American Academy of Actuaries
Life Financial Reporting Committee

Draft 6-13-02

Frequently Asked Questions Regarding the Valuation of Embedded Derivatives in Life Insurance and Annuity Contracts in Accordance with FAS 133

Preface

This document is intended to provide actuaries with information to assist in the valuation of embedded derivatives at fair value in accordance with Financial Accounting Statement (FAS) 133. The valuation of embedded derivatives is a relatively new and complex subject and valuation practices in this area are emerging. Because of the emerging state of actuarial and related valuation practices, we have elected to issue this document using a "frequently asked questions" format rather than as a Practice Note of the American Academy of Actuaries (Academy). Like a Practice Note, this document is intended to provide information on some of the relevant considerations and the range of current actuarial practice. It is not intended to provide authoritative accounting guidance or to establish an actuarial standard of practice.

The Academy's Life Financial Reporting Committee has issued this document in draft form. We welcome comments and questions from Academy members and others. Please send comments to Steve English at 202-223-8196 or english@actuary.org. We request comments by September 30, 2002.

Frequently Asked Questions

1. What life insurance products are generally considered to have embedded derivatives under FAS 133?

Examples of products commonly regarded as having embedded liabilities are:

- Equity indexed annuity or equity indexed universal life insurance,
- Variable annuity guaranteed minimum accumulation or withdrawal benefits,
- Reinsurance of variable annuity guaranteed minimum income benefits where the reinsurer settles with ceding company in cash at annuitization (versus income stream),
- Multi-bucket annuities,
- Corporate Owned Life Insurance (COLI)/Business Owned Life Insurance (BOLI) stable value wrappers, and
- Synthetic Guaranteed Investments Contracts (GICs).

2. **What life insurance products are generally considered to not have embedded derivatives under FAS 133, (but may appear to have embedded derivatives)?**

   Examples of products commonly regarded as not having embedded liabilities are:

   - Variable annuity guaranteed minimum death benefits (insurance exclusion),
   - Variable annuity guaranteed minimum income benefits (not net settled in cash),
   - Market Value Adjusted Annuities (clearly and closely related to the host exclusion),
   - Fixed annuities with crediting rates a function of an interest index (clearly and closely related to the host exclusion), and
   - Fixed annuities with crediting rates a function of a cost–of-living index (clearly and closely related to the host exclusion).

3. **Is a 'free-look' period on a variable annuity an embedded derivative under FAS 133?**

   There are several states that require the variable annuity premium to be refunded during the free-look period regardless of fund performance (Georgia, Louisiana, Maryland, North Carolina, Oklahoma, Oregon, South Carolina, Utah, and Washington). This gives the policyholder a put-option and this generally would qualify as an embedded derivative under FAS 133. However, as the free look period is for a very limited number of days only (e.g., 10 days), and applies only to certain states, some actuaries may conclude that the embedded option value is immaterial.

4. **Do the embedded derivative and host contract pieces need to be separately reported on the financial statements?**

   No, the split is required only for internal calculation of the policy liability and the two components do not need to be reported separately. However, FAS 133 does include certain disclosure requirements related to embedded derivatives.

5. **Should decrements such as deaths and surrenders be included in the valuation of embedded derivatives?**

   Use of decrements (e.g., surrender, death) in valuing the embedded derivative is appropriate when material. If no decrements are assumed, the valuation of the embedded derivative is more straightforward.

   In most cases, however, it is appropriate to reflect decrements in the valuation of the embedded derivative to the extent such decrements are expected to be material based on then current best estimate assumptions. [See Derivatives Implementation Group (DIG) paper B29.]

6. **If the initial decrement assumptions later turn out to be materially wrong, should the initial host contract value be unlocked?**

   No. The consideration (premium) deemed to be related to the host contract is made at issue based on the estimated fair value of the embedded derivative at issue.

7. **What are appropriate option pricing assumptions to use as of the valuation date (e.g., for risk free rates and implied volatilities)? Specifically, what should be assumed when implied volatilities are known for short-term options, but not for long duration options covering many years are to be valued?**

   In a deterministic model, future period risk-free rates and implied volatility should equal the forward rates and forward implied volatility for the future period reflected in current yield curve and term structure of volatility, respectively. In a stochastic model, the mean risk free rate and the mean volatility in future periods should equal the forward rate and forward volatility for each period.

   Implied volatilities comprise a curve that varies by term period rather than a single value (e.g., analogous to a yield curve of interest rates). In particular, implied volatilities for short-term options reflect current near term market expectations and can vary widely from period-to-period, whereas the implied volatilities for longer-term options tend to exhibit more stability. Techniques exist to derive the curve from observed market option prices, however, care must be taken on giving credibility to thinly traded long-term options. A practical method is to assume the short-term volatility grades to a long-term volatility assumption. Where possible, the volatility assumptions for longer dated options should reflect credible, observable market prices for long dated options.

8. **For an annual ratchet equity indexed annuity, how are amounts credited at the end of each contract year to be treated?**

   Valuing an embedded derivative per FAS 133 requires a clear distinction between the embedded derivative and host contract. One approach is to define the embedded derivative portion of the contract as all amounts in excess of the minimum guarantee (i.e., the amounts payable without any indexation increases). The host contract reflects the minimum guaranteed values. At issue, the value of the host contract equals the premium paid less the fair value of the embedded derivative. The initial host contract value is accreted to the guaranteed value at end of the contract term. As interest is credited at policy anniversaries, no change needs to be made to the host contract.

The fair value of the embedded derivative is recalculated at each reporting period using the then current contract values and option pricing assumptions. Correct option pricing for embedded derivatives of this type generally requires a stochastic simulation approach, although closed form approximations can be acceptable in some circumstances.

FAS 133 provides for valuing the entire contract at fair value if you cannot reliably identify and measure the embedded derivative.

9. For an annual ratchet equity indexed annuity where the parameters (i.e., participation rate and cap) are reset each policy year, is the valuation of the embedded derivative based on guaranteed or expected values?

The embedded derivative is to be based on expected behavior as appropriate to each of the scenarios modeled and should follow the company's expected rate reset strategy. For example, one strategy might be to maintain a constant participation percentage, and it would then be appropriate to assume that percentage as level for future years. A more common strategy is to maintain a constant "spread", {e.g., earn Y percent on the underlying fixed assets and budget X percent for option cost for a target spread of (Y-X) percent (the participation rate and cap would thus be determined each year based on the then option costs, subject to any contractual guarantees)}. In this case, the valuation should reflect management's intended reset strategy with due regard to any constraints imposed by policy guarantees as well as expected dynamic policyholder behavior (e.g., dynamic lapse).

10. For an annual ratchet equity indexed annuity where the parameters (i.e., participation rate and cap) are reset each policy year, can the embedded liability be simple determined as the current year option cost?

The embedded derivative includes the option cost for all future years. [See DIG paper B29 (see link above) and B15.] If management has the ability and the intent to reset the policy parameters, so as to maintain a constant budgeted cost for the liability, then the embedded derivative at fair value may exhibit price stability. Policy guarantees or competitive pressures may restrict the insurer's ability to achieve the budgeted cost, in which case the value of the embedded derivative may be sensitive to current market conditions. Dynamic policyholder behavior may also impact the value of the embedded derivative.

11. What valuation methods/models are appropriate in what types of circumstances?

The objective is to estimate the fair value of the liability. There are a variety of techniques that can be used to achieve this objective, depending on the circumstances, including but not limited to:

a) Use the observed fair value of a corresponding market derivative, with suitable adjustment if not directly observable (e.g., fair value of current period EIA options derived from market price for corresponding call option).

b) Use stochastic projection techniques to value embedded derivative directly by projecting the contract under a range of scenarios then calculating the average (path-wise) present value of the option related payments. The link to market prices is maintained by ensuring that the stochastic process is calibrated using suitable market value margins to reproduce observed market prices for available assets.

c) Use closed form estimate (e.g., Black-Scholes formula) with parameters, such as market volatility, chosen to calibrate to market prices of similar options, and suitable adjustments to match product characteristics (e.g., lapse-adjusted to allow for early exits).

Direct use of observable market prices is only possible in certain cases, due to the complexity of the embedded options in most insurance contracts, and is typically applicable only to a portion of the embedded derivative (e.g., current period EIA option, but not future renewal option).

Stochastic projection is the most flexible technique as it can deal appropriately with path-dependent behavior (e.g., dynamic lapsation). Its disadvantage is the need for sophisticated modeling capabilities, careful calibration to match market prices and the number of trials required to achieve stable results (and hence processing times). In order to reduce run times to manageable levels, it is typically implemented on a grouped basis.

Closed form approaches are generally only suitable when the cash flows to be valued are static in nature or when certain simplifying assumptions are made (e.g., policyholder behavior not dependent on market performance), which may distort the results.

12. Should the valuation be done seriatim or grouped?

Grouping reduces the work required to calculate values, but needs to done in a way which does not distort the results. Depending on product design, the fair value of options can vary substantially due to factors such as:

1 Extent to which guarantees are currently in the money.
2 Volatility of return from funds or indexes chosen.
3 Policyholder behavior characteristics (e.g., reset or renewal probability).

Any grouping should be done in a way that keeps groups as homogeneous as possible with respect to material factors.

13. Should the sum of the host contract and the embedded derivative be constrained to be at least as great as the cash surrender value or account value of the contract?

No. There is no liability floor requirement. [See DIG issue paper B30.]

14. What additional guidance is available in this area?

Some additional sources of information include:

- FAS 133,
- DIG issue papers [e.g., A16, B6, B7, B8, B9, B10, B15, B25, B29, B30, and B31]. All papers can be found at the DIG webpage (part of the Financial Accounting Standards Board's website) on "Guidance on Statement 133 Implementation", at http://www.fasb.org/derivatives/issuindex.shtml, and
- general guidance on fair value and the fair value of insurance liabilities.