AMERICAN ACADEMY of ACTUARIES

DIG B36 Practice Note

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Introduction

This practice note was prepared by a work group organized by the Life Financial Reporting Committee of the American Academy of Actuaries. The work group was charged with developing a description of some of the common practices that might be considered by actuaries in the United States in the application of the Financial Accounting Standards Board's (FASB) Derivatives Implementation Group Statement 133 Implementation Issue No. 36 (DIG B36), *Embedded Derivatives: Modified Coinsurance Arrangements and Debt Instruments That Incorporate Credit Risk Exposures That Are Unrelated or Only Partially Related to the Creditworthiness of the Obligor under Those Instruments*. DIG B36 addresses the applicability of FAS 133 to many modified coinsurance (Modco) and related insurance transactions.

This practice note represents a description of practices believed by the work group to be employed by actuaries in the United States in regards to DIG B36. The purpose of this practice note is to assist actuaries with the application of DIG B36.

It should be recognized that the information contained in the practice note provides guidance, but is not a definitive statement as to what constitutes generally accepted practice in this area. It has not been promulgated by the Actuarial Standards Board nor by any other authoritative body of the American Academy of Actuaries.

The members of the work group that are responsible for this practice note are as follows:

Michelle Smith, FSA, MAAA - Chairperson

Errol Cramer, FSA, MAAA
Rob Frasca, FSA, MAAA
Tara Hansen, FSA, MAAA
Ken LaSorella, FSA, MAAA
Patricia Matson, FSA, MAAA
Graham Mackay, FSA, MAAA
David Rockwell, FSA, MAAA
Larry Rubin, FSA, MAAA
Rebecca Wang, FSA, MAAA
Darin Zimmerman, FSA, MAAA

*The work group would also like to thank Elias Habayeb and Peter Sawtelle for all their efforts.

The practice note has been divided into seven sections:

Section A: Overview of DIG B36 requirements
Section B: Selecting the type of DIG B36 embedded derivative
Section C: Credit default swap method
Section D: Total return swap method
Section E: Valuation of floating and fixed rate total return swaps
Section F: Embedded derivatives in financial reinsurance transactions
Section G: Other considerations

Section A: Overview of DIG B36 Requirements

Q1. What is addressed in DIG B36 and how does it apply to insurance business?

A1. Financial Accounting Statement (FAS) 133 Paragraph 12(a) states that an embedded derivative shall be separated from the host contract and accounted for as a derivative under FAS 133 if "*the economic characteristics and risks of the embedded derivative instrument are not clearly and closely related to the economic characteristics and risks of the host contract*."

The following question is posed and answered by DIG B36:

> *Does a modified coinsurance arrangement, in which funds are withheld by the ceding insurer and a return on those withheld funds is paid based on the ceding company's return on certain of its investments, contain an embedded derivative feature that is not clearly and closely related to the host contract?*

DIG B36 provides various examples. In the case of a generic Modco arrangement, the DIG B36 response is that there is an embedded derivative that is not clearly and closely related to the host contract. Under a Modco arrangement, the ceding company generally owns the assets backing the liabilities ceded and passes through to the reinsurer all investment returns, including credit related gains and losses. The embedded derivative normally arises to the extent the reinsurer has a reinsurance arrangement with the ceding company but is exposed to credit risk of the issuers (i.e., unrelated third parties) of the Modco assets. Hence, the criterion in FAS 133 Paragraph 12(a) is usually met, and the embedded derivative feature will usually be bifurcated and valued consistent with FAS 133.

While DIG B36 makes specific reference to Modco arrangements, it additionally discusses other debt arrangements. Some actuaries therefore believe DIG B36 also applies to other forms of insurance arrangements where the total return on assets held by the insurer are passed through to the reinsurer or policyholder. For example, this could include other reinsurance transactions such as coinsurance with funds withheld (CFW), and Co/Modco combinations. Also, this could apply to contracts where the insurer holds the assets and the total return is required by the agreement to be passed to the policyholders, for example an immediate participation guarantee group annuity contract.

Q2. What role do actuaries play in the valuation of DIG B36 embedded derivatives?

A2. The actuary may be called upon to value the embedded derivative. As discussed below the valuation methods may involve what have traditionally been actuarial calculations, such as projecting insurance cashflows (including changes in reserves), and calculating discounted present values of cashflows under a variety of deterministic or stochastic scenarios. In addition, actuaries may be called upon to make the determination as to whether DIG B36 applies, for example as might relate to the interpretation of the provisions of reinsurance or other insurance arrangements.

Q3. What factors would the actuary usually consider in determining whether a Modco or related arrangement contains an embedded derivative?

A3. The two key determinants normally are: whether (1) the assets are, in fact, owned by the insurer, and (2) the investment returns, after considering all terms of the arrangement, do effectively result in the credit risk of these assets being passed on to the reinsurer or policyholder.

Examples where it might be determined that an embedded derivative does not exist using these criteria include:

- Situations where assets backing the arrangement are held by the insurer in an investment trust and ownership of the assets are transferred to the reinsurer. In this case DIG B36 typically does not apply, as ownership is not with the insurer.

- A Modco arrangement whereby the ceding company pays the reinsurer a stated fixed rate or a floating risk-free rate, such as a London Interbank Offered Rates (LIBOR)-based rate. In this case, the reinsurer usually has no third party exposure to credit risk.

- The funds withheld might be invested entirely in risk free assets such as cash or US government bonds.

- The terms of the treaty might effectively pass all credit related experience to the ceding company.

- Situations where upon a credit event occurring, the reinsurer can require the insurer to replace the affected assets held for the reinsurance arrangement. Effectively, the material credit gains and losses normally remain with the ceding company.

Q4. If DIG B36 applies, what does the embedded derivative look like?

A4. Per FAS 133, underlying the arrangement is a "hybrid" contract that can be "bifurcated" into its host contract and embedded derivative components. These two components are then separately valued. Under FAS 133, the embedded derivative is valued using fair value principles.

In the case of a Modco arrangement (or similar arrangements where DIG B36 applies), one interpretation in common use is that the hybrid contract is the agreement to pay a return on the assets backing the arrangement. According to DIG B36, the hybrid contract contains an embedded derivative incorporating the transfer of third party credit risk. Such an instrument is generally referred to as a ***credit derivative***. A credit derivative is an arrangement between two parties, under which one party agrees to provide protection against credit events on certain reference assets, in return for a certain fee paid by the other party.

There are several types of credit derivatives. The two most common types that are frequently associated with DIG B36 valuations of Modco and similar arrangements are ***credit default swaps*** and ***total return swaps***. A credit default swap is a swap of credit losses (usually) for a fixed fee, while a total return swap is a swap of the total return on the referenced assets for a fixed or floating rate of return. The main difference between a typical total return swap and a credit default swap is that the latter simply transfers credit risk, while the former transfers all investment return risks of the referenced assets.

Q5. Are there any special considerations that the actuary might choose to take into account when valuing DIG B36 embedded derivatives versus valuing other types of credit derivatives?

A5. Potential items the actuary might choose to consider include the following:

1. Modco and other insurer arrangements typically have cash flows settled only at periodic times such as calendar quarters, or with a lag such as one month in arrear. Generally, these timing differences might be allowed for by the accounting (i.e., as accrual items), with no special consideration taken into account when valuing the embedded derivative.

2. The cash flows under the credit default swap or total return swap would normally follow the accounting method for credit events or total returns specified in the underlying reinsurance arrangement, respectively. These arrangements would typically be based on statutory accounting, including the statutory definition of credit events, and possibly with adjustment for changes in the Asset Valuation Reserve (AVR) and/or Interest Maintenance Reserve (IMR). Many actuaries believe that sufficient accuracy is attained by application of the methods described in the following Sections C through F, which are commonly found in practice. While not reflecting the exact timing of statutory cashflows, such methods are believed to provide an accurate FAS 133 valuation of the embedded derivative.

3. The Modco or CFW assets would typically be periodically adjusted to balance to the corresponding statutory liabilities. Various balancing rules for assets withheld might apply in the case of Co/Modco based on the treaty specifications. Generally, having a varying balance of reference assets for a swap valuation does not normally generate special, additional considerations in valuing the embedded derivative. One possible exception is for certain financial reinsurance treaties where the insurer has an option to terminate or continue the arrangement; some actuaries might consider valuing the embedded derivative(s) as a put option, rather than a swap.

Q6. Suppose the funds withheld are measured at fair value. Is bifurcation appropriate?

A6. Per FAS133, if the funds withheld balances are already being accounted for at fair value **under the terms of the arrangement,** with the changes in fair value currently included in earnings, then no bifurcation or change in valuation is required.

Section B: Selecting the Type of DIG B36 Embedded Derivative

Q7. What are factors an actuary might choose to consider in determining which method to use for valuing the embedded derivative?

A7. Two key items the actuary might choose to consider are as follows:

1. The facts and circumstances of the specific Modco or other financial arrangement, and theoretical justification of the method selected; and

2. Practicality issues such as ease of calculation, data availability and impact on earnings volatility.

Q8. What are the theoretical considerations for selecting a credit default versus total return swap?

A8. The actuary might conclude that the credit risk of the Modco assets is not “clearly and closely related” to the host contract per FAS 133, and thereby decide to value the embedded derivative as a credit default swap.

In other situations, the actuary might conclude there are other embedded derivatives besides the credit risk, for example, because it has been determined that interest rate risk is not clearly and closely related to the host contract (perhaps using the criteria specified in FAS 133, Paragraph 13). As required by FAS 133 Implementation Issue B15, multiple embedded derivatives should be valued as a combined “compound embedded derivative.” Where both the credit and interest rate risk are determined to be “not clearly and closely related,” the compound embedded derivative may be considered to be a swap of the total investment return on the portfolio for a stated fixed or floating rate, and would thereby be valued as a total return swap.

Also regarding the issue of compound derivatives, some actuaries believe that the existence of credit risk not clearly and closely related to the host permits, or arguably requires, that all significant investment risks of the underlying assets be valued in combination (i.e., as a total return swap).

Q9. What are some of the practicality issues the insurer’s actuary would usually consider in choosing a method for valuing the embedded derivative?

A9. The actuary might choose to consider the following items:

1. Ease of calculation - Some actuaries consider the total return swap with a floating leg (i.e., floating interest rate) to be the most manageable method; in brief, the embedded derivative can normally be valued by simply reflecting changes in the market to book value of the underlying assets. The total return swap with a fixed leg would likely be a more complex method because it usually involves projections of future reinsurance cashflows and/or reserves. The credit default swap method may also be complicated because it typically involves the tracking of credit spreads for each individual asset at treaty inception or asset purchase, and at all subsequent valuation dates. These methods are discussed in further detail in the sections below.

2. Earnings volatility - The total return swap with a floating leg would usually reflect in earnings all significant realized and unrealized gains in the underlying asset portfolio, and some might consider it likely to produce the most volatile earnings impact. However, note that the floating rate swap typically would have no earnings impact to the extent the underlying assets were held as trading assets (i.e., marked to market with changes reflected in earnings); similarly, there normally would be no impact on surplus to the extent the underlying assets were held as available for sale (marked to market with changes reflected in surplus). An item of caution, however, is that some actuaries believe that, in the event the business is recaptured, the insurer might possibly be unable to reclassify the assets away from its trading portfolio and would thereby face earnings volatility.

   The total return swap with a fixed leg generally reflects changes in credit spreads and the impact of interest rate mismatch between the Modco assets and liabilities. The credit default swap method would likely have less volatility of earnings than the total return swap with a fixed leg, to the extent the credit default swap reflects only changes in the market credit spreads.

Q10. What are the considerations the reinsurer's actuary would usually consider in selecting the valuation method, and would the method necessarily be the same as for the ceding company?

A10. The reinsurer is not required to have mirror application of DIG B36. Generally, the reinsurer's actuary might choose to consider practicality and earnings volatility issues. Note that these issues would likely be different for the reinsurer than the ceding company.

For example, for practicality reasons a reinsurer might choose simply to hold the numbers provided by the ceding company; the ceding company's embedded derivative asset (liability) being the reinsurer's liability (asset).

On the other hand, a reinsurer might be concerned with earnings volatility. Note that only the ceding company holds the underlying assets and therefore has the option as to how to classify the assets under FAS 115. For example, as discussed in Q9 above, the ceding company might choose to hold the underlying assets as trading and value the embedded derivative as a total return swap with floating leg and thereby avoid earnings volatility. In the case of the reinsurer, however, fair value changes in the embedded derivative would not be offset as the reinsurer holds a receivable asset at book value. The reinsurer might then prefer to select a different method such as total return swap with a fixed, rather than floating, leg, or maybe a credit default swap.

Section C: The Credit Default Swap Method

Q11. What is a credit default swap?

A11. A credit default swap is an arrangement between two parties, under which one party agrees to assume the credit risk on certain reference assets, in return for a fixed periodic premium paid by the other party.

Q12. If a company chooses the credit default swap method, how does the actuary value the embedded derivative?

A12. In theory, the actuary would usually project credit losses using default assumptions consistent with market prices at the valuation date and adjusted for statutory accounting rules, and then subtract the projected fixed periodic premium to arrive at the projected cashflows of the embedded derivative. These cashflows would normally then be discounted at the forward rates implied by the valuation date swap curve.

In order to project the fixed periodic premium, the credit risk spread of the assets underlying the funds withheld is typically captured at point of treaty inception or upon subsequent asset purchase. This Issue Credit Spread (denoted ICS) is the additional yield an instrument is paying over an equivalent risk free instrument (assuming no significant prepayment, liquidity or other risks, else the related risk spreads would be separated out to arrive at the credit spread). Conceptually (ignoring basis spread for cashflow optionality and liquidity), the credit spread would usually be based on one of the following:

A) If the instrument offers a floating rate yield, the spread over LIBOR of the instrument; or

B) If the instrument offers a fixed rate yield, the spread over LIBOR of the instrument if it were swapped to a floating rate yield. If the maturity is indeterminate then the swap would be based on the average life of the instrument.

To approximate the value of statutory credit losses at each subsequent valuation date, the actuary normally would determine the Current Credit Spread ("CCS") using the same approach but based on current market rates. The fair value of the embedded credit default swap usually is calculated as the present value of this difference between ICS and CCS, applied to the notional amount of reference assets at each future period, and discounted using the forward rates implied by the valuation date yield curve. Note that, using this valuation methodology, the value of the credit default swap is zero at inception.

Section D: Total Return Swap Method

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Q13. What is a Total Return Swap?

A13. A Total Return Swap is a swap where one party agrees to pay the other the total return on certain reference assets in return for receiving a stream of fixed rate (referred to as a "Fixed Leg") or floating (usually LIBOR based and referred to as a "Floating Leg") cash flows.

Q14. How does a company decide between a Total Return Swap with a fixed leg ("TR Fixed") and a floating leg ("TR Floating")?

A14. There is no clear guidance on determining whether an embedded total return swap has a fixed or floating leg. Such characteristics generally are based on the stated or implied substantive terms of the hybrid instrument (as specified in the Modco or other agreement). Those terms may include a fixed-rate, floating-rate, zero-coupon, discount or premium, or some combination thereof. In the absence of stated or implied terms, some actuaries believe that DIG Issue B19 implies that an entity may make its own determination of whether to account for the total return swap as having a fixed-rate or floating-rate leg.

In practice, ceding companies may choose TR Floating instead of TR Fixed since the use of the FAS 115 "mulligan", where assets are allowed a re-classification from Held to Maturity or Available for Sale to the Trading category, mitigates income statement impact. Reinsurance companies may choose TR Floating for ease of calculation, or TR Fixed, as it tends to lead to less volatile GAAP earnings than TR Floating.

Q15. What is the basic formula to calculate the fair value of a total return swap?

A15. In a total return swap, the total return of the reference assets is typically swapped for a fixed or floating rate return on an underlying "notional loan" balance.

The fair value of the total return swap can be understood as the fair value of the assets minus the fair value of the notional loan. The basic formula to calculate a total return swap is:

(Market Value of Assets minus Book Value of Assets)

Minus

(Market Value of Notional Loan minus Book Value of Notional Loan)

In the calculation, it is presumed that the book value of the notional loan will always equal the statutory reserve, which generally will equal the statutory book value of the assets. In this case, the formula reduces to:

(Market Value of Assets minus Market Value of Notional Loan)

For the transactions where these amounts are not equal, adjustments to balances are made in order to determine the asset market value to be allocated to the block. Modco (or Funds Withheld Coinsurance) funds withheld are typically equal to statutory reserves, and may or may not reflect items such as IMR or ceding commission withheld. Financial reinsurance treaties might have funds withheld that are other than statutory reserves, for example, accumulated product cashflows.

Q16. Is the value of a total return swap zero at inception?

A16. Per DIG issue B20, the fair value of a non-option type derivative is zero at the inception of the derivative. Since a total return swap is not considered an option type derivative, its value is zero at the inception of the treaty.

Q17. How would the valuation of an embedded total return swap be different if the assets were in the ceding companies' general account rather than in a segregated portfolio?

A17. The same basic approach is normally used to calculate the value of a total return swap whether the assets backing the treaty reside in a ceding company's general account or a segregated account. For general account assets, a pro-rata approach can be used in determining the market value of the assets.

Section E: Valuation of Floating and Fixed Rate Total Return Swaps

Q18. What is the fair value of a TR Floating Swap?

A18. Assuming the market value equals the book value of assets at inception, and since the notional loan is a floating rate instrument so that, at all times, Market Value of Loan equals Book value of Loan, the formula in A15 reduces to:

Market Value Assets (MVA) - Book Value Assets (BVA)

Q19. How does the actuary determine the value of a TR Floating Swap is zero at inception?

A19. At treaty inception, the fair value of the total return swap should be zero as discussed in A16. However, for some treaties, market value of assets may not equal book value of the assets at treaty inception and so an adjustment is made. The adjustment for the difference between market and book values is part of the embedded derivative, and hence is valued at fair value in theory. In practice, companies may come up with reasonable approaches to approximate a fair value to this opening difference and amortize into income over time. Following are some methods that have been used:

(a) Any significant difference is amortized into income as either a deferred profit liability or a ceding commission. One method is to do something analogous to DAC and amortize the difference as a percentage of expected gross profit.

(b) If detailed asset data is available, a company can track the assets that give rise to the opening difference. As these assets mature or are sold, the opening difference will usually decline and the adjustment will be amortized exactly. It may also be reasonable to approximate this opening adjustment runoff over the life of the assets using a simplified approach, such as a straight-line or declining-balance method.

(c) A ratio equal to the BVA/MVA at inception could be applied to MVA at each future valuation date.

Q20. How does the actuary determine that the value of a TR Fixed Swap is zero at inception?

A20. A19 addressed the calibration of market and book values of assets at inception for a TR Floating Swap. For a TR Fixed Swap, the initial model calibration is more complex. Again, there is no clear guidance on how calibration is usually done.

There are two common methods of calibration used in practice:

(a) Book Value Calibration Approach: Under this approach, the market value of the notional loan is calibrated to equal the book value of the notional loan (which often equals statutory reserve), and the market value of the assets is calibrated to equal to the book value of assets (which also often equals statutory reserve) using two separate calibration processes. On the loan side, the loan pay-off pattern is adjusted so that the loan cash flows (which equal the loan principal payoff plus interest on the loan), discounted at the forward swap rates equals the book value of the loan. The calibration can be done in a number of ways as follows:

(i) Fixed Loan Rate: Assuming the actuary has a satisfactory projection of the loan principal payoff pattern (e.g., a projection of the statutory reserve), this method solves for the fixed loan interest rate (over the term of the notional loan) such that loan cash flows, discounted at the forward swap rates, equals the loan book value, or the starting reserve.

(ii) Multiple of Cash Flows: Given a satisfactory pattern of loan cash flows (instead of the loan principal payoff pattern), the actuary solves for the multiple of cash flows, such that loan cash flows, discounted at the forward swap rates, equal the loan book value.

On the asset side, an opening difference between asset market and book values will usually be accounted for using one of the methods as discussed in A19.

(b) Market Value Calibration Approach: Under this approach, calibration at inception is done to adjust the loan pay-off pattern such that the loan cash flows, discounted using the forward rates, equals ***the market value*** of the assets at inception. Again, the calibration can be done in different ways:

(i) Fixed Loan Rate: Given the loan principal payoff (e.g. the reserve runoff) pattern, the actuary solves for the fixed loan interest rate (over the term of the notional loan) such that loan cash flows, discounted at the forward swap rates, equal the opening market value of assets.

(ii) Multiple of Cash Flows: Given a loan cash flow pattern, the actuary solves for the multiple of cash flows, such that loan cash flows, discounted at the forward swap rates, equal the opening market value of assets.

Under the market value calibration approach, the actuary usually does not make a separate adjustment for the initial asset market-to-book value difference. One likely consequence of using this approach is that the book and market values of the loan normally are not equal at inception.

Q21. How does the actuary choose between calibrating the loan value to the market value or the book value of the assets at inception?

A21. Some actuaries prefer Method (a) described in A20 because they prefer that both the book and market values of the loan equal the reserve at inception.

Others prefer Method (b) because they prefer the market value of the loan to equal the market value of assets at inception, so that the embedded derivative at inception will be zero without needing the types of approximate adjustments described in A19.

Q22. How does the actuary choose between calibration using the fixed loan rate or a multiple of cashflows?

A22. The actuary usually takes into account the type of product covered under the reinsurance agreement. If the underlying business is single premium or paid-up business, then the projected reserve pattern is likely to be a monotonic decreasing function, which can be used as the projected loan principal pattern. Once the actuary has a good projection of the loan principal pattern, then calibration using the fixed loan rate is a suitable method.

However, if the underlying business contains renewal premium products, then reserves are likely to increase in the future, creating new loans in the future on existing business, and hence introducing modeling complexities. For regular premium products, some actuaries believe that it may be more practical to instead estimate a total loan cashflow pattern for the current loan, based on the projected best estimate for future benefits (or other appropriate cashflows), and based on premiums paid to date. In this case, the calibration at inception uses the multiple of cashflow approach.

Q23. Under these calibration approaches, won't the book value of the loan deviate from the reserve at dates after inception?

A23. By the definition of methods (a)(i) and (b)(i), as described in A20, the loan book value equals the reserves at inception and at all dates in the future. Hence, this problem normally will not arise under these two methods.

However, under Method (a)(ii), this may not be the case, because the actual cashflows may not match the elements of the reserve release (i.e., the principal paydown plus interest on notional balance). The difficulty here is that the projected notional balances are not known. To get around this, some actuaries use a practical adjustment whereby they ***re-calibrate*** the multiple of the current expected loan cashflow pattern, such that these cashflows, discounted at the ***inception date*** (as defined in A26) forward rates equal the reserves at subsequent valuation dates.

Method (b)(ii) is not likely to lead to an ideal validation of the book value of the loan to the reserve at inception, or subsequently. This is partly why some actuaries believe that the other methods provide for more appropriate calibration approaches.

Q24. How is the market value of the notional loan determined at each subsequent valuation date?

A24. In order to calculate the market value of the loan the actuary usually requests appropriate information concerning the stream of loan cash flows. Usually, these cash flows (after calibration, where applicable) are then discounted at the forward rates implied by the valuation date swap curve to determine the market value of the notional loan. The methodology for projecting loan cashflows is determined by the calibration method selected, as described in A20. These two methods give projected loan cashflows as:

> (i) Fixed Loan Rate: This method has a projected stream of the notional balance of the loan (= projected reserves) and a loan interest rate fixed at inception. The combination of these defines the loan cashflows at any valuation date, based on the current best estimate projection of the future reserve run-off.
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> (ii) Multiple of Cash: This method has a projected pattern of cashflows and a valuation-date specific multiple of this pattern, such that the value of these cashflows discounted along the forward rates derived from the ***inception date swap curve*** (as defined in A26), equals the valuation date statutory reserve.

Under both of these loan cashflow methods, the projected stream of loan cashflows is usually discounted at the forward rates implied by the ***valuation date swap curve***.

Q25. Why is the discount rate for the notional loan based on the swap curve?

A25. The swap curve usually determines the "risk free rate" rate in market pricing. (In reality, there is a small credit risk premium in the swap curve rates so they are not truly risk free, but the impact of this on the embedded derivative valuation is considered immaterial.) In the DIG B36 embedded derivative valuation, the only credit risk to be considered is that "not clearly and closely related to the host contract." Since there is no third party credit risk associated with the notional loan, typically no risk premium is usually added to the swap rates to determine the market value of the loan.

Q26. Any periodic "valuation date" is well defined and therefore so is the valuation date swap curve. But what about "initial swap curve date" of the DIG B36 embedded derivative for calibration purposes? Is the "initial swap curve date" of an embedded derivative defined as:

- **Treaty effective date, or**
- **Date of purchase of assets, or**
- **Date of issue of policies?**

A26. There is no guidance on how to select the initial swap curve date, and the selection may be influenced by whether the actuary is considering a new treaty for new business, new business under an existing treaty or a new treaty for an in force block. It may also be influenced by the calibration method the actuary selects.

Where a new treaty is entered into for future new business, there normally will be no assets or liabilities at the treaty effective date, and DIG 36 embedded derivatives are generated either as business is issued or as assets are purchased. In this case, some actuaries prefer that the initial swap curve date be the asset purchase date(s) because that is what triggers the third party credit risk that gives rise to the embedded derivative in the first place. This is known as the "asset inception approach" for setting the initial swap curve date.

Other actuaries prefer to set the initial swap curve date for an embedded derivative as the date the policies are issued and reserves start to be generated. It is these liabilities, they say, that give rise to the need for assets and therefore the embedded derivative. In addition, this method is not subject to frequent "turnover" of embedded derivatives caused by asset turnover. This is known as the "liability inception approach" for setting the initial swap curve date.

Where a new treaty covers an in force block, the "liability approach" would set the initial swap curve date at the treaty effective date, instead of the issue date, as this is the date at which the reserves originate under the reinsurance contract. Hence, the initial swap curve date of the embedded derivatives under the liability approach can be summarized as the effective date for an in force block, and the later issue dates for new business.

Under the asset approach, FAS 133 Paragraph 51 may not allow the initial swap curve date to precede the treaty effective date. Hence, the initial swap curve date under the asset approach may be the asset purchase date or the treaty effective date, if later.

Q27. What are the typical considerations in deciding between the asset vs. liability approaches?

A27. A key distinction between the asset and the liability approaches is usually in determining the new market value of the loan. Under the asset approach, the initial swap curve is established when new assets are purchased, whereas under the liability approach, the initial swap curve is set when the liability is established (either at the treaty effective date or as new business is issued and/or reserves increase for existing business). When an asset is sold, under the asset method, the original swap is viewed has having been settled and a new swap with the new asset is initiated, whereas under the liability method, there is no effect on the loan calculation, assuming the liability is still in place.

The asset approach is preferred by actuaries who like the parity of the assuming company recognizing a realized gain or loss at the same time that the ceding company does. While DIG B36 is silent as to whether such a result was proscribed or even intended, there is an appeal to this parallel result. Actuaries who prefer the liability approach believe that it is more faithful to FAS 133's concept of a host instrument, where the host is characterized in such a way as to minimize its need to be redefined frequently. They emphasize that in a typical Modco relationship, the asset turnover is much more frequent than the liability turnover.

Q28. How often does the actuary normally calibrate? At every asset purchase or liability issue date, or do actuaries sometimes use an average over a period?

A28. Again, no guidance is provided, so for practical purposes it may be sufficient to aggregate assets purchased over a reporting period (if using the asset method) or liabilities issued over a reporting period (if using the liability method) and develop an "average initial swap curve" based on the swap curve movements and timing of reserve movements or asset turnover over the period. If the reporting period is sufficiently short, it may even be appropriate to use the swap curve as of a certain date within the period (such as start date, end date or mid-point).

Where the calibration methods described in A20 (a)(i) and (b)(i) are selected, and new loans arise each reporting period either from new business and/or increases in reserves on existing business, the average initial swap curve for any period is normally used in deriving the fixed loan rate associated with the reserve pattern originating in the corresponding period.

Where method (a)(ii) (Multiple of Cash Flows) is selected, the average initial swap curve for any period generally used for both the initial calibration and subsequent recalibration of loan cash flows arising from business issued, or other reserve increases attributable to, the corresponding period.

Section F: Embedded Derivatives in Financial Reinsurance Transactions

Q29. How is DIG B36 applicable for financial reinsurance?

A29. DIG B36 may be applicable in a financial reinsurance type arrangement with a minimal amount of cash changing hands. The base treaty could be a modified coinsurance or funds withheld coinsurance. There may also be an experience refund provision that requires the reinsurer to pay a refund to the ceding company based on the actual performance of the reinsured block of business. This experience refund may reflect a number of factors, such as mortality, expense and investment performance. The investment performance generally will be related to a portfolio of assets backing the underlying business and, consequently, an embedded derivative exists in the experience refund leg as well. According to DIG B15 these embedded derivatives should be combined to form a compound embedded derivative.

Q30. Is the value of the compound embedded derivative for financial reinsurance always zero?

A30. In some financial reinsurance treaties, it may be argued that the two embedded derivatives substantially offset one another, and the resulting net embedded derivative would be negligible. A detailed analysis of the agreements would have to be performed to verify that this is indeed the case.

Q31. When would the embedded derivative for financial reinsurance not be zero?

A31. Certain financial reinsurance treaties are more likely to have a significant embedded derivative than others. For example, treaties where there have been, or are expected to be, experience refunds not paid out due to reinsurance losses and thus the loss carry-forward account has been, or is expect to be, valued.

Q32. What does the embedded derivative look like?

A32. The host may be seen as including two loans: the first is a loan equal to the Modco reserve or funds withheld loaned to the ceding company, the second is a loan from the ceding company to the reinsurer to support the experience refund leg.

There may be loss scenarios where the carry-forward account would be valued and could continue indefinitely. In this case, the treaty will most likely not be recaptured by the ceding company, since in doing so, it would have to repay the reinsurer the amount in the loss carry-forward account.

An approach is to view the combination of both legs as a "put like" option. If there are gains from the assets, the gains will normally be passed on to the reinsurer in the Modco adjustment, and back to ceding company as an experience refund. The derivative value would be zero. If there are losses from the assets, the losses will normally be passed on to the reinsurer. A negative experience refund would usually be set up in the loss carry-forward account. If the ceding company does not recapture, it would in effect "put" the losses to reinsurer.

Q33. How does the actuary value this embedded put option?

A33. The put option may be valued using option pricing methodology. However, in practice, an exact option valuation may not be feasible. For example, a reinsurer may not have an updated actuarial model in house or from the ceding company. In this case, an approximation method may be used.

Q34. What are the usual considerations in valuing this option?

A34. Each financial reinsurance treaty is unique, and is evaluated accordingly. A company is usually well advised to examine its finance reinsurance treaties diligently, including provisions related to experience refunds and recapture, and to provide accurate information to its actuary. Profitability of the block can also be a key consideration. Data availability may influence the approach.

Section G: Other Considerations

Q35. What is grandfathering and how is that applicable to DIG Issue B36?

A35. Under the provisions of FAS 133, as amended by FAS 137, an entity was allowed to grandfather all embedded derivatives, including B36 derivatives, on hand prior to a transition date that the entity selected, either 1/1/1998 or 1/1/1999. This provision was applicable to all embedded derivatives existing at the transition date, whether or not the entity had identified the embedded derivatives as such prior to the selected date. The grandfathering decision could not be applied to only some of an entity's individual hybrid instruments and, therefore, had to be applied on an all-or-none basis. If a contract has been grandfathered, but has been substantially modified since the transition date, the contract will be subject to DIG Issue B36 and bifurcation of the embedded derivative will be required.

Q36. What types of contracts other than reinsurance contracts may be impacted by DIG B36?

A36. Actuaries should review any contract under which the contract holder is contractually guaranteed to receive a significant return based on an underlying portfolio of assets owned by the insurance company. These contracts may be interpreted to contain embedded derivatives because the return realized by the contract holder reflects the credit experience of the underlying assets rather than the credit quality of the insurer that wrote the contract. Examples of contracts that may contain these features are participating group annuity contracts and group insurance contracts with experience rating provisions.

Q37. What considerations are applicable with respect to group annuity contracts?

A37. Many traditional group annuity contracts, specifically of the deposit administration and immediate participation guarantee design but potentially others as well, contain provisions that guarantee a return to the contract holder based on the actual return of a defined portfolio of assets. These contracts may fall under the purview of DIG B36. In assessing whether these contracts contain embedded derivatives, the actuary may choose to consider whether the mechanism by which investment earnings are credited to contract holders is directly and contractually tied to the asset portfolio, or, conversely, whether by management discretion or the exercise of other contract features, like termination provisions, the direct pass-through of investment earnings may be disrupted. Considerations for the valuation of any embedded derivative would usually be similar to those for reinsurance contracts, discussed earlier, though many actuaries might consider the total return swap with a floating leg to most closely fit the circumstances of the typical contract. However, because many traditional group annuity contracts are backed by investments, like commercial mortgages and real estate, to which FAS 115 does not apply, the ability to obtain parallel accounting between assets and liabilities through the total return/floating mechanism may not exist for these contracts.

Q38. What considerations are applicable with respect to experience-rated group contracts?

Q38. Some actuaries believe that some experience-rated group contracts may contain embedded derivatives as described under in DIG B36. They point to contracts where interest credits to the group contract holder may be made with reference to the returns on specific assets underlying the contract. Depending on the specific provisions of the contract, this may indicate an embedded derivative exists within the contract. Some actuaries might also point out that experience refund provisions, as well as associated loss carryforward provisions, are potential sources of embedded derivatives as well, depending on the definition of how interest credits are determined within those provisions. While it is usually preferable to consider each contract on its own to determine whether DIG B36 applies, the sense of many actuaries is that even if it does apply, in many situations the impact of the embedded derivatives from three sources (interest credits, experience refunds, and loss carryforward provisions) could be largely offsetting with a *de minimis* net result, rendering the exercise of individually computing their values largely academic. The comments made in Section F with respect to financial reinsurance contracts are often applicable to experience-rated group contracts as well.

Q39. Other types of contracts, like universal life insurance and deferred annuities, often feature credited interest rates that are related to an underlying portfolio of assets. Are these contracts deemed to have embedded derivatives under the DIG B36 rationale?

Q39. Variable annuity and variable universal life contracts typically are required to credit policyholders with the actual investment performance of the assets that comprise the variable sub-accounts under the contracts. However, because the recorded liability for such contracts typically equals the fair value of the assets in the underlying sub-account, there is no conflict with the concepts contained in DIG B36.

For fixed annuity and universal life contracts, the liability held often does not equal the fair value of the assets backing them. Many companies develop credited interest rates on these contracts with reference to a pool of assets underlying them. However, when the interest crediting strategy is left to the insurance company with no contractual guarantee with respect to the underlying asset portfolio, many actuaries believe that DIG B36 does not apply to such contracts. The lack of a contractual guarantee is a key point. Of course, the provisions of each contract are unique, so actuaries are usually well advised to consider each contract’s language individually to determine whether or not DIG B36 applies.