



AMERICAN ACADEMY *of* ACTUARIES

Special Issues for Variable Annuities

Introduction

This practice note was prepared by a work group organized by the Committee on State Life Insurance Issues of the American Academy of Actuaries. The work group was charged with developing a description of some of the current practices that could be used by actuaries in the United States.

The practice notes represent a description of practices believed by the work group to be commonly employed by actuaries in the United States in 1998. The purpose of the practice notes is to assist actuaries with the requirement of adequacy testing by supplying examples of some of the common approaches to this work. However, no representation of completeness is made; other approaches may also be in common use. It should be recognized that the information contained in the practice notes provides guidance, but is not a definitive statement as to what constitutes generally accepted practice in this area. This practice note has not been promulgated by the Actuarial Standards Board, nor is it binding on any actuary.

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This practice note has been divided into two sections:

Section A. Statutory reserve and accounting requirements.

Section B. Asset adequacy analysis considerations.

LIFE PRACTICE NOTE

1999

Section A: Statutory Reserve and Accounting Requirements

Q. Are there any Model Regulations or Actuarial Guidelines which specifically address reserve requirements for variable annuities?

A. Four regulatory documents are often looked to for guidance.

The first is the NAIC Model Standard Valuation Law ("SVL"). Section 5a of the SVL requires reserves according to the "commissioners' annuity reserve method" ("CARVM") for all annuity contracts with the exception of certain specifically defined group contracts. CARVM is defined as the excess of the greatest present value of future guaranteed benefits provided for at the end of each contract year over the present value of any valuation considerations. Although the majority of variable annuity contracts fall under the scope of CARVM as defined in the SVL, the theoretical application of CARVM to variable annuities is problematic due to the variable (i.e., non-guaranteed) nature of the benefits.

The second is the NAIC Model Variable Annuity Regulation ("AVAR"), which gives some guidance to the issue of applying CARVM to variable annuities by requiring that the "reserve liability for variable annuities shall be established pursuant to the requirements of the Standard Valuation Law in accordance with actuarial procedures that recognize the variable nature of the benefits provided and any mortality guarantees."

The third document, Actuarial Guideline XXXIII ("AAG3 3"), represents the NAIC's interpretation of CARVM and is applicable to all contracts that are subject to CARVM which contain elective benefits (as defined in the guideline). Revisions have been made to AG33 which will become effective as of 12/31/98 to clarify the requirement that "all guaranteed benefits potentially available under the terms of the contract must be considered.. .and.. .each integrated benefit stream available under the contract must be individually valued and the ultimate reserve established must be the greatest of the present values of these values...." The guideline interprets the application of CARVM to annuity contracts with multiple benefits to entail an Integrated Benefit Stream approach, involving the development of Integrated Benefit Streams that reflect blends of more than one type of benefit (e.g., surrenders, annuitization and death benefits).

The fourth, Actuarial Guideline XXXIV ("AG34"), was adopted by the NAIC in 1997 and has a 12/31/98 effective date. AG34 also represents the NAIC's interpretation of CARVM, giving guidance to the application of CARVM to minimum guaranteed death benefits ("MGDBs") contained in variable annuity contracts. AG34 requires these benefits to be reflected in Integrated Benefit Streams. The reserve for the variable annuity contracts, including the MGDB, is then calculated using an AG33 Integrated Benefit Stream approach.

Q. Is CARVM always applied to variable annuities in practice?

A. No. Some actuaries argue that since guaranteed cash surrender values are not provided, variable annuities are not subject to CARVM. These actuaries usually set statutory reserves equal to the cash surrender value.

However, the actuaries of many variable annuity writers believe that CARVM does apply to variable annuities, based on the requirements set forth in the SVL and VAR. Such actuaries argue that while variable annuities do not provide guaranteed cash values, they do have numerous other guarantees that are subject to CARVM, including MGDBs, guaranteed living benefits ("GLBs"), guaranteed expense charge levels, and guarantees that surrender charges will decline over time.

Q. How do actuaries generally apply CARVM to variable annuities?

A. Applying CARVM to fixed annuities generally entails determining future guaranteed benefits by projecting the account value at the valuation date using the guaranteed interest rate. Since there are no explicitly guaranteed interest rates offered with variable annuities, many variable annuity writers apply a similar methodology by using a projection rate equal to the appropriate regulatory specified valuation interest rate less some or all contract charges. They then hold the greatest present value of the resulting guaranteed benefit streams (this methodology follows the interpretation of CARVM described in the American Academy of Actuaries' 1991 White Paper on the *Practical Application of Reserving for Contemporary Annuities*).

Some actuaries who use this interpretation hold continuous CARVM reserves (where guaranteed benefits at all future points in time are considered), while others hold curtate CARVM reserves (where only guaranteed benefits available at the end of each contract year are considered). Many actuaries agree that the model SVL specifies a curtate CARVM requirement, although some states specifically require continuous CARVM. Other interpretations of CARVM include holding full account value or cash surrender value.

Q. Do actuaries usually include maintenance expenses in the CARVM calculation for variable annuities?

A. Actuaries that apply CARVM by projecting the account value using the valuation interest rate less some or all contract charges differ in their treatment of maintenance expenses. Some actuaries ignore maintenance expenses in the calculation, while others reflect them in varying degrees.

The CARVM reserve methodology as set forth in SVL does not include a specific provision for maintenance expenses. However, where the valuation actuary is required to opine on the

adequacy of the assets supporting reserves, Actuarial Standard of Practice (ASOP) No. 22, *Statutory Statements of Opinion Based on Asset Adequacy Analysis by Appointed Actuaries for Life and Health Insurers*, states that the analysis should take into account all anticipated cash flow, including expenses.

Q. How are CARVM reserves typically determined for variable annuities with fixed account options?

A. Typically, reserves for fixed account options within variable annuities are determined in a manner consistent with regular fixed annuities. Some actuaries project the fixed and separate account fund balances separately in order to determine the greatest present value of guaranteed future benefits, while other actuaries combine the guaranteed future benefits provided by the fixed and variable fund balances before determining the greatest present value.

Q. What valuation interest rates are generally used to determine variable annuity CARVM reserves?

A. Many actuaries use a Plan Type A valuation interest rate for the variable account portion of the contract and a Plan Type A, B or C valuation interest rate for the fixed account portion (based on the withdrawal characteristics of the fixed accounts). For simplicity, some actuaries use one valuation interest rate for all funds (e.g., the valuation interest rate applicable to the underlying fixed account portion). In addition, some actuaries assume a valuation interest rate of 0%.

It is important to note that where the reserve for the variable account portion of the contract is determined by using a projection rate equal to the valuation interest rate less some or all of the asset based charges, the spread between the projection rate and the valuation interest rate usually has a greater impact on reserves than the Plan Type of the valuation interest rate. In addition, for many variable annuities designs, reserve levels for the variable account portion may actually be greater as the valuation interest rate increases.

Q. What are some of the ways that actuaries reserve for ancillary benefits in variable annuity contracts?

A. Actuaries vary in how they reserve for ancillary benefits. Some integrate projected guaranteed ancillary benefit streams into the CARVM benefit streams (as noted above), while others (particularly those that hold cash surrender value) hold an add-on reserve to cover ancillary benefits. In addition, many actuaries (regardless of how they calculate reserves for ancillary benefits) hold MGDB reserves in the General Account.

As noted above, the NAIC has adopted two Actuarial Guidelines, both with 12/31/98 effective dates, that address reserves for ancillary benefits. One is the revision to AG33, which interprets the application of CARVM to annuities with multiple benefit streams; the other is AG34, which interprets the application of CARVM to MGDBs offered with variable annuities and would require MGDB reserves to be held in the General Account.

Currently, there are no explicit requirements for reserving for GLBs offered with variable annuities. The June 1998 Interim Report of the American Academy of Actuaries VAGLB Work Group does outline several potential methods along with the advantages and disadvantages of each approach. The work group concluded in this report that an AG34 type of framework is best suited to the risk and benefit structure of GLBs. However, it also noted that such an approach would need to be appropriately modified to address the unique features of GLBs (e.g., the waiting period) as well as the potential interaction of MGDBs and GLBs within a single variable annuity contract.

Q. Is there any special General Account accounting treatment for assets and liabilities supporting variable annuity contracts?

A. Since the CARVM reserve calculation will often result in reserves that are less than account value, many variable annuity writers have assets in the Separate Account (which generally equals account value) in excess of policy reserves. Beginning in 1996, the NAIC Annual Statement instructions require that this excess, often referred to as the "CARVM allowance," be shown in the General Account as a net transfer from the Separate Account. The instructions also require the change in the CARVM allowance to be treated as income in the General Account. Risk Based Capital requirements support this treatment.

Q. Why is the CARVM allowance accounted for in the General Account?

A. In most situations, Separate Account assets that exceed contract reserves for variable annuities are available to support the liabilities of the General Account. This is different from Separate Accounts that support certain group annuities and certain single contractholder life insurance and annuity contracts which may specifically provide for the insulation of Separate Account assets (i.e., assets are not available to support the liabilities of the General Account).

Since Separate Account assets that exceed contract reserves for variable annuities are available to support the liabilities of the General Account, these assets are accounted for as amounts due to the General Account.

Q. Is the CARVM allowance shown as a transfer to the General Account because it represents future Separate Account fees, surrender charges and fund transfers?

A. The CARVM allowance represents the difference between Separate Account assets and reserves supporting variable annuities. As previously mentioned, the CARVM allowance is a General Account asset that is available to support the liabilities of the General Account. The CARVM allowance does not represent future cash flows from the Separate Account (such as fees, surrender charges and fund transfers). It represents assets that are invested in the funds that support the variable annuities. Since the investment of these assets is, in fact, controlled by variable annuity contractholders (as opposed to being owned by the contractholders), the assets may not be as liquid as other General Account assets.

Section B: Asset Adequacy Analysis Considerations

Q. What insurer risks are associated with variable annuities?

A. Except for the risks associated with fixed account options and ancillary benefits, most of the investment risk (i.e., C-1 and C-3) associated with a variable annuity usually is borne by the contractholder. The insurer's most significant risk generally is based on the level and timing of based fees and surrender charges versus those expected in pricing. Typically this investment risk is minimal when compared with the investment risk associated with comparable fixed annuities. The level and timing of asset fees are a function of the performance of the funds supporting the product and the mix of assets between the funds. The level and timing of surrender charges are mainly a function of contractholder behavior, fixed interest rates, and variable fund performance. Another risk an insurer often takes with respect to variable annuity contracts is the risk that actual expenses exceed those assumed in pricing.

Variable annuities that include fixed and market value adjusted account options have the added investment risks typically associated with those options. In addition, the distribution of funds between these options and the variable funds can impact the level of insurer risk.

Ancillary benefits may also add risks to a variable annuity. These include annuitization benefits (which are usually guaranteed and may be subsidized), free partial withdrawals, bail-outs, MGDBs, GLBs (e.g., minimum guaranteed income benefits) and waiver of surrender charge due to events such as death, disability or nursing home confinement. Some products also waive or modify the surrender charge for funds invested in a particular fund. All of these benefits can add a level of both investment and "decrement" (e.g., mortality) risk. In addition, GLBs that allow the contractholder to elect contractual options may contain the risk of anti-selection (i.e., the

contractholder is more likely to exercise contractual options when it is more costly to the company offering the option).

Q. Does the Actuarial Opinion cover variable annuities?

A. Many actuaries believe variable annuities are covered by the Actuarial Opinion, based on the NAIC Model Actuarial Opinion and Memorandum Regulation ("AOMR"). Section 5E of the AOMR states that the Opinion "shall apply to all in force business on the statement date regardless of when or where issued, e.g., reserves of Exhibits 8, 9 and 10 and claim liabilities in Exhibit 11, Part I and equivalent items in the separate account statement or statements."

Q. Is asset adequacy analysis required by the AOMR for variable annuities?

A. Companies subject to section 8 of the AOMR are required to base their Actuarial Opinion on asset adequacy analysis. Under section 8, the actuary's work must conform to the appropriate Actuarial Standards of Practice promulgated by the Actuarial Standards Board. According to the ASOP No. 22, asset adequacy analysis should reflect all material risks, including those created by guarantees made by the general account in support of ancillary benefits. In addition, ASOP No. 22 states "for reserves to be reported as 'not analyzed', the appointed actuary should judge them to be immaterial".

Q. Is the CARVM allowance typically recognized in asset adequacy analysis?

A. Many actuaries recognize the CARVM allowance in asset adequacy analysis. In addition, some states require that it be recognized and require the valuation actuary to state in the Actuarial Memorandum how the CARVM allowance is handled in asset adequacy analysis.

One way to recognize the CARVM allowance in asset adequacy analysis is to include the CARVM allowance as one of the assets used to support the general account reserves being analyzed and integrate such analysis with the asset adequacy analysis of the separate account block of business. Under this approach the future Separate Account fees, surrender charges and fund transfers are aggregated with the future liability cash flows of the general account business being supported by the CARVM allowance in determining the adequacy of the assets.

Q. What methods are used to perform asset adequacy analysis for variable annuities?

A. ASOP No. 22 states that "both the type and depth of asset adequacy analysis will vary with the nature and significance of the asset, obligation, and/or investment-rate-of-return risks".

One approach currently being used by some actuaries is to demonstrate that the risk associated with the book of variable annuity business is highly risk controlled or that the degree of

conservatism in the reserves is so great that it provides for reasonably anticipated deviations from current assumptions. This type of methodology is used most often for variable annuities with a smooth surrender charge pattern, without a fixed account option or without significant ancillary benefits.

Cash flow testing methodologies are often used for products where future cash flows may differ under different economic or interest rate scenarios. For example, cash flow testing may be used for a variable annuity without a smooth surrender charge pattern, for one with a fixed account option, or with an MGDB design that varies materially by economic scenario.

Q. What do valuation actuaries typically take into consideration when modeling variable annuities for cash flow testing?

A. For non-variable products, cash flow testing scenarios are generally based on assumed future fixed interest rate movements. For variable products, one key consideration is usually the projection of variable fund performance. Thus, to perform cash flow testing on variable products, many actuaries try to specify how future fund performance correlates to fixed interest rate movements.

Cash flow testing models used by many actuaries also reflect the presence of any existing fixed and market value adjusted account options and the movement of assets between funds, including the movement of assets between variable funds and any fixed and market value adjusted account options.

Such models frequently take into account the impact of all benefits, including surrender and ancillary benefits, on model assumptions (e.g., lapse rates may be impacted by the existence of a generous MGDB or bail-out provision) and any material restrictions or other provisions put into place to protect the company (e.g., surrender charges and market value adjustment), as well as any significant constraints on contractholder actions (e.g., tax penalties).

ASOP No. 22 requires the valuation actuary to examine combinations of risk and to apply sensitivity testing to the results to reflect the interaction of assumptions.

Q. Are the models used for cash flow testing typically stochastic or deterministic?

A. ASOP No.22 lists several alternative assumption bases, one of which is the use of a deterministic scenario or set of scenarios and another of which is the use of a statistical distribution or stochastic method. In choosing the assumption basis, "the actuary should be satisfied that the assumption bases chosen are suitable for the business and risks involved. In

particular, the actuary should be satisfied that the number and types of scenarios tested are adequate". Therefore, either a stochastic or a deterministic approach is permitted by the ASOP as long as the scenarios tested are properly determined and applied.

In practice, actuaries use both stochastic and deterministic scenarios to perform cash flow testing on variable annuity business. Stochastic methods typically use Monte Carlo simulation. Some actuaries model all funds stochastically, while some may only model equity funds stochastically, modeling the performance of bond funds through the use of a set of fixed interest rate scenarios based on the interest rate scenarios used to model general account products. Other actuaries model aggregated performance for all funds (fixed and variable) on a stochastic basis.

Deterministic methods used by valuation actuaries typically project the total fund performance for the entire book of variable annuity business based on a reasonable (and often conservative) total return consistent with the expected mix of funds for that book of business. Deterministic scenarios are often chosen to produce conservative fund performance projections. One example of such a scenario is a large one-time drop in asset values, followed or preceded by a period of lower than expected returns. Another example is an extended period of fund under-performance.

With either assumption basis, ASOP No. 22 requires the valuation actuary to be satisfied that the scenarios tested reflect the expected return and volatility of the underlying funds and reasonably cover the distribution of possible outcomes.

Q. What sources of data are used by actuaries to model the different variable funds?

A. One source of specific variable annuity fund data used by some actuaries, which includes fund performance data for the entire industry by fund type, is "Morningstar Principia for Variable Annuities" (which is protected by copyright law). Unfortunately, this source has a limited number of years of historical data. In order to reflect an appropriate measure of fund volatility for a longer time period, some actuaries supplement this data with historical return data from indices, such as the S&P 500, that reflect the underlying assets contained in each variable fund (e.g., cash, foreign and domestic equities, and foreign and domestic bonds).

Some actuaries are reluctant to use only historical data, since future experience could vary from historical. Also, some actuaries carry out tests to determine whether using Morningstar data appropriately reflects the characteristic of the specific company funds, since company funds can vary significantly within Morningstar fund type. When supplementing Morningstar data with historical indices, many actuaries choose a time period that reflects both favorable and adverse results in both the equity markets and the fixed interest rate environment. In addition, actuaries may compare fund expenses to those reflected in the data source. Also, actuaries may model the correlation between the performance of the funds under various economic scenarios.

Q. How do actuaries usually model the fixed account option of a variable annuity when performing cash flow testing?

A. When modeling fixed account options of variable annuities, actuaries usually consider the interaction of the options with variable fund options. For example, during a period of low

interest rates it is common to expect an increase in lapse rates with a standalone fixed annuity. However, when modeling a fixed account option of a variable annuity contract, some actuaries assume an increase in the movement of funds from the fixed account option to the variable funds rather than an increase in lapse. Conversely, during a period of high interest rates, these actuaries assume an increase in movement of funds from the variable funds into the fixed account option.

When considering the selection of assets to use in the modeling of the fixed account option, many valuation actuaries consider the requirements of section 1 0B of the AOMR.

As discussed above, due to the unique cash flow characteristics of the CARVM allowance, many actuaries use the CARVM allowance to support specific General Account liabilities. One such General Account liability is the reserve held for fixed account options of the variable annuity, which, due to its cash flow and duration characteristics, may be particularly suited to this treatment. Since investment gains and losses of the Separate Account assets belong to the variable funds, the cash flow available to the General Account usually consists of contractual fees (e.g., M&E charges), surrender charges and fund transfers. Some actuaries perform sensitivity tests to check that the underlying assets provide the necessary liquidity to support the liabilities under reasonable adverse scenarios.

Q. What special consideration does the valuation actuary generally give regarding minimum guaranteed death benefits offered with variable annuities?

A. As noted earlier, most of the investment risk associated with a variable annuities is borne by the contractholder. However, by offering MGDBs, a company is taking back a portion of that investment risk. The amount of risk the company takes back depends on the design of the MGDB.

Actuarial Guideline XXXIV, which was adopted by the NAIC in 1997 with an effective date of 12/31/98, requires that the death benefit be projected using a combination of a specified immediate drops and net assumed returns which vary by fund class. The Guideline states that the "determination of the appropriate fund classifications, for purposes of this Guideline, is the responsibility of the appointed actuary."

Under the AOMR and ASOP No. 22, the valuation actuary is also responsible for making sure that the interest rate and variable fund projection scenarios used in asset adequacy testing properly reflect the risks inherent in the MGDB design. For example, scenarios used in the

analysis of a product with a ratchet benefit design may include a large drop in fund value shortly after the valuation date while scenarios used in the analysis of a product with a roll-up benefit design may include a prolonged period of fund underperformance.

In addition, many actuaries reflect the impact of the MGDB on lapse and mortality assumptions used for asset adequacy analysis. Some actuaries have argued that a generous MGDB could significantly decrease lapses and/or increase mortality selection.

Q. What special consideration does the valuation actuary typically give regarding guaranteed living benefits offered with variable annuities?

A. Recently, some variable annuities have also begun to offer GLBs (e.g., minimum guaranteed income benefits and minimum guaranteed accumulation benefits). Such benefits provide a minimum floor on benefits to be provided at certain points in time. GLBs pose risks that are similar to MGDBs, and can include added risk because they introduce the potential for anti-selection on the part of the contractholder. The June 1998 Interim Report of the American Academy of Actuaries VAGLB Work Group contains more information of the risk profile of GLBs.

The valuation actuary typically considers all of the issues involved MGDBs included (above) and incorporates the risk of anti-selection and other risks discussed in the Academy report.