, equity movements, and separate account fund performance be modeled stochastically. Prudent estimate assumptions shall be used for all assumptions that are not prescribed or are not stochastically modeled. A company may exclude certain policies from the stochastic modeling requirement if the policies meet the conditions described in C.4.
2. Determine the stochastic reserve using the following steps:
- Determine policy grouping as defined in C.3.4;
  - Determine which policies, if any, will be excluded from the stochastic modeling requirement in C.4, and calculate the modified deterministic reserve for these policies;
  - For policies that meet the stochastic modeling requirement:
    - Determine prudent estimate assumptions as defined in C.5.1;
    - Project cash flows and calculate the path of net asset earned rates and discount rates for each model segment for each scenario as described in C.6., C.7., C.8., and C.9;
    - Calculate the scenario reserve for each scenario using the methodology in C.3.6;
    - Rank the scenario reserves from lowest to highest;

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- v. Calculate the average of the highest 30% of the scenario reserves.
- vi. If necessary, add an amount to C.3.2.c.v to capture any material risk included in the scope of these requirements but not already reflected in C.3.2.c.v using a method and supporting rationale determined by the company;

**Drafting Note:** Explore varying the CTE level in v. by product type i.e. 30 for whole life insurance, 20 for variable life, 35 for other products.

**Drafting Note:** The result in v. cannot be negative.

- d. The stochastic reserve equals the amount determined in C.3.2.c. plus the modified deterministic reserve for all policies that are subject to the stochastic modeling exclusion.

**Drafting Note:** If proprietary scenarios sets are used, the derivation of the amount determined in C.3.2.c will be calculated using a different method defined by the NAIC rather than the process defined above. Also, further work is needed to define acceptable methods to determine the amount in C.3.2.c.vi It is expected that guidance will be given in practice notes and/or Actuarial Standards of Practice.

- 3. Alternatively, the stochastic reserve may be calculated by applying the methodology in C.3.2 to groupings of policies defined by the company, and then summing the stand-alone results together for each grouping of policies.
- 4. Projections may be performed for each policy in force on the date of valuation or by grouping policies into representative cells of model plans using all characteristics and criteria having a material impact on the size of the reserve. It should be highly likely that grouping will produce a stochastic reserve greater than or equal to what would result with no grouping. (An appropriate rationale may be provided to show compliance with this requirement, in lieu of an explicit seriatim calculation.)
- 5. For each scenario, the net accumulated asset amount for a model segment at the projection start date is the statement value of starting assets for that model segment. For each scenario the net accumulated asset amount for a model segment at the end of each projection year is equal to the projected statement value of general and separate account assets for that model segment. The net accumulated asset amount can be either positive or negative.
- 6. For each scenario, calculate the scenario reserve as follows:
  - a. For each model segment at the end of each projection year and at the projection start date calculate;
    - i. The net accumulated asset amount, which equals the projected statement value of general account and separate account assets at the end of each projection interval, and equals the starting assets at the projection start date.
    - ii. The accumulated deficiency by taking the negative of the net accumulated asset amount for the model segment (note that the accumulated deficiency can be either positive or negative);
    - iii. The discounted value of the accumulated deficiency that was calculated in C.3.6.a.ii. Calculate the discounted value using the path of discount rates for the model segment from the projection start date to the end of the respective projection year.
  - b. Determine the aggregate discounted value of the accumulated deficiency at the end of each projection year and at the projection start date by adding together the discounted values of the accumulated deficiency across all model segments at each duration.
  - c. Determine the scenario reserve as the sum of:
    - i. The statement value of the starting assets across all model segments and
    - ii. The maximum of the values calculated in C.3.6.b. The amount described in C.3.6.b can be either positive or negative.



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7. Reporting and Documentation Requirements Related to the Stochastic Reserve Calculation to be included in the PBR Actuarial Report.
- a. A description of any material risks that are not fully reflected in the cash flow model used to calculate the stochastic reserve, as described in C.3.2.c.vi. Such disclosure shall include at least the following:
    - i. A description of each element of the cash flow model for which this provision has been made in the stochastic reserve (e.g., risk factors, policy benefits, asset classes, investment strategies, risk mitigation strategies, etc.).
    - ii. A description of the approach used by the company to provide for these risks in the stochastic reserve outside the cash flow model, and a summary of the rationale for selecting this approach, and the key assumptions justifying the underlying approach.
    - iii. If there is more than one model element included in this provision, clarify whether a separate provision was determined for each element, or collectively for groups of two or more elements. Explain the methodology, supporting rationale and key assumptions for how separate provisions were combined.
  - b. A summary of the impact of aggregation on the stochastic reserve, (i.e. the degree of risk offsets reflected in the stochastic reserve due to aggregating groups of policies when performing the stochastic reserve calculation) shall be determined by:
    - i. Subdividing policies subject to these requirements into groups that reflect similar risk characteristics that will likely create risk offsets when aggregated together. Acceptable risk characteristics that can be used by the company to define the number of groups include, but are not limited to:
      - (1) Separate account vs. general account policies.
      - (2) Flexible premium vs. fixed premium policies.
      - (3) Policies with cash values vs. policies with little or no cash values.
    - ii. Determining the stochastic reserve for each subgroup of policies.
    - iii. Summing the stochastic reserves for each subgroup of policies, and subtracting the actual minimum reserve for all policies.
    - iv. Disclose the impact of aggregation at least once every three (3) years, and in the current year regardless of the three (3) year requirement if the company has made a material change in its risk profile, such as buying or selling a block of business, or entering into a reinsurance arrangement covering the policies subject to these requirements.
    - v. Disclose the nature of any approximations used and the rationale for why the approximations are appropriate.
    - vi. If the company uses a date that precedes the valuation date to perform this demonstration, explain why the use of such date will not produce a material change in the results if the results were based on the valuation date. Such explanation shall address the nature of any adjustments made to the data and the rationale for why the adjustments are appropriate.

**Drafting Note:** Add reference to documentation of stochastic exclusion risk C.4.2.

### **C.4 Stochastic Modeling Exclusion**

#### C.4.1 General Provisions

1. The company may elect to exclude certain groups of policies from the stochastic modeling requirement by:

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- a. Passing the stochastic exclusion test defined in C.4.2, or
  - b. Providing a demonstration that the modified deterministic reserve for those groups of policies will meet the requirements in C.4.3.
2. A group of policies for which there is one or more clearly defined hedging strategies shall not be eligible for the stochastic modeling exclusion.
  3. For groups of policies for which the stochastic modeling exclusion is elected, future transactions associated with non-hedging derivative programs may not be reflected in the reserve calculation.
  4. The modified deterministic reserve for the policies to be excluded shall equal the sum of:
    - a. The greater of:
      - i. An amount calculated in the aggregate for all policies using the method described in C.3.6, but using the valuation assumptions and cash flows used to determine the deterministic reserve and
      - ii. The sum of the per policy reserves for these policies.
    - b. An additional reserve amount that the company may decide to include for the purpose of the stochastic modeling exclusion.

### C.4.2 Stochastic Exclusion Test

1. The test for dependence of the reserve on the economic scenario requires calculating a scenario asset amount on 16 scenarios and using the results to calculate a ratio.
  - a. The scenario asset amount is defined as the net present value of projected future cash flows following the method defined in C.2.4. For purposes of this test, grouping of policies is permitted. The path of discount rates specific to each scenario is equal to the corresponding path of net asset earned rates.
  - b. The 16 scenarios shall be based on specified patterns of random shocks to the economic conditions on the projection start date.
    - i. The scenarios will be generated by a process approved by the NAIC or the commissioner.

Drafting note: The American Academy of Actuaries is working on software available to generate the scenarios. The software will likely require input of interest rates on the scenario starting date. The LRWG intends to let the NAIC make this software free and publicly available on the internet.

- ii. If the specified scenarios are not available on the projection start date, the company shall use the specified scenarios from the most recent date prior to the projection start date.
  - iii. One of the scenarios is referred to as the baseline economic scenario, and it is based on random shocks of zero.
- c. The experience assumptions used within each scenario shall be anticipated experience assumptions. Experience assumptions should be dynamically adjusted as appropriate to be consistent with each tested scenario.
  - d. The test ratio is equal to  $(b-a)/c$  where a, b, and c are defined as follows:
    - i. a = The scenario asset amount in the baseline economic scenario.
    - ii. b = The largest scenario asset amount in any of the other 11 scenarios.

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- iii. c = An amount, calculated from the baseline economic scenario, that represents the present value of benefits and expenses for the policies, adjusted for reinsurance as appropriate to achieve consistency between the numerator and denominator. For this purpose, the company shall generally use the present value of cash flows defined in C.2.4 for the policies, excluding the gross premium payments as defined in C.2.4.e and excluding as appropriate the corresponding portion of such gross premium payments reflected in reinsurance cash flows in C.2.4.h and C.2.4.i.

**Drafting Note:** As an example of the portion of gross premium payment excluded from reinsurance cash flows, for policies reinsured through a modified coinsurance arrangement where the policy premium is substantially returned to the ceding company through a reserve transfer, the ceding company would not need to reduce this amount for the gross premiums reflected in the reinsurance cash flows.

- e. To pass the test, the ratio must be less than 4%.

**Drafting Note:** The 4% pass mark is expected to be continually reviewed for appropriateness by the NAIC once the valuation manual is adopted and companies submit their results of the stochastic exclusion test as part of the required documentation for a principle-based valuation.

- f. The test shall be carried out annually to continue to qualify for the stochastic testing exclusion, and shall be done within the 12month period prior to the valuation date.
- g. Contract types with significantly different risk profiles should not be grouped together for purposes of this test.

### C.4.3 Exclusion Requirements if the Stochastic Exclusion Test is Not Used

1. If the company elects the stochastic modeling exclusion following the approach described in C.4.1.1.b, a demonstration supporting the exclusion must be provided in the PBR Actuarial Report in the initial exclusion year and at least once every three (3) calendar years subsequent to the initial exclusion.
2. Any demonstration shall take into account whether changing conditions over the current and two (2) subsequent calendar years would be likely to change the conclusion to exclude the group of policies from the stochastic modeling requirement. If, as of the end of any calendar year, the company determines the modified deterministic reserve for the group of policies no longer adequately provides for all material risks, the exclusion shall be discontinued and the policies shall be included in the stochastic modeling calculations.
3. The demonstration may be based on analysis from a date that precedes the initial or subsequent exclusion period.
4. The demonstration shall provide a reasonable assurance that if the amount described in C.3.2.c was calculated on a standalone basis for only those polices subject to the stochastic modeling exclusion, this amount would not be greater than the modified deterministic reserve for such policies.
5. The demonstration shall provide an effective evaluation of the residual risk exposure resulting from risk mitigation techniques such as derivative programs and reinsurance.
6. Examples of acceptable methods to demonstrate that the exclusion requirements are met for a group of policies include, but are not limited to:
  - a. Calculating the amount described in C.3.2.c on a standalone basis and comparing this amount to the modified deterministic reserve.
  - b. Comparing the modified deterministic reserve to a set of scenario reserves resulting from a sufficient number of adverse deterministic scenarios.
  - c. Comparing the modified deterministic reserve to the amount described in C.3.2.c on a standalone basis, but using a representative sample of policies in the stochastic modeling calculations.
  - d. Demonstrating that any risk characteristics that would otherwise cause the amount described in C.3.2.c on a standalone basis to exceed the modified deterministic reserve are not present or have been substantially

eliminated through actions such as hedging, investment strategy, reinsurance, or passing the risk on to the policyholder by contract provision.

## **C.5 Valuation Assumptions**

### **C.5.1 Prudent Estimate Assumptions**

1. The company shall determine prudent estimate assumptions for each risk factor that is not prescribed or is not stochastically modeled. A prudent estimate assumption is developed by applying a margin to the anticipated experience assumption for the risk factor.
2. The company shall use its own experience, if relevant and credible, to establish an anticipated experience assumption for any risk factor. To the extent that company experience is not available or credible, the company may use industry experience or other data to establish the anticipated experience assumption, making modifications as needed to reflect the circumstances of the company.
3. The company is required to examine the results of sensitivity testing to understand the materiality of prudent estimate assumptions on the reported reserve. Disclosure of the impact of sensitivity testing shall be included in the PBR Actuarial Report. [VM-20 080922 018]
  - a. Sensitivity testing may be performed using samples of the policies in force; it is not required that the entire valuation be done for each alternative assumption set. The choice of the sample must not have a material impact on the results of the sensitivity testing.
  - b. Sensitivity testing may be done using data from prior periods when appropriate.
  - c. The company shall update the sensitivity tests when appropriate, considering the materiality of the results of the tests. Less frequent updating of these tests is appropriate when the tests show less sensitivity of the minimum reserve to changes in the assumptions being tested or the experience is not changing rapidly.
34. As the company determines is appropriate, the prudent estimate assumptions shall vary from scenario to scenario within the stochastic reserve calculation.
45. The prudent estimate assumption for each risk factor shall be:
  - a. Based on available, relevant and credible experience, including, but not limited to, the company's own experience studies and industry experience studies;
  - b. Set to produce, together with all other valuation assumptions, an overall value for the minimum reserve that is consistent with the objectives of statutory reserve reporting; and
  - c. Reviewed periodically and updated as appropriate in accordance with these requirements.

### **C.5.2 Deterministic Reserve Assumptions**

1. Use the prescribed deterministic reserve assumptions given in E.5.3. and E.5.4. for the following risk factors:
  - a. Interest rate movements (i.e., Treasury interest rate curves);
  - b. Net spreads (net of default costs and investment expenses) over Treasuries for reinvestment assets;
  - c. Equity performance (i.e., S&P 500 returns and other returns of other equity investments).
2. Use prudent estimate assumptions for all other deterministic assumptions for significant risk factors not listed in C.5.2.1, taking into account the effects of the scenario underlying the deterministic reserve, following the principles in C.5.1.4.

### **C.5.3 Stochastic Reserve Assumptions**

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1. Model the following risk factors stochastically:
  - a. Interest rate movements (i.e., Treasury interest rate curves) and
  - b. Equity performance (i.e., S&P 500 returns and returns of other equity investments).
2. If the company elects to stochastically model risk factors in addition to those listed in C.5.3.1, the requirements in this section for determining prudent estimate assumptions for these risk factors do not apply.
3. Use the assumptions prescribed in E.5.3 for net spreads (net of default costs and investment expenses) over Treasuries for reinvestment assets.
4. For all other significant risk factors use prudent estimate assumptions that are consistent with those used for the deterministic reserve, modified for each scenario following the principles in C.5.1.4 to take account of the effects of the scenario.

### **C.5.4 Assumption Margins**

1. Include a margin to provide for adverse deviations and estimation error in the prudent estimate assumption for each risk factor, or combination of risk factors as allowed in C.5.4.3, which is not stochastically modeled or prescribed.

**Drafting Note:** Additional guidance via an ASOP may be needed to clarify how the company determines the modifications that may be needed to reflect the circumstances of the company.

2. The choice of an appropriate margin for each assumption may result in a distorted measure of the total risk. Conceptually, the choice of margins should be made so that the final result approximates what would be obtained for the minimum reserve at the required CTE level if it were possible to calculate results over the joint distribution of all future outcomes. In applying this concept to the actual calculation of the minimum reserve, the actuary shall be guided by evolving practice and expanding knowledge base in the measurement and management of risk.
3. From a practical standpoint, it may not be possible to completely apply the concept in C.5.4.2 to determine the level of margins in the aggregate for all risk factors. Therefore, the company shall determine margins for each risk factor independently (e.g., mortality, lapse, premium patterns, etc.) using the requirements and guidance given in C.5.4.4, C.5.4.5, C.5.4.6, C.5.4.7, and C.5.4.8, unless the company can demonstrate that an appropriate method was used to jointly determine the Margin for two or more risk factors in combination.

**Drafting note:** Due to the difficulty in determining margins in the aggregate, it is expected that jointly determining margins for 2 or more risk factors will be rare, at least in the initial years following the effective date of these requirements. As emerging practice and techniques in this area continue to evolve, this may become a more common practice in future years.

**Drafting Note.** For prescribed assumptions, the margin is implicitly specified in these requirements. Thus, determining margins for prescribed assumptions does not require any action on the part of the company.

4. The greater the uncertainty in the anticipated experience assumption, the larger the required margin, with the margin added or subtracted as needed to produce a larger minimum reserve than would otherwise result. For example, use a higher margin when:
  - a. The experience data are either not relevant or not credible;
  - b. The experience data are of lower quality, such as incomplete, internally inconsistent, or not current;
  - c. There is doubt about the reliability of the anticipated experience assumption, such as, but not limited to recent changes in circumstances or changes in company policies; or
  - d. There are constraints in the modeling that limit an effective reflection of the risk factor.
5. Greater analysis and more detailed justification ~~for changes in assumptions~~ are needed to determine the level of uncertainty when establishing margins for risk factors that produce greater sensitivity on the minimum reserve (see C.5.1.3). ~~Higher margins shall be required unless justified otherwise.~~ [VM-20\_080922\_018]

6. Margins do not need to be established for risk factors when variations in the assumptions do not have a material impact on the minimum reserve.
7. Margins should reflect the magnitude of fluctuations in historical experience of the company for the risk factor, as appropriate.
8. Apply the method used to determine the margin consistently on each valuation date. Document any changes in the method or amounts of margin including the reason for the change.

### **C.5.5 Reporting and Documentation Requirements**

1. The following items shall be included in the PBR Actuarial Report:
  - a. Disclose an estimate of the impact of the margin on the deterministic reserve for each risk factor, or group of risk factors, that has a material impact on the deterministic reserve: This shall be determined for each model segment by subtracting i from ii:
    - i. The sum of the seriatim reserves for all policies, but with the seriatim reserves calculated based on the anticipated experience assumption for the risk factor and prudent estimate assumptions for all other risk factors.
    - ii. The sum the seriatim reserves as reported.
  - b. Disclose an estimate of the aggregate impact of all margins on the deterministic reserve for each model segment. This shall be determined for each model segment by subtracting (i) from (ii):
    - i. The sum of the seriatim reserves for all policies, but with the seriatim reserves calculated based on anticipated experience assumptions for all risk factors prior to the addition of any margins.
    - ii. The sum of the seriatim reserves for all policies as reported.
2. Since the company is not required to determine an anticipated experience assumption or a prudent estimate assumption for assumptions that are prescribed for the deterministic reserve (i.e., interest rates movements, equity performance, and net spreads on reinvestment assets), when determining the impact of margins in C.5.5.1, the prescribed assumption shall be deemed to be the prudent estimate assumption, and the anticipated experience assumption.

### **C.6 Cash Flow Models**

#### **C.6.1 General Provisions**

1. Both the stochastic reserve and deterministic reserve calculations require the use of cash flow models for each model segment.
2. Cash flow models shall project the premiums, benefits, expenses and other applicable revenue items to be used in the reserve calculations.
3. Cash flow models shall project the total asset and liability cash flows, net investment earnings, and invested asset balances for the purpose of determining the path of net asset earned rates for each model segment.

#### **C.6.2 Model Structure**

1. Assign each policy subject to these requirements to one and only one model segment. Use a separate cash flow model for each model segment.
2. The company may use a grouped liability model to calculate the path of net asset earned rates for the deterministic reserve and then perform the seriatim reserve calculation for each policy based on those net asset earned rates.



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3. The projection period shall extend far enough into the future so that no material amount of business remains at the end of the projection period. ~~be sufficiently long so that no materially greater value of the reported reserve.~~
4. Simplified approaches may be acceptable if they can be shown to produce reserves that are no less than those produced by a more robust cash flow model.
5. Asset adequacy analysis principles and techniques as defined by applicable regulations, actuarial guidelines and Actuarial Standards of Practice may be relied on for many of the detailed aspects encountered in projecting cash flows.

### C.6.3 Starting and Projected Assets

1. For each model segment, select starting assets such that their aggregate annual statement value at the projection start date is equal to the estimated value of the minimum reserve allocated to the policies in the appropriate model segment.
2. Include in the starting asset values the relevant balance of any due, accrued or unearned investment income.
3. For an asset portfolio of the company that supports both policies that are subject and not subject to these requirements, determine an equitable method to apportion the total amount of starting assets between the subject and non-subject policies.
4. If for all model segments combined, the aggregate annual statement value of starting assets is less than 98% or greater than 102% of the final aggregate minimum reserve, provide documentation in the PBR Actuarial Report which provides reasonable assurance that the aggregate minimum reserve is not materially understated as a result of the estimate of the amount of starting assets.
5. The starting assets for each model segment shall consist of the following:
  - a. All of the separate account assets supporting the policies;
  - b. All policy loans supporting the policies (if policy loan are explicitly modeled per C.6.5.4);
  - c. All derivative instruments currently held at the projection start date that are part of a derivative program and are allocable to the model segment;
  - d. The negative of any pretax interest maintenance reserve liability allocable to each model segment at the projection start date.
    - i. The amount of PIMR allocable to each model segment shall be the approximate statutory interest maintenance reserve liability that would have developed for the model segment without regard to any applicable capital gains taxes. The allocable PIMR liability may be either positive or negative, resulting in either a decrease or increase to starting assets.
    - ii. In performing the allocation to each model segment, the company shall use a reasonable approach to allocate any portion of the total company balance that is disallowable under statutory accounting procedures (i.e., when the total company balance is an asset rather than a liability).
    - iii. A simplified approach to allocate the PIMR is permissible where the impact of the PIMR on the minimum reserve is minimal.
  - e. An amount of other general account assets such that the aggregate value of starting assets meets the conditions in C.6.3.1, C.6.3.2, C.6.3.3 and C.6.3.4. These assets shall generally be selected on a consistent basis from one reserve valuation to the next. Any material change in the selection methodology shall be documented in the PBR Actuarial Report.
6. The aggregate value of general account starting assets, which is equal to the sum of items C.6.3.5.b, C.6.3.5.c, C.6.3.5.d and C.6.3.5.e, may be negative. This may occur for example for model segments in which a substantial

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portion of policyholder funds are allocated to separate accounts. The assets in item C.6.3.5.e may include negative assets or short-term borrowing, resulting in a projected interest expense.

7. Determine the projected values of starting assets in a manner consistent with their values at the start of the projection.
8. When calculating the projected statement value of assets at any date, the company shall include the negative of any outstanding PIMR liability. For purposes of these requirements, the projected PIMR liabilities for any model segment and for all model segments combined are allowed to be negative.

### C.6.4 General Description of Cash Flow Projections

1. For the deterministic reserve and for each scenario for the stochastic reserve, project cash flows ignoring federal income taxes and reflecting the dynamics of the expected cash flows for the entire model segment. The effect of all material product features, both guaranteed and non-guaranteed shall be reflected. Cash flow projections include, but are not limited to:
  - a. Actual gross premiums received from the policyholder as revenue in the cash flow projection. Project amounts charged to account values on general accounts business (such as cost of insurance and expense charges) in order to determine any effects on future policy benefits, but do not include these as revenue in the cash flow projections.
  - b. All material benefits paid to policyholders, including but not limited to, death claims, surrender benefits, and withdrawal benefits, reflecting the impact of all material guarantees.
  - c. Net cash flows between the general account and separate account for variable products. (Cash flows going out from the general account to the separate account increase the reserve, and cash flows coming in to the general account from the separate account decrease the reserve.) Examples include allocation of net premiums to the separate account, policyholder-initiated transfers between fixed and variable investment options, transfers of separate account values to pay death or withdrawal benefits, and amounts charged to separate account values for cost of insurance, expense, etc.
  - d. Insurance company expenses (including overhead expenses), commissions, fund expenses, contractual fees and charges, and taxes (excluding federal income taxes). Exclude expenses paid to provide fraternal benefits in lieu of federal income taxes.
  - e. Revenue sharing income received by the company (net of applicable expenses) and other applicable revenue and fees associated with the policies. Adjustments shall be made to reflect the uncertainty of revenue sharing income that is not guaranteed.
  - f. Net cash flows associated with any reinsurance on a basis consistent with the requirements herein.
  - g. Cash flows from derivative liability and derivative asset programs, as described in C.6.10.
  - h. Cash receipts or disbursements associated with investment income, realized capital gains and losses, principal repayments, appropriate asset default costs, investment expenses, asset prepayments, and asset sales. Cash flows related to policy loans are handled in the reserve calculation in a manner similar to cash flows to and from separate accounts. Policy loan investment yields are not included in the net asset earned rates.

**Drafting Note:** Since the projection of cash flows reflect premium mode directly, deferred premiums are zero under this approach.

### C.6.5 Cash Flows from Starting Assets

1. Select assets at the beginning of the projection from the company's actual assets backing the policies associated with each model segment using the method to determine the amount of starting assets described in C.6.3.

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2. Determine cash flows for each projection interval for general account fixed income investments (e.g., public bonds, convertible bonds, preferred stocks, private placements, asset backed securities, commercial mortgage loans, residential mortgage loans, mortgage backed securities, and collateralized mortgage obligations) including derivative asset programs associated with these assets as follows:
  - a. Model gross investment income and principal repayments in accordance with the contractual provisions of each asset and in a manner consistent with each scenario. Grouping of assets is allowed if the company can demonstrate that grouping does not result in materially lower reserves than would have been obtained using a seriatim approach.
  - b. Reflect appropriate asset default costs and investment expenses through a deduction to the gross investment income using prudent estimate assumptions.
  - c. Model the proceeds arising from modeled asset sales and determine the portion representing any realized capital gains and losses.

**Drafting Note:** Additional requirements may be needed to determine projected market values on sales of starting assets using the prescribed net spreads in E.5.3. For instance, it would be inappropriate to use net-after-default spreads in the discounting of pre-default cash flows to determining market values.

- d. Reflect any uncertainty in the timing and amounts of asset cash flows related to the paths of interest rates, equity returns, or other economic values directly in the projection of asset cash flows.
3. Determine cash flows for each projection interval for general account equity investments (i.e., non-fixed income investments having substantial volatility of returns such as common stocks and real estate investments) including derivative programs associated with these assets as follows:
  - a. Determine the grouping for equity investment categories and the allocation of specific assets to each category (e.g. large cap stocks, international stocks, owned real estate, etc.) as described in C.6.8.
  - b. Project the gross investment return (including realized and unrealized capital gains) for each investment category in a manner that is consistent with the projected total return on the S&P 500 for the Scenario, reflecting any differences in the total return and risk between the S&P 500 and each equity investment category.

**Drafting Note:** This does not imply a strict functional relationship between the returns on the various investment categories and the return on the S&P 500, but it would generally be inappropriate to assume that an investment category consistently ‘outperforms’ (i.e. has lower risk, but achieves a higher expected return relative to the efficient frontier) the S&P 500.

- c. For the deterministic reserve, C.7.1 prescribes the projected S&P 500 total return assumptions. For the stochastic reserve, C.7.2 prescribes the stochastic modeling of the projected Standard & Poor’s (S&P) 500 return for each scenario.
  - d. Model the timing of an asset sale in a manner that is consistent with the investment policy of the company for that type of asset. Reflect expenses through a deduction to the gross investment return using prudent estimate assumptions.
4. Determine cash flows for each projection interval for policy loan assets by modeling existing loan balances either explicitly, or by substituting assets that are a proxy for policy loans (e.g., bonds, cash, etc.), provided the latter approach meets the requirements for simplified approaches stated in C.6.2.4 and the policyholder behavior requirements stated in E.3.1.4. If loans are explicitly modeled, follow these requirements:
  - a. Treat policy loan activity as an aspect of policyholder behavior subject to the requirements of E.3.
  - b. For both the deterministic reserve and the stochastic reserve, assign loan balances either to exactly match each policy’s utilization or to reflect average utilization over a model segment or subsegments.
  - c. Model policy loan interest in a manner consistent with policy provisions and with the scenario. In calculating the deterministic reserve, include interest paid in cash as a loan cash flow in that projection

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interval, but do not include interest added to the loan balance as a loan cash flow (the increased balance will require increased repayment cash flows in future projection intervals).

- d. Model principal repayments, including those which occur automatically upon death or surrender.
- e. Model any investment expenses allocated to policy loans and include them either with loan cash flows or insurance expense cash flows.

5. Determine cash flows for each projection interval for all other general account assets by modeling asset cash flows on other assets that are not described in C.6.5.2, C.6.5.3, and C.6.5.4 using methods consistent with the methods described in C.6.5.2 and C.6.5.3. This includes assets that are a hybrid of fixed income and equity investments.

### C.6.6 Cash Flows from Reinvestment Assets

1. Model any purchase of general account reinvestment assets with available net asset and liability cash flows in a manner that is representative of and consistent with the company's investment policy for each model segment. Determine the value in a manner consistent with the value of starting assets that have similar investment characteristics. Model any disinvestment in a manner consistent with the company's investment policy and that reflects the cost of borrowing.
2. Determine cash flows for each projection interval for general account fixed income investments including derivative asset programs associated with these assets as following:
  - a. For fixed income investments including derivative asset programs associated with these assets, at purchase of each asset, determine an appropriate combination of market price and future contractual cash flow provisions for which the resulting purchase yield appropriately reflects the then-current Treasury interest rate curve plus the prescribed net spread requirements in E.5.3.

**Drafting Note:** The NAIC shall define the structure and levels of the prescribed net spreads over Treasuries. One recommendation being considered is that only the option-adjusted net spreads be prescribed. In such case, the company could add an appropriate option premium to the purchase yield as long as it also fully models the associated cash flow risks such as calls or prepayments.

- b. For fixed income investments including derivative asset programs associated with these assets, after purchase, model the cash flows using the contractual provisions determined in C.6.6.2.a and following the same methodology as described in C.6.5.2, except that no deduction for default costs and investment expenses is necessary since they are implicit in the prescribed net spreads.
4. Determine cash flows for general account equity assets following the same methodology as described in C.6.5.3.
5. Determine the cash flows for new policy loans following the same methodology as described in C.6.5.4.
6. Determine the cash flows for all other general account assets following the same methodology as described in C.6.5.5.

### C.6.7 Future Pretax Interest Maintenance Reserve Amounts

1. Realized capital gains and losses arising from changes in interest rates shall be spread out over future projection intervals by establishing a new PIMR amount and future amortization schedule in a manner that is reasonably consistent with statutory accounting procedures under the assumption that capital gains tax is zero.

### C.6.8 Grouping of Equity Investments in the General Account

1. The portion of the general account starting assets that are equity investments (e.g., common stocks, real estate investments) may be grouped for modeling using an approach that establishes various equity investment categories with each investment category defined to reflect the different types of equity investments in the portfolio.
2. Design a proxy for each equity investment category in order to develop the investment return paths. The development of the returns for the proxy equity investment categories is a fundamental step in the modeling and can

have a significant effect on results. Map each investment category to an appropriately crafted proxy investment category normally expressed as a linear combination of recognized market indices (or sub-indices). The proxy construction process should include an analysis that establishes a firm relationship between the investment return on the proxy and the specific equity investment category.

#### C.6.9 Grouping of Variable Funds and Subaccounts for Separate Accounts

1. Similar to the approach used for general account equity investments, the portion of the starting asset amount held in the separate account represented by the variable funds and the corresponding account values may be grouped for modeling using an approach that recognizes the investment guidelines and objectives of the funds. In assigning each variable fund and the variable subaccounts to a grouping for projection purposes, reflect the fundamental characteristics of the fund and assure that the parameters shall have the appropriate relationship to the required calibration points of the S&P 500. Reflect the characteristics of the efficient frontier (i.e., returns generally cannot be increased without assuming additional risk) in the grouping.

**Drafting Note:** This approach is similar to what is required for the RBC C3 Phase 2 requirements.

2. Similar to the approach used for general account equity investments, design an appropriate proxy for each variable subaccount in order to develop the investment return paths. The development of the returns for the proxy funds is a fundamental step in the modeling and can have a significant effect on results. Map each variable account to an appropriately crafted proxy fund normally expressed as a linear combination of recognized market indices (or sub-indices). The proxy construction process should include an analysis that establishes a firm relationship between the investment return proxy and the specific variable funds.

#### C.6.10 Modeling of Derivative Programs

1. When determining the deterministic reserve and the stochastic reserve include in the projections the appropriate costs and benefits of derivative instruments that are currently held by the company in support of the policies subject to these requirements. Also include the appropriate costs and benefits of anticipated future derivative instrument transactions associated with the execution of a clearly defined hedging strategy. Also include the appropriate costs and benefits of anticipated future derivative instrument transactions associated with non-hedging derivative programs (e.g. replication, income generation) undertaken as part of the investment strategy supporting the policies provided they are normally modeled as part of the company's risk assessment and evaluation processes.

**Drafting Note:** The prohibition in these minimum reserve requirements against projecting future hedging transactions other than those associated with a clearly defined hedging strategy is intended to address initial concerns expressed by various parties that reserves could be unduly reduced by reflection of programs whose future execution and performance may have greater uncertainty. The prohibition appears however to be in conflict with Principle 2 listed in the valuation manual. Companies may actually execute and reflect in their risk assessment and evaluation processes hedging strategies similar in many ways to clearly defined hedging strategies but lack sufficient clarity in one or more of the qualification criteria. By excluding the associated derivative instruments, the investment strategy that is modeled may also not reflect the investment strategy the company actually uses. Further, since the future hedging transactions may be a net cost to the company in some scenarios and a net benefit in other scenarios, the exclusion of such transactions can result in a **minimum** reserve that is either lower or higher than it would have been if the transactions were not excluded. The direction of such impact on the reserves could also change from period to period as the actual and projected paths of economic conditions change. A more graded approach to recognition of non-qualifying hedging strategies may be more theoretically consistent with Principle 2. The requirements stated here for handling hedging strategies are essentially consistent with those included in the CTE methodology portion of the September 2006 exposure draft of Actuarial Guideline VACARVM for variable annuity reserving. It is recommended that, as greater experience is gained by actuaries and regulators with the principle-based approach, and as industry hedging programs mature, the various requirements of C.6.10 be reviewed.

2. For each derivative program that is modeled, reflect the company's established investment policy and procedures for that program, project expected program performance along each Scenario, and recognize all benefits, residual risks, and associated frictional costs. The residual risks include, but are not limited to: basis, gap, price, parameter estimation, and variation in assumptions (mortality, persistency, withdrawal, etc.). Frictional costs include, but are not limited to: transaction, margin (opportunity costs associated with margin requirements) and administration. For clearly defined hedging strategies, do not assume that residual risks and frictional costs have a value of zero unless the company can demonstrate in the PBR Actuarial Report that "zero" is an appropriate expectation.



3. In circumstances where one or more material risk factors related to a derivative program is not fully captured within the cash flow model used to calculate the CTE amount in C.3.2.c.v, reflect such risk factors by increasing the stochastic reserve as described in C.3.2.c.vi.

**Drafting Note:** The previous two paragraphs address a variety of possible situations. Some hedging programs may truly have zero or minimal residual risk exposure, such as when the hedge program exactly replicates the liability being hedged. With dynamic hedging strategies, residual risks are typically expected; however, in some cases the cash flow model supporting the CTE calculation may be able to adequately reflect such risks through margins in program assumptions, adjustments to costs and benefits, etc. In other cases, reference to additional external models or analyses may be necessary where such results cannot be readily expressed in a format directly amenable to a CTE calculation. In such cases, the company will need to combine the results of such models by some method that is consistent with the objectives of these requirements. Emerging actuarial practice will be relied on to provide approaches for a range of situations that may be encountered.

4. 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.

#### C.6.11 Clearly Defined Hedging Strategy

1. In order to qualify as a clearly defined hedging strategy, the strategy must identify:
  - a. The specific risks being hedged (e.g., cash flow, policy interest credits, delta, rho, vega, etc.);
  - b. The hedge objectives;
  - c. The risks not being hedged (e.g., variation from expected mortality, withdrawal, and other utilization or decrement rates assumed in the hedging strategy, etc.);
  - d. The financial instruments that will be used to hedge the risks;
  - e. The hedge trading rules including the permitted tolerances from hedging objectives;
  - f. The metrics for measuring hedging effectiveness;
  - g. The criteria that will be used to measure effectiveness;
  - h. The frequency of measuring hedging effectiveness;
  - i. The conditions under which hedging will not take place;
  - j. The person or persons responsible for implementing the hedging strategy;
  - k. Areas where basis, gap or assumption risk related to the hedging strategy have been identified; and
    1. The circumstances under which hedging strategy will not be effective in hedging the risks.
2. Hedging strategies may be dynamic, static or a combination of dynamic and static.
3. Hedging strategies involving the offsetting of the risks associated with other products outside of the scope of these requirements do not currently qualify as a clearly defined hedging strategy.

**Drafting Note:** For purposes of the above criteria, “effectiveness” need not be measured in a manner as defined in NAIC Accounting Practices and Procedures.

### C.7 Description of Economic Scenarios

#### C.7.1 Deterministic Economic Scenario



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1. The cash flow projections for the deterministic reserve shall reflect a prescribed path of U.S. Treasury yield curves and a prescribed path of S&P 500 returns for general account assets and, for separate account assets.
2. The prescribed path of yield curves for U.S. Treasuries shall equal the interest rate yield curves in Scenario 12 from the set of prescribed scenarios used in the stochastic exclusion test defined in C.4.2.

**Drafting Note:** The Scenario 12 interest rate yield curves are based on a one standard deviation shock to the economic conditions as of the projection start date, where the shock is spread uniformly over the first 20 years of the projection. It is anticipated that Scenario 12 will be updated quarterly and posted on the NAIC website, reflecting the current yield curve at the end of each quarter. The values in Scenario 12 are based on a generator that has not yet been adopted

3. The prescribed path of S&P 500 returns shall equal the 10-year treasury rate path in Scenario 12 from the prescribed scenarios used in the stochastic exclusion test defined in C.4.2, plus the prescribed net spread defined in E.5.3 added to each rate.

**Drafting Note:** The Academy is working on a prescribed path for S & P returns.

**Drafting Note:** It is anticipated that specific parameters associated with the deterministic paths of these underlying indices will be updated from time to time.

### C.7.2 Stochastic Economic Scenarios

1. The cash flow projections for the stochastic reserve shall reflect stochastically generated paths of U.S. Treasury yield curves, S&P 500 returns for general account equity assets, and future fund performance (for separate account assets). These stochastically generated paths shall be determined by pre-packaged scenarios generated from stochastic generators and model parameters as described in E.5.5.
2. The number of scenarios for which scenario reserves are computed shall be considered to be sufficient if any resulting understatement in total reserves, as compared with that resulting from running a broader or more robust range of additional scenarios, is not material.

**Drafting Note:** More guidance is needed regarding how to determine whether a sufficient number of scenarios has been used.

### C.8 Net Asset Earned Rates and Discount Rates

1. For calculating both the deterministic reserve and the stochastic reserve, use cash flow models to determine a path of net asset earned rates for each model segment and for each scenario that reflects the net general account portfolio rate in each projection interval (i.e., monthly, quarterly, annually). Do not include either separate account returns and assets or policy loan interest and assets in the calculation of net asset earned rates. This path of net asset earned rates will depend on, among other things:
  - a. The projected net investment earnings from the portfolio of starting assets;
  - b. The pattern of projected asset cash flows from the starting assets and subsequent reinvestment assets;
  - c. The pattern of net liability cash flows; and
  - d. The projected net investment earnings from reinvestment assets.
2. Compute the net asset earned rate for each projection interval in a manner that is consistent with the timing of cash flows and length of the projection interval of the related cash flow model. The net asset earned rate equals the ratio of net investment earnings divided by invested assets. It excludes the impact of separate accounts and policy loans. The following requirements apply to the calculation of this ratio:
  - a. Net investment earnings shall include:
    - i. Investment income plus capital gains and losses (excluding capital gains and losses that are included in the PIMR), minus appropriate default costs and investment expenses;

- ii. Income from derivative asset programs; and
  - iii. Amortization of the PIMR.
- b. Determine invested assets in a manner that is consistent with the timing of cash flows within and the length of the projection interval of the cash flow model.
  - c. Adjust invested assets to reflect the negative of the outstanding PIMR liability.
  - d. Include the annual statement value of derivative instruments or a reasonable approximation thereof in invested assets.
  - e. Assure that all items reflected in the ratio are consistent with statutory asset valuation and accrual accounting, including reflection of due, accrued or unearned investment income where appropriate.

**Drafting Note:** C.6.2.4 permits the use of simplified approaches to calculate the deterministic reserve and stochastic reserve. This availability for simplification includes ways to determine appropriate net asset earned rates. Small to intermediate size companies, or any size company with smaller blocks of business, have options to create net asset earned rates under simplified approaches if they continue to meet the requirements of C.6.2.4.

- 3. The path of discount rates for each model segment shall be equal to the path of net asset earned rates.

#### **C.9 Treatment of Non-Guaranteed Elements**

- 1. Include non-guaranteed elements in the models used to project future cash flows for both the deterministic reserve and the stochastic reserve. Where NGE are based on some aspect of experience, reflect future changes in the level of NGE in the cash flow models based on the experience assumed in each scenario.
- 2. As would be the case in actual practice, do not assume that the projected NGE change simultaneously with the change in projected experience, but only at the date following the recognition of a change in experience on which the company would normally implement a change.
- 3. When determining the projected NGE for each scenario, take into consideration those factors that affect how the company will modify its current NGE scale, such as existence of contract guarantees, the company's past NGE practices and current NGE policies.
- 4. Establish a margin for the projected NGE that increases the minimum reserve compared to the minimum reserve that would result without a margin.
- 5. Report any liability for dividends declared but not yet paid that has been established according to statutory accounting principles as of the valuation date separately from the minimum reserve. Accordingly, where such a separate liability is reported on the statutory balance sheet as of the valuation date, exclude any dividends that are included in the separate liability from the reserve cash flow projection.

**Drafting Note:** The reporting requirements for NGE's should be reviewed.

**Drafting Note:** The LRWG is considering a procedure whereby the treatment of non-guaranteed elements outlined above would apply only to policies that have material tail risk, as defined by a test. A simplified procedure is under development for policies that do not have material tail risk.

#### **D. Reinsurance**

##### **D.1 General Considerations**

- 1. The terms "reinsurance" and "assuming company" in this section include retrocession and retrocessionaire respectively.

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2. The assumptions and margins used to determine the minimum reserve and the gross reserve shall be appropriate for each party to a reinsurance agreement and need not be the same as those used by the other party for these policies. As a consequence, the credit for reinsurance ceded calculated by the ceding company may not necessarily be equal to the minimum reserve set up by the assuming company.
3. Assume that current laws and regulations in place as of the valuation date regarding credit for reinsurance will remain in effect.
4. In determining reserves, one party to a reinsurance transaction may make use of reserve calculations performed by a qualified actuary of the other party. The opining actuary, however, must determine appropriate assumptions for his or her own company. If the opining actuary chooses assumptions different from those used by the other party, he or she must either rerun the reserve calculation or be prepared to demonstrate that appropriate adjustments to the other party calculation have been made.
5. A reinsurance agreement or amendment shall be considered in force and included in calculating the minimum reserve if:
  - a. The agreement or amendment has been duly executed by both parties no later than the “as of date” of the financial statement; or
  - b. A binding letter of intent has been duly executed by both parties no later than the “as of date” of the financial statement unless no final agreement or amendment has been executed more than 90 days after the execution date of the letter of intent; or
  - c. If neither (a) nor (b), but the company has determined after review of the relevant facts and circumstances that it is likely to have legal obligations under the agreement or amendment and including the agreement or amendment would decrease the surplus of the company (i.e., the minimum reserves plus other liabilities minus other assets related to the agreement or amendment would increase).
6. There are certain provisions of reinsurance agreements where a single deterministic valuation assumption for the related risk factor or factors will not adequately capture the risk. Examples of such provisions include stop-loss reinsurance and maximum limits on benefits receivable. For these features, the company shall make provision for these risk factors by either:
  - a. Stochastically modeling the risk factor(s) directly in the cash flow model when calculating the stochastic reserve, or
  - b. Performing a separate stochastic analysis outside the cash flow model to quantify the impact on reinsurance cash flows to and from the company. The results of this analysis shall be used to adjust prudent estimate assumptions or to determine an amount to adjust the stochastic reserve to adequately make provision for the risks of the reinsurance feature(s).

**Drafting Note:** Additional guidance in an ASOP may be needed to explain further what features give rise to this stochastic modeling requirement.

### **D.2 Reinsurance Ceded**

1. Cash Flows for Reinsurance Ceded.
  - a. The cash flows used in calculating the deterministic and stochastic reserves shall include the effect of cash flows projected to be received from or paid to assuming companies under the terms of ceded reinsurance agreements.
  - b. If cash flows received from or paid to assuming companies under the terms of any reinsurance agreement are dependent upon cash flows received from or paid to assuming companies under other reinsurance agreements, then reinsurance cash flows shall first be determined for reinsurance agreements with no such dependency. The resulting reinsurance cash flows from these independent agreements shall then be used as an input in order to determine reinsurance cash flows for the remaining dependent agreements.

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2. Assumptions for Reinsurance Ceded. The assumptions used to project cash flows to and from assuming companies shall be consistent with other assumptions used by the ceding company in calculating the minimum reserve for the reinsured policies, and reflect the terms of the reinsurance agreements.
3. Credit for Reinsurance. While it is recognized that the company's primary responsibility is to determine the appropriate liability net of reinsurance, a gross reserve shall be calculated using methods and assumptions consistent with those used in calculating the minimum reserve, but excluding the effect of ceded reinsurance. The credit for reinsurance ceded shall be the excess, if any, of the gross reserve over the minimum reserve. The assumptions used to calculate the gross reserve are to some degree hypothetical, since this is not the situation that actually occurs. For example, assets backing ceded reserves may be held by the assuming company, not the ceding company.
4. The ceding company should use assumptions that represent what company experience would be if the reinsurance were not entered into and the business was managed in a manner consistent with the manner the retained business is managed.

### **D.3 Reinsurance Assumed**

1. Cash Flows for Reinsurance Assumed.
  - a. The cash flows used in calculating the deterministic reserve and the stochastic reserve shall include the effect of cash flows projected to be received from and paid to ceding companies under the terms of assumed reinsurance agreements.
  - b. If cash flows received from and paid to ceding companies under the terms of any reinsurance agreement are dependent upon cash flows received from or paid to ceding companies under other reinsurance agreements, then reinsurance cash flows shall first be determined for reinsurance agreements with no such dependency. The resulting reinsurance cash flows from these independent agreements shall then be used as an input in order to determine reinsurance cash flows for the remaining dependent agreements.
2. If a policy is assumed under more than one reinsurance agreement, then treat each cession separately for the purposes of calculating the deterministic reserve.
3. Assumptions for Reinsurance Assumed. The assumptions used to project cash flows to and from ceding companies shall reflect the assuming company's experience for the business segment to which the reinsured policies belong, and reflect the terms of the reinsurance agreement.

### **D.4 Reinsurance Assumptions**

1. Actions by Counterparty.
  - a. Knowledgeable counterparties. Assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and thus likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties. Items that should be considered when setting assumptions for the non-guaranteed elements in reinsurance cash flows shall include but not be limited to:
    - i. The usual and customary practices associated with such agreements,
    - ii. Past practices by the parties concerning the changing of terms, in an economic environment similar to that projected,
    - iii. Any limits placed upon either party's ability to exercise contractual options in the reinsurance agreement,
    - iv. The ability of the direct-writing company to modify the terms of its policies in response to changes in reinsurance terms, and
    - v. Actions that might be taken by a party if the counterparty is in financial difficulty.

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- b. Consideration of ceding company actions. The assumptions used to determine the minimum reserve shall take into account any actions that the ceding company and, if different, the direct-writing company have taken or are likely to take that could affect the expected cash flows of the reinsured business. Examples of actions that could be taken by the direct-writing company include, but are not limited to
    - i. Internal replacement programs or special underwriting programs, both of which could change expected mortality rates, and
    - ii. Changes in non-guaranteed elements in the reinsured policies, which could affect mortality, policyholder behavior, and possibly expense and investment assumptions.
  - c. Examples of actions that could be taken by the ceding company include, but are not limited to
    - i. The exercise of contractual options in a reinsurance agreement to influence the setting of non-guaranteed elements in the reinsured policies, and
    - ii. The ability to participate in claim decisions.
  - d. For actions taken by the ceding company, and, if different, the direct-writing company, set assumptions in a manner consistent with E.3. Note that these assumptions are in addition to, rather than in lieu of, assumptions as to the behavior of the underlying policyholders.
  - e. Consideration of assuming company actions. The assumptions used to determine the minimum reserve shall take into account any actions that the assuming company has taken or is likely to take that could affect the expected cash flows of the reinsured business. Examples of such actions include, but are not limited to
    - i. Changes to the current scale of reinsurance premiums and
    - ii. Changes to expense allowances.
  - f. 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, assumptions for such actions shall be set in a manner consistent with C.9. Appropriate assumptions for this option may depend on the scenario being tested (analogous to changes in cost of insurance charges) and take into account all likely consequences of such actions, including any potential impact on the probability of recapture by the ceding company.
  - g. Treatment of ceding company recapture options. The assumptions used to determine the minimum reserve shall take into account any ceding company option to recapture reinsured business, setting assumptions in a manner consistent with D.4.1.b. The right of a ceding company to recapture is comparable to policyholder surrender options for a direct-writing company. Thus, appropriate assumptions for this option may depend on the scenario being tested (analogous to interest-sensitive lapses). When a recapture is assumed, take all associated cash flows into account, including the payment or receipt of any recapture fees or other termination settlements.
  - h. Treatment of assuming company termination options. The assumptions used to determine the minimum reserve shall take into account an assuming company's right to terminate in-force reinsurance business, setting assumptions in a manner consistent with D.4.1.e. 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, this termination option would be expected to have insignificant value to either party and may be ignored in the calculations. However, if a reinsurance agreement contains other termination provisions with material impact, the company should set appropriate assumptions for these provisions, perhaps dependent on the particular scenario being tested.
2. Modeling when assets are not in the possession of the company.
- a. Assets held by another party. If under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the counterparty or by another party, the company must determine whether to model such assets in order to determine projected cash flows. In some situations, it may not be necessary to model



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the assets held by the other party. An example would be modeling by an assuming company of a reinsurance agreement containing provisions, such as experience refund provisions, under which the cash flows and effective investment return to the assuming company are the same under all Scenarios. Consider the following to determine if modeling of the assets is necessary:

- i. The degree of linkage between the portfolio performance, and the calculation of the reinsurance cash flows, and
  - ii. The sensitivity of the valuation result to the asset portfolio performance.
- b. If the company concludes that modeling is unnecessary, the company should document the testing and logic leading to that conclusion.
  - c. If the company concludes that modeling is necessary, follow the requirements in C.2.5 and E.5., taking into account the following:
    - i. The investment strategy of the company holding the assets, as codified in the reinsurance agreement or otherwise based on current documentation provided by that company.
    - ii. Actions that may be taken by either party that would affect the net reinsurance cash flows (e.g. a conscious decision to alter the investment strategy within the guidelines).

**Drafting Note:** Special considerations for modified coinsurance. Although the modified coinsurance (ModCo) reserve is called a reserve, it is substantively different from other reserves. It is a fixed liability from the ceding company to the assuming company in an exact amount, rather than an estimate of a future obligation. The ModCo reserve is analogous to 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.

### 3. Credit Risk

- a. Ceded Reinsurance. If a ceding company has confidential or publicly available information that an assuming company has a financial impairment, the ceding company shall determine a margin for default by the ceding company. In cases without a known financial impairment, no margin for default is required.
- b. Assumed Reinsurance. If a ceding company is known to have a financial impairment, the assuming company shall determine whether a margin for default by the ceding company is necessary. If the assuming company may terminate the reinsurance upon non-payment by the ceding company, the margin may be reduced or eliminated. In cases without a known financial impairment, no margin for default is required.
- c. In setting margins to reflect potential uncertainty regarding the receipt of cash flows from a counterparty, take into account the ratings, risk-based capital ratio or other available information bearing on the probability of default by the counterparty, together with the impact on cash flows. In determining the impact on cash flows, take into account any security or other factor limiting such impact.

### D.5 Treatment of Certain Reinsurance Provisions

1. Certain reinsurance provisions are difficult to appropriately reflect in the cash flow model with an appropriate level of conservatism. Therefore, specified treatment of these reinsurance provisions in the cash flow model is prescribed.
2. Reinsurance agreements with the following provisions are subject to the requirement of D.5.1:
  - a. Settlements under a reinsurance agreement are made less frequently than quarterly or payments due are not payable in cash within ninety days of the settlement date.

**Drafting Note:** Although the Life Reinsurance Work Group believes that any risks relative to infrequent settlements and delayed payments would be captured in the modeling and therefore in the reserve calculation, further guidance is needed as to



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whether a Margin is needed and whether the current risk transfer requirement was originally put in place for reasons other than concerns with liquidity risk or counterparty default risk.

- b. The ceding company is required to make representations or warranties in a reinsurance agreement not reasonably related to the business reinsured or about the future performance of the business reinsured.
  - i. The assumptions used to determine the minimum reserve shall include the effect on cash flows resulting from such representations or warranties when possible. For example, if the ceding company warrants that the ceded reinsurance will be profitable to the assuming company, cash flows under scenarios that would otherwise result in a loss to the assuming company must be adjusted to reflect the warranty.
  - ii. If the impact of such a representation or warranty is not possible to include in projected cash flows, the company should determine the legal consequence of breaching the representation or warranty under the agreement. The minimum reserve is the greater of the calculation assuming the breach of the representation or warranty has occurred or the calculation assuming the breach has not occurred. For example, if the ceding company warrants that it will remain solvent during the term of the agreement, and the consequence of a breach will be immediate termination of the reinsurance, such immediate termination shall be assumed in the model if doing so will decrease the company's surplus.

**Drafting Note:** Consider adding more guidance on when it is possible or not possible to include the impact of these representations or warranties in cash flow models.

- c. A reinsurance agreement does not contain provisions:
  - i. Acknowledging the entire agreement between the parties with respect to the business being reinsured, or
  - ii. That any changes to the agreement shall be null and void unless made by amendment to the agreement signed by both parties.

In this case, each company shall use assumptions for such agreements that reflect the company's obligations under the agreement but do not reflect the obligations of the other party. For example, the ceding company will assume that it has outgoing cash flows for reinsurance premiums and other amounts due to the assuming company but no incoming cash flows for benefit reimbursements or other amounts due from the assuming company.

- d. A reinsurance agreement contains automatic or optional triggers relating to financial deterioration of one of the parties, such as a ratings downgrade or a declaration of conservatorship or insolvency.

In this case the assumptions used to determine the minimum reserve shall reflect a conservative valuation for the trigger. If the trigger results in the automatic occurrence of an event or the occurrence of the event at the option of the other party, the minimum reserve is the greatest of the calculation assuming the event caused by the trigger has occurred, or the calculation assuming the event has not occurred but will occur at some future date, or the calculation assuming the event has not occurred and will never occur. There is neither penalty nor benefit to the other party which has the option. Examples of critical trigger events include termination, recapture, an increase in amounts due under the reinsurance agreement, and immediate payment of funds withheld.

**Drafting Note:** Consider whether results should vary depending on how remote the trigger is on the valuation date. For example, if a ratings trigger is several notches below the current rating, should the answer be the same as if the ratings trigger is only one notch below the current rating?

- 3. Special reporting and documentation requirements related to reinsurance assumptions.

The PBR Actuarial Report shall include the following:

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- a. A description of each reinsurance provision where a stochastic analysis is required per D.1.6, along with a description of the stochastic approach used and a summary of the results.
- b. A description of each reinsurance provision in D.5.2, along with a summary of the approach used to satisfy the requirements of D.5.2.

### **E. Assumptions**

#### **E.1 General**

#### **E.2 Mortality Assumptions**

##### **E.2.1 Procedure for Setting Prudent Estimate Mortality Assumptions**

1. Determine the company's credibility segments and mortality segments, as described in E.2.2.
2. Apply the credibility criterion described in E.2.3 to each credibility segment to determine if the credibility segment qualifies for the simplified method to determine prudent estimate mortality assumptions.
  - a. If the mortality experience of the credibility segment does not meet the minimum credibility level defined by the credibility criterion, the company shall use the following simplified method to determine prudent estimate mortality assumptions:
    - i. Use the underwriting scoring procedure described in paragraph E.2.5 below to determine the applicable valuation basic table.
    - ii. Set the prudent estimate mortality assumption for each mortality segment within the credibility segment equal to the mortality rates in the commissioners' table that correspond to the applicable valuation basic table determined in i. above.
  - b. If the mortality experience of the credibility segment meets or exceeds the minimum credibility level defined by the credibility criterion, the company shall use the following procedure to determine the prudent estimate mortality assumption for each mortality segment within the credibility segment:
    - i. Select a credibility procedure meeting the requirements of E.2.4 below.
    - ii. Use the underwriting scoring procedure described in E.2.5 to determine which of the valuation basic tables shall serve as the industry table for that mortality segment required by the selected credibility procedure.
    - iii. Determine the mortality experience rates and apply the selected credibility procedure to determine credibility adjusted experience rates, as provided in E.2.6.
    - iv. Determine margin as provided in E.2.7.
    - v. Set the prudent estimate mortality assumption to equal the corresponding rates in that commissioners' table for which the seriatim reserve for the mortality segment is nearest to, but not less than, the seriatim reserve based on the credibility adjusted experience rates increased by the margin.
3. Adjust the prudent estimate mortality assumptions determined in E.2.1.2 to reflect differences associated with impaired lives, or if there is a reasonable expectation that due to conditions such as changes in premiums or other policy provisions, policyholder behavior will lead to mortality results that vary from the mortality results that would otherwise be expected.
  - a. The adjustment for impaired lives shall follow established actuarial practice, including the use of mortality adjustments determined from clinical and other data.

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- b. The adjustment for policyholder behavior shall follow accepted actuarial practice, including the use of dynamic adjustments to base mortality.

### E.2.2 Determination of Credibility Segments and Mortality Segments

1. The company shall group policies into credibility segments for the purpose of determining whether the policies qualify for the simplified method of determining mortality assumptions described in E.2.1.2.a.
  - a. Each credibility segment shall consist of policies having similar underwriting and mortality experience characteristics. When these characteristics are similar for policies having various plans of insurance, the company may group the policies into the same credibility segment.

**Drafting Note:** It is anticipated that most companies will define a credibility segment to be a block of policies with similar underwriting rules, such as guaranteed issue, or regularly underwritten policies.

- b. The company shall remove from the credibility segments any policies for which the experience is reflected through adjustments to the prudent estimate mortality rate assumptions under E.2.1.3, including policies insuring impaired lives and those for which there is a reasonable expectation, due to conditions such as changes in premiums or other policy provisions, that policyholder behavior will lead to mortality results that vary significantly from those that would otherwise be expected.
2. The company shall group policies into mortality segments, each consisting of a group of policies within a credibility segment for which a separate mortality table representing the prudent estimate assumption will be determined.

### E.2.3 Determination of the Credibility of Mortality Experience

1. The company shall apply the credibility criterion defined in E.2.3.3 to the credibility data set defined in E.2.3.2 for each credibility segment to determine if the experience meets a defined minimum credibility level. For those credibility segments that fall below the minimum credibility level, the simplified method to determine the prudent estimate mortality assumption for those segments defined in E.2.1.2.a shall be used. For those credibility segments that fall above the minimum credibility level, the method defined in E.2.1.2.b shall be used to determine the prudent estimate mortality assumption for those segments.
2. The credibility data set to which the credibility criterion is applied shall be determined as follows:
  - a. The credibility data set for each credibility segment shall consist of all inforce and claim data pertaining to the last three years prior to the valuation date for all policies currently in the credibility segment or that would have been in the credibility segment at any time during the three- year period.
  - b. The company shall use actual experience data directly applicable to the credibility segment if available.
  - c. The company shall use actual experience data of one or more mortality pools in which the policies participate under the terms of a reinsurance agreement, provided that the policies in the credibility segment have underwriting and mortality experience characteristics similar to those of the policies in the pool and the aggregate pool data required to carry out the requirements of E.2.3 are available to the company.
  - d. The company shall update the mortality experience described in E.2.3.2.b, and E.2.3.2.c at least every three years.
3. The experience of a credibility segment meets the minimum credibility level provided the number of deaths within its credibility data set is at least 30.

<<insert definition of criterion>>

**Drafting Note:** Based on a Limited Fluctuation Method calculation which sets the standard for full credibility as being within 3% of the true value with 90% probability, assuming a Poisson distribution for the number of deaths and assuming no variation in net amount at risk, the number of deaths required for 10% credibility is 30 and for 20% credibility it is 120. Note that the credibility data set includes all deaths within the three years prior to the valuation date. Because the purpose of the credibility criterion is to provide a simple test that would improve the efficiency of the principles-based valuation process by

exempting small blocks of business, it may be appropriate to determine the level of deaths that is consistent with this goal by, for example, surveying small companies.

**E.2.4 Selection of Credibility Procedure**

1. If the experience of any credibility segment meets or exceeds the minimum credibility level under the provisions of E.2.3, the company shall select a credibility procedure that describes the method by which the experience data for a mortality segment and appropriate industry experience are used to produce credibility adjusted experience rates.
2. The credibility procedure shall meet the following requirements:
  - a. The credibility procedure shall be consistent with accepted actuarial practice.
  - b. As the number of claims in the experience data set for a mortality segment or for a cell or group of cells included in a mortality segment increases, the credibility adjusted experience rates produced by the credibility procedure shall approach the actual experience rates.

**E.2.5 Application of the Underwriting Scoring Procedure**

1. The company shall apply the underwriting scoring procedure described in E.2.5.2 to determine:
  - a. The applicable valuation basic table for mortality segments within those credibility segments that qualify for the simplified method to determine prudent estimate mortality assumptions as described in E.2.1.2.a; and
  - b. The valuation basic table that shall serve as the industry table under the selected credibility procedure for mortality segments within those credibility segments that do not qualify for the simplified method to determine Prudent Estimate mortality assumptions as described in Paragraph E.2.1.2.a.

2. The underwriting scoring procedure is as follows:

<<insert the source of the underwriting scoring procedure, and any guidance as to how to apply the scoring procedure >>

**Drafting Note:** The underwriting scoring procedure is under development. It is expected that each of several risk characteristics will affect an overall score in a way that reflects the effectiveness of the company's treatment of that characteristic. In addition to applying the underwriting scoring, the procedure described in this subparagraph (1) must take into account factors that are not recognized in the underwriting scoring and must be applicable to policies that are issued subject to simplified underwriting and policies that are issued without underwriting.

3. The company shall determine the valuation basic table for each mortality segment from the results of the underwriting scoring procedure as follows:

**Drafting Note:** The manner in which the underwriting score and other factors beyond the score are used to select a valuation basic table is still to be determined.

4. If no valuation basic table appropriately reflects the risk characteristics of the mortality segment, the company may use any well-established industry table that is based on the experience of policies having the appropriate risk characteristics in lieu of a valuation basic table.

**Drafting Note:** E.2.5.4 is intended to provide flexibility needed to handle products based on group-type mortality, etc., for which there might not be a valuation basic table.

**E.2.6 Determination of Experience Rates and Credibility Adjusted Experience Rates**

1. For each mortality experience cell or group of cells specified by the company's credibility procedure, the company shall calculate mortality experience rates based on the experience data set defined in E.6.2.
2. The experience data set used to determine mortality experience rates shall be determined as follows:

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- a. The experience data set shall include, at a minimum, the credibility data set defined in E.2.3.2.
  - b. If actual experience data is not available or has limited credibility, the company may include in the experience data set data from other sources if available and appropriate. Data from other sources is appropriate if the source has underwriting and mortality experience characteristics that are similar to policies in the credibility segment and the data is directly measured (as opposed to determined by extrapolation or other indirect procedure).
  - c. The company shall update the mortality experience described in E.2.6.2.a and E.2.6.2.b, whether based on actual experience or data from other sources, at least every three years; however, whenever updated experience data becomes available, the company shall reflect changes implied by the updated data to the extent such changes are significant and are expected to continue into the future. More frequent updates should result in lower margins under in E.2.7.
3. The company may adjust the mortality experience rates for each mortality experience cell or group of cells to reflect the expected incremental change due to the adoption of risk selection and underwriting practices different from those underlying the experience data identified above, provided that:
    - a. The adjustments are supported by published medical or clinical studies; and
    - b. The rationale and support for the use of the study and for the adjustments are disclosed in the PBR Actuarial Report.

**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 commissioner may wish to determine the level of documentation or analysis that is required to allow such adjustments. The NAIC may want to consider whether approval by a centralized examination office would be preferable to approval by the commissioner.

4. The company shall determine credibility adjusted experience rates using the credibility procedure selected in accordance with E.2.4.
5. The appropriate industry experience to be used in conjunction with the credibility method shall be the valuation basic table or appropriate weighted average of valuation basic tables determined in E.2.5 for the mortality segment or the mortality segments to which the mortality experience cell or cells belong. Adjustments to the valuation basic tables may be prescribed by the commissioner to reflect intercompany studies made subsequent to the adoption of the commissioners' table and appropriate mortality improvement from the effective date of the resulting table to the experience weighted average date underlying the data used to develop the experience mortality rates.
6. If experience data by age and duration only exist for some of the mortality experience cells within a mortality segment, the credibility adjusted experience rates for the cells where data exist shall be graded into the applicable industry mortality table rates over 10 years (e.g., over 10 attained ages or over 10 durations during the select period, as applicable) to produce credibility adjusted rates for the remainder of the segment. The grading must be reasonable and consistent with accepted actuarial practice. The grading shall take into account the level of partial credibility, the trend in actual to expected ratios, the shape and level of the resulting mortality rates, and the reasons for differences in mortality results relative to industry mortality rates such as differences in underwriting, market and other factors.
7. The credibility adjusted experience rates shall reflect mortality improvement up to the projection start date based on applicable published industry-wide experience. 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 date.

### E.2.7 Determination of Margin

1. For each credibility segment that qualifies for the simplified method to determine prudent estimate mortality assumptions as defined in E.2.1.2.a, the margin shall equal the respective differences between the rates obtained from the applicable commissioners' table and the corresponding rates obtained from the associated valuation basic table.



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2. For each credibility segment that does not qualify for the simplified method to determine prudent estimate mortality assumptions as defined in E.2.1.2.a, the company shall determine a margin; consistent with C.5.4.4, C.5.4.5, C.5.4.6, C.5.4.7 and C.5.4.8; to add to the credibility adjusted experience rates determined in E.2.6.
3. The margins determined in E.2.7.2 shall be increased to reflect situations involving greater uncertainty, including but not limited to the following:
  - a. The reliability of the company's experience studies is low due to imprecise methodology, length of time since the data was updated or other reasons. The longer the time since the experience data was updated, the larger the margin.
  - b. The underwriting or risk selection risk criteria associated with the mortality segment have changed since the experience on which the credibility adjusted experience rates are based was collected.
  - c. The data underlying the credibility adjusted experience rates lack homogeneity.
  - d. Unfavorable environmental or health developments are unfolding and are expected to have a material and sustained impact on the insured population.
  - e. The company's marketing or administrative practices or market forces (for example, the secondary market for life insurance policies) expose the policies to the risk of anti-selection.

### **E.2.8 Anticipated Experience Assumption for Mortality**

1. For purposes of disclosure of aggregate and individual margins as required by C.5.5.1, the anticipated experience assumption for mortality shall be:
  - a. For mortality segments that qualify for the simplified method to determine prudent estimate mortality assumptions as described in E.2.1.2.a, the applicable valuation basic table.
  - b. For mortality segments that do not qualify for the simplified method to determine prudent estimate mortality assumptions as described in E.2.1.2.a, the credibility adjusted experience Rates.

### **E.2.9 Reporting and Documentation Requirements to Include in the PBR Actuarial Report**

1. A description of each credibility segment and the rationale for selecting policies to include in each credibility segment.
2. A summary of the results of the application of credibility criterion to determine which policies qualify for the simplified method to determine prudent estimate mortality assumptions.
3. A summary of the rationale and results of applying the underwriting scoring procedure to select the valuation basic table(s).
4. A description of each mortality segment and the rationale for selecting policies to include in each mortality segment.
5. For each mortality segment, a summary of the experience mortality rates.
6. If experience mortality rates for any mortality segment are not based on the experience directly applicable to the mortality segment (whether or not the data source is from the company), then provide a summary containing the following:
  - a. The source of data including a detailed explanation of the appropriateness of the data, and the underlying source of data, including how the experience mortality rates were developed, graduated and smoothed;
  - b. Similarities or differences noted between policies in the mortality segment and the policies from the data source (e.g., type of underwriting, marketing channel, average policy size, etc.);



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- c. Adjustments made to the experience mortality rates to account for differences between the mortality segment and the data source;
  - d. 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.
7. If the company makes adjustments to the experience mortality rates for changes in risk selection and underwriting practices as described in E.2.6.2, a summary of the following items:
- a. The rationale for any adjustment;
  - b. Description and summary of any studies used to support an adjustment;
  - c. Documentation of the mathematics used to adjust the mortality;
  - d. Summary of any other relevant information concerning any adjustments to the experience mortality that affected the mortality assumption.
8. A summary of the following items that support the credibility procedure used:
- a. Description and rationale for the credibility procedure used;
  - b. Explanation of the credibility analysis used to adjust experience mortality rates;
  - c. To the extent the company has changed the credibility procedure (or procedures and values for determining partial credibility) from the prior valuation date, disclosure of the rationale for the change and an estimate of the change's impact on the minimum reserve of the change.
9. For each mortality segment, a summary of the credibility adjusted mortality rates (if applicable).
10. A summary of the rationale and support for any adjustment to mortality assumptions for impaired lives or policyholder behavior as described in E.2.1.3.
11. For each mortality segment that does not qualify for the simplified method, a summary of the rationale used to determine assumption margins, along with a summary of the actual margins used. For each mortality segment that qualifies for the simplified method, a summary of the margin embedded within the commissioner's table as described in E.2.7.1.
12. An actual to expected analysis at least once every three years. For this purpose, the actual rates for the study period equal the mortality experience of the company as described in E.2.3.2, and the expected rates equal the anticipated experience assumptions used during the study period.

### **E.3 Policyholder Behavior Assumptions**

#### **E.3.1 General Requirements**

1. Anticipated experience policyholder behavior assumptions for policyholder behavior risk factors include, but are not limited to, assumptions for premium payment patterns, premium persistency, surrenders, withdrawals, allocations between available investment and crediting options, benefit utilization, and other option elections. For fixed premium products, many of the premium payment patterns, premium persistency and partial withdrawal behavior assumptions may not apply and do not need to be considered.
2. These assumptions shall reflect expectations regarding variations in anticipated policyholder behavior relative to characteristics that have a significant impact on the minimum reserve, which, for example, may include such things 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.

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3. These assumptions shall be appropriate for the block of business being valued, giving due consideration to other assumptions used in conjunction with the cash flow model and to the Scenarios whose results are likely to contribute to the minimum reserve.
4. These assumptions shall be based on actual experience data directly applicable to the block of business being valued (i.e., direct data) if such are available. In the absence of directly applicable data, the company should next use available data from any other block of business that is similar to the block of business being valued, whether or not that block of business is directly written by the company. If data from a similar block of business are used, the anticipated experience assumption shall be adjusted to reflect material differences between the business being valued and the similar block of business. The company shall document any significant similarities or differences between the two blocks of business, the data quality of the experience data used, and the adjustments applied.
5. These assumptions shall reflect the outcomes and events exhibited by historical experience only to the extent such experience are relevant to the risk being modeled.
6. These assumptions shall reflect the likelihood that policyholder behavior will be affected by any significant increase in the value of a product option, such as term conversion privileges or policy loans; and
7. These assumptions shall be assigned to policies in a manner that provides an appropriate level of granularity

### E.3.2 Dynamic Assumptions

1. Use a dynamic model or other scenario-dependent formulation for anticipated policyholder behavior unless the behavior can be appropriately represented by static assumptions.
2. 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.
3. In the absence of evidence to the contrary, it is not necessary to model extreme or “catastrophic” forms of behavior.

### E.3.3 Margins for Policyholder Behavior Assumptions

1. Margins for policyholder behavior assumptions shall be established according to the requirements of C.5.4.4, C.5.4.5, C.5.4.6, C.5.4.7 and C.5.4.8 and the requirements below.
2. To the extent that there is an absence of relevant and fully credible data, the margin shall be determined such that the policyholder behavior assumption is shifted toward the conservative end of the plausible range of behavior, that is, the end of the range that serves to increase the minimum reserve.
- ~~3. Sensitivity testing of assumptions is required to establish the margin, as discussed in E.3.4. These tests should include, but are not limited to, premium payment patterns, premium persistency, surrenders, partial withdrawals, allocations between available investment and crediting options, benefit utilization, and other option elections if relevant to the risks in the product. [VM-20 080922 018]~~
43. Margins for policyholder behavior assumptions shall assume, without relevant and credible experience or clear evidence to the contrary, that policyholders’ efficiency will increase over time.
54. Margins shall reflect the data uncertainty associated with using data from a similar but not identical block of business to determine the anticipated experience assumption.
65. A higher margin is appropriate for partial withdrawal and surrender assumptions where the company’s marketing and /or administrative practices encourages anti-selection.

### E.3.4 Sensitivity Testing

1. The company is required to examine the sensitivity of results to understand the materiality of making alternate policyholder behavior assumptions on the minimum 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. (See C.5.1.3)~~ These tests should include, but

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are not limited to, premium payment patterns, premium persistency, surrenders, partial withdrawals, allocations between available investment and crediting options, benefit utilization, and other option elections if relevant to the risks in the product.

2. ~~The company 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 minimum reserve to changes in the assumptions being tested or the experience is not changing rapidly. [VM-20\_080922\_018]~~
32. With respect to policies which give policyholders flexibility in the timing and amount of premium payments, the company must examine, but not be limited by the following, premium scenarios:
- a. Minimum premium scenario;
  - b. No further premium payment scenario;
  - c. Pre-payment of premiums – Single premium scenario; and
  - d. Pre-payment of premiums – Level premium scenario.

### E.3.5 Reporting and Documentation Requirements Related to Policyholder Behavior Assumptions

The following items shall be included in the PBR Actuarial Report:

1. An actual to expected analysis every three years.
2. A summary of the required sensitivity tests that underlie the premium payment assumptions described in E.3.4.3.
3. A description of the scenario-dependent mechanism, if any, for varying withdrawal assumptions.
4. A description of the scenario-dependent mechanism, if any, for varying premium assumptions.
5. A description of the changes in premium payment assumptions and withdrawal assumptions related to the treatment of non-guaranteed elements in the reserve calculations.
6. An explanation of how assumptions were determined for periods that were based on less than fully credible and /or relevant data.

## **E.4 Expense Assumptions**

### E.4.1 Anticipated Experience Assumptions

1. The expense assumption shall reflect all costs associated with the policies subject to the principle-based reserve valuation requirements. 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. Include expenses categorized in the annual statement as ‘taxes, licenses and fees’ (Exhibit 3 of the Annual Statement) in the expense assumption.
3. Include 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 in the expense assumption.
4. Certain information 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 shall assume that the company is a going-concern.

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6. Choose an appropriate expense basis 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. Expenses shall reflect the impact of inflation. Expense assumptions for the deterministic and stochastic scenarios are expected to be the same except for differences arising from application of inflation rates.
8. Expense assumptions shall not assume future expense improvements.
9. Since reserves are calculated on a pre-tax basis, assumptions for federal income taxes (and expenses paid to provide fraternal benefits in lieu of federal income taxes) and foreign income taxes are not required.
10. Expense assumptions shall be consistent with other related assumptions.
11. The expense factors used to determine anticipated experience assumptions for policies sold under a new policy form or due to entry into a new product line shall be consistent with the expense factors used to determine anticipated experience assumptions for policies from an existing block of mature policies after taking into account:
  - a. Any differences in the expected long term expense levels between the block of new policies and the block of mature policies, and
  - b. That all expenses must be fully allocated as required by E.4.1.12.
12. Use fully allocated expenses, 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 allocated to the modeled policies.
13. Allocate expenses in a manner that is within the range of actuarial practice and methodology and that is consistent with applicable Actuarial Standards of Practice. Use an allocation method consistently across company lines of business. Allocations may not be done for the purpose of decreasing the minimum reserve.
14. Reflect expense efficiencies that are derived and realized from the combination of blocks of business due to a business acquisition or merger in the expense assumption only when any future 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.)

### E.4.2 Margins for Expense Assumptions

1. Margins for expense assumptions shall be determined according to the requirements given in C.5.4.4, C.5.4.5, C.5.4.6, C.5.4.7, and C.5.4.8.

## **E.5 Asset Assumptions**

### E.5.1 Overview

1. The asset assumptions are related to the projection of asset cash flows and net investment earnings for starting assets and reinvestment assets when determining the stochastic reserve and the deterministic reserve. Modeling of both general account and separate account assets are addressed..

### E.5.2 Default Costs and Other Uncertainty in Timing and Amounts of Cash Flows

For both the stochastic reserve and deterministic reserve calculations:

1. Default cost assumptions for starting assets subject to credit default risk, including both cash market assets and derivative instruments under which the company buys or sells credit default protection, shall reflect prudent estimates of default costs over a lifetime of the assets consistent with the type of asset and quality rating. Default

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cost assumptions for reinvestment assets are already implicit in the prescribed net spreads and do not need to be explicitly modeled. Default cost assumptions for starting assets are subject to the following requirements:

- a. Market default cost experience shall be the basic experience assumed for assets traded in public and liquid markets. Adjustments to the anticipated experience assumption for default cost for a particular asset class may only take into consideration the company's own experience; to the extent the experience is credible and appropriate, and sustainable if better than the basic experience; and available insurance industry and broad financial market experience. If the company expects substantial difference in default cost experience from market and industry experience, the company shall disclose the difference and justification for using adjustments in the PBR Actuarial Report.
  - b. As default cost experience is generally observed to be cyclical in nature, anticipated experience assumptions shall 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 company shall use a consistent method from one reserve valuation to the next in developing the supporting historical experience. When changes in method are made, the company shall disclose them in the PBR Actuarial Report.
  - c. If the company consolidates quality rating categories for purposes of setting the default cost assumptions, the resulting default costs shall be consistent with those that would have resulted had the more refined recognition of rating categories been used.
  - d. The company 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. Add a margin to the anticipated experience assumption for each asset class. Use 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:
    - i. 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.
    - ii. Material exposures to newer asset structures that have limited historical experience;
2. Reflect any uncertainty in the timing and amounts of asset cash flows related to the paths of interest rates, equity returns, or other economic values contained in the various Scenarios 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, model the impact on cash flows of embedded prepayment, extension, call and put options in a manner consistent with current asset adequacy analysis practice.

### E.5.3 Prescribed Net Spreads on Reinvestment Assets

1. The prescribed net spread on reinvestment assets shall be 4% of the appropriate Treasury spot path plus 0.25%.

**Drafting Note:** Further research and analysis is in process to determine these prescribed net spreads.

### E.5.4 Stochastic Scenarios

1. Interest Rates Paths. U.S. Treasury rates shall be modeled using a prescribed set of interest rate scenarios.
2. Equity Return Paths. S&P 500 returns and separate account fund performance shall be modeled using a pre-packaged set of equity return scenarios.
3. For considerations as to other funds, correlation of funds, number of scenarios and efficiency in estimation, frequency of projection and time horizon the company 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. Integrated Scenarios

<<insert requirements>>

**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. Ideally, a fully integrated model of interest rates, equity returns, and separate account fund performance would be used. If the company chooses to use a fully integrated interest rate and equity return model, the equity return scenarios must satisfy the equity return calibration criteria adopted by the NAIC and the interest rate scenarios must satisfy the interest rate calibration criteria adopted by the NAIC. The U.S. Treasury Fund scenarios within the 10,000 prepackaged scenarios for the C3P2 requirements qualify as meeting these criteria. Although an integrated modeling approach is desirable, a number of simpler approaches are acceptable. 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 C3P2.

E.5.5 Reporting and Documentation Requirements Related to Assets

The following items shall be included in the PBR Actuarial Report:

1. For each model segment, provide a summary of the path of net asset earned rates calculated for the deterministic reserve.
2. For fixed income investments included in the starting assets, the company shall estimate and disclose the embedded spread on starting assets for each model segment, including the following items:
  - a. The approximate market value and the method used to determine such approximate market value of such investments on the valuation date;
  - b. The statutory value of such investments on the valuation date;
  - c. The gross level “option-adjusted” spread (in basis points) over the Treasury yield curve at the valuation date implied in the approximate market values of such investments on that date;
  - d. The projected average estimated annual default costs expressed as a percent of the approximate average annual market value of such investments;
  - e. The net level “option-adjusted” spread over the Treasury yield curve at the valuation date (E.5.7.2.c minus E.5.7.2.d); and
  - f. The aggregate weighted average life and the method used to determine such aggregate weighted average life of such investments at the valuation date.

**Drafting Note:** This disclosure is intended to provide regulators and the PBR review actuary a tool to assess from a capital market perspective the level of asset risk embedded in a company’s principle-based valuation compared to that of other companies or compared to the current market risk associated with typical asset classes found in insurance company portfolios. It is anticipated that market spread benchmarks for various asset classes and quality rating levels will be developed or recommended to provide context to regulators and the PBR review actuary when assessing an individual company’s disclosures. It is important to recognize that asset spreads reflect all sources of risk, not just defaults. Further, the existence of these disclosure metrics does not indicate an intent that long-term estimates of default costs should fluctuate significantly from period to period based on movements in market values.

4. Derivative Programs Documentation and Certification.

- a. Provide documentation for the company’s derivative programs that affect model segments subject to these requirements, starting with a list that identifies and summarizes the purpose of each derivative program, that clarifies whether it involves the future purchase or sale of derivative instruments, and if so whether it is a clearly defined hedging strategy, and whether it is a static or dynamic strategy.



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- b. For each clearly defined hedging strategy, document the extent to which the derivative program and its associated risk factors are fully incorporated into the cash flow model and the extent to which the cash flow model is supplemented by the adjustment to stochastic reserves calculations.
- c. The actuary shall provide a certification and maintain documentation supporting such certification that each derivative program modeled as a clearly defined hedging strategy meets the requirements of a clearly defined hedging strategy. The certification shall include a statement to the effect that the implementation of the derivative program in the stochastic cash flow model does not include knowledge of events that occur after any action dictated by the derivative program (i.e., the model cannot use information about the future that would not be known in actual practice). While clearly defined hedging strategies may change over time, any material change in a clearly defined hedging strategy shall be documented and include an effective date of the change in strategy.
- d. A financial officer of the company (e.g., Chief Financial Officer, Treasurer or Chief Investment Officer) or a person designated by such financial officer who has direct or indirect supervisory authority over the actual trading of derivative instruments shall certify that for each derivative program that is modeled with anticipated future derivative instrument transactions, the company's documentation of the program provided to the actuary accurately describes the actual trading strategy being used by the company.

### **E.6 Revenue Sharing Assumptions**

#### E.6.1 Requirements

- 1. Cash flow projections may include income from projected future revenue sharing (as defined in these requirements net of applicable projected expenses (net revenue sharing income) if the following requirements are met:
  - a. The company receives and controls the net revenue sharing income;
  - b. 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
  - c. The net revenue sharing income is not already accounted for directly or indirectly as a company asset.

#### E.6.2 Anticipated Revenue Sharing Amounts

- 1. The anticipated experience assumption for net revenue sharing income to be used shall reflect factors that include but are not limited to the following (not all of these factors will necessarily be present in all situations):
  - a. 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).
  - b. 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.
  - c. The benefits and risks to both the company and the entity paying the net revenue sharing income of continuing the arrangement.
  - d. 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.
  - e. 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.
  - f. 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.

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- g. Include 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 E.6.2.1.e) in the projections as a company expense. In addition, include expenses incurred by either the entity providing the net revenue sharing income or an affiliate of the company in the applicable expenses that reduce the net revenue sharing income.

### E.6.3 Margins

1. The prudent estimate of projected net revenue sharing income shall also reflect a margin (which decreases the assumed net revenue sharing income) 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.
2. To the extent the agreement(s) guarantees 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.

**Drafting Note:** 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.

**Drafting Note:** 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.

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