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Session 11: Embedded Derivatives – SFAS 133

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FAS 133: The Big Picture

- In summary:
  - Broadly defines a derivative
  - Introduces embedded derivatives
  - All derivatives at fair value on the balance sheet
  - Default accounting – mark-to-market in earnings
  - Limited hedge accounting permitted

Definition of a Derivative

Any contract with ALL of the following:
- Financial instrument or contract
  - Underlying
    - Notional amount or payment provision
  - No (or smaller) investment at inception
- Requires or permits net settlement or de facto net settlement
### Definition of a Derivative

FAS 149 – include occurrence / nonoccurrence of specified events

<table>
<thead>
<tr>
<th>Derivative</th>
<th>Underlying</th>
<th>Notional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock option</td>
<td>Stock price</td>
<td>Number of shares</td>
</tr>
<tr>
<td>Currency forward</td>
<td>Exchange rate</td>
<td>Amount of currency</td>
</tr>
<tr>
<td>Commodity future</td>
<td>Commodity price</td>
<td>Number of commodity units</td>
</tr>
<tr>
<td>Interest rate swap</td>
<td>Interest rate index</td>
<td>Dollar amount</td>
</tr>
<tr>
<td>Purchase order</td>
<td>Price of computers</td>
<td>Number of computers</td>
</tr>
<tr>
<td>computers</td>
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</tbody>
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### Net Settlement

- Neither party must deliver the underlying asset and the contract settles on a net basis
  - Net cash or share settlement
- One party must deliver the underlying asset, but
  - There is a mechanism that facilitates net settlement (e.g. exchange, assignment)
  - or -
  - The asset is readily convertible to cash or is itself a derivative (e.g. publicly traded securities)
### Derivatives – Common and not so common

<table>
<thead>
<tr>
<th>Common</th>
<th>Not So Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Options (caps/floors)</td>
<td>● Certain Reinsurance Contracts</td>
</tr>
<tr>
<td>● Forwards</td>
<td>● Embedded features</td>
</tr>
<tr>
<td>● Swaps</td>
<td>(convertible bonds, equity-linked notes,</td>
</tr>
<tr>
<td></td>
<td>embedded in leases, insurance, other agreements)</td>
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<td></td>
<td>● Minimum guarantees</td>
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### What is an Embedded Derivative?
- Many contracts do not meet the definition of a derivative, but may contain “embedded derivatives”
  - Implicit or explicit terms that affect some or all of the cash flows or the value of other exchanges, in a manner similar to a derivative
  - If certain criteria are met, separate such a Hybrid Instrument into “host contract” and “embedded derivative”

*FASB – can’t hide a derivative by incorporating into another instrument*
What is an Embedded Derivative?

An embedded derivative instrument (ED) shall be separated from the host contract and accounted for as a derivative instrument pursuant to SFAS 133 if it satisfies the following conditions:

(a) ED is not clearly and closely related to the host

(b) The hybrid contract is not re-measured at fair value

(c) A separate instrument with the same terms of the ED would be a derivative instrument subject to the SFAS 133 requirement

Embedded Derivatives Key Terminology

- Found in non-derivative contracts ("Host")

- **Host** contract + **embedded** derivative = **hybrid** contract

- Annuity + equity option = equity-linked annuity
What is Clearly and Closely Related?

- Clearly and closely related refers to:
  - Economic characteristics
  - Risks
  - Defined mostly by examples in FAS 133
- Factors to consider
  - Type of host
  - Underlying

Insurance Contract Exclusion

- SFAS 133 paragraph 10(c)
- An insurance contract is not subject to SFAS 133 if it entitlements the holder (a) to be compensated only if, as a result of an identifiable insurable event (b) incurs a liability or (c) there is an adverse change in the value of a specific asset or liability for which the holder is at risk
- Examples:
  - Traditional life insurance contracts
  - Traditional property and casualty contracts
Products Generally Not Subject to FAS 133

- Variable Annuity GMDB (insurance exclusion)
- Variable Annuity GMIB (not settled in cash)
- Market value adjustment annuity (clearly and closely related to host contract)
- Fixed annuities with crediting rates tied to an external interest index (clearly and closely related to host contract)
- Fixed annuities with crediting rates tied to an external cost of living adjustment index (clearly and closely related to host contract)

Products Generally Subject to FAS 133

- Equity Indexed Annuities (EIA)
- Equity indexed universal life (EIUL)
- Variable annuity with GMWB and GMAB
- Reinsurance of VA GMIB where assuming company settles with the ceding company in cash at annuitization
- Modified Coinsurance treaties
Separate Account Variable Annuities

- Traditional
  - SA assets legally isolated from general account
    - Policyholder not subject to insurance company’s risk of default
  - SA assets’ performance accrued 100% to policyholder
    - Policy holder subject to investment risk (not shared)
  - Redeemable at any time (subject to surrender charges)
  - FAS 133 conclusion:
    - 100% beneficial interests in assets
    - No embedded derivatives
Separate Account Variable Annuities

- Non-traditional features
  - Most features are not clearly and closely related because result in sharing of investment risk
  - However, many such features do not meet definition of derivative

Guaranteed Minimum Death Benefits

- Host contract
  - Annuity
- Embedded derivative
  - Option
- Clearly and closely related?
  - No!
  - Embedded derivative scoped out as insurance
Guaranteed Minimum Accumulation Benefits

Separate account A issues variable annuity for $1 million. Separate account guarantees a minimum account value of $1 million at end of accumulation period. If policyholder terminates before end of accumulation period, the policyholder will receive the account value less surrender charges.

- Host contract
  - Annuity
- Embedded derivative
  - Option
- Clearly and closely related?
  - No!
  - Sharing of investment risk

It’s an embedded
Guaranteed Minimum Withdrawal Benefits

Separate account A issues variable annuity for $1 million. Variable annuity contains a GMWB. GMWB guarantees $1 million value through fixed payouts that don’t exceed 7% of the guaranteed remaining balance per year.

- Host contract
  - Annuity
- Embedded derivative
  - Option
- Clearly and closely related?
  - No!
  - Sharing of investment risk

It’s an embedded
GMWB for Life

Separate account A issues variable annuity for $1 million. Variable annuity contains a GMWB for Life. GMWB guarantees $1 million value through fixed payouts that don’t exceed 7% of the guaranteed remaining balance per year. Once the account value falls below $0, the 7% payments continue to for life.

GMWB for Life (for Life Component)

- Host contract
  - Annuity
- Embedded derivative
  - Option
- Clearly and closely related?
  - No!
  - Sharing of investment risk
  - Life contingent portion scoped out as insurance

It’s an embedded
So, How Do You Account for Embedded Derivatives?

Accounting Implications

- Embedded derivative or not?
  - No → SOP 03-1
  - Yes → FAS 133
  - Yes & No → FAS 133 & SOP 03-1 (bifurcation)
Embedded Derivative Instruments

If all criteria met and embedded derivative can be reliably identified and measured, **BIFURCATE** hybrid instrument:

- Apply FAS 133 MTM
- Apply applicable GAAP for similar contracts

Can’t Bifurcate?

If the embedded derivative cannot be reliably measured:

- Account for entire contract at fair value through earnings
- Hybrid may not be used as a hedging instrument
- Should be RARE
What is “Fair Value”?

Definition of a fair value:
The amount at which an asset (or liability) can be bought (or incurred) or sold (or settled) in a current transaction between willing parties, other than in a forced or liquidation sale.

- Quoted market prices are the best evidence of fair value (e.g., the price of stock traded on the NYSE)
- In the absence of quoted prices, use other valuation techniques (e.g., present value techniques or option or other pricing models)
- Definition clarified under FAS 157

FAS 133 Valuation of GMWB

- Risk neutral stochastic models generally a must – these are complex options
- Calculate PV Expected Benefit cost
  - Value at the Mean
  - Discount using risk-free spot rates
- At inception, FV of embedded derivative is zero
- Solve for a Valuation Net Premium or Ascribed Fee
  - PV Valuation NP at t=0 equals PV Expected Benefits
- Future Liability/Asset
  - Updated PV Expected Benefit less PV Valuation NP (Ascribed Fee)
  - Updating assumptions, inforce, stochastic model parameters
Embedded Derivatives

Asset or Liability?

- After initial valuation, market conditions may change such that embedded derivative value is “negative”
  - The contract is valued as an asset rather than a liability
- SEC staff have indicated view that a written option is a “noncontingent obligation to stand ready to perform”
- This view would not support recording such a derivative at fair value if it would be an asset
- Implication is a mismatch with respect to hedging programs supported by market-traded derivative contracts

FAS 133 Mechanics

- Ascribed fee for the GMxB must be determined (typically expressed as basis points of AV)
- Solve for fee to produce zero liability at issue
- Remaining rider fee goes through operating income
- Liability is calculated as risk-neutral PV of GMxB benefits (pay leg) less PV of ascribed fee (receive leg)
- Assumptions must be updated each period
Modeling Considerations

- Typically monthly or quarterly cohorts
- Additional Deposits
- Careful consideration should be given to the interplay of various guarantees
  - Model mortality and associated GMDB in valuation of GMWB, and vice-versa
- Changes in value of embedded derivative should flow through EGPs
- Assumptions
  - Mortality, persistency, utilization, fund growth, volatility
  - Best estimates, unlocked as warranted, generally consistent with DAC assumptions except fund growth and volatility

Modeling Considerations (continued)

- Need relatively granular model
  - Minimize offsetting effect of different levels of in-the-moneyness
- Model prospective policyholder behavior vs. static assumptions
  - Benefit utilization and Reset
  - Dynamic lapse and withdrawal
  - Utilization varies with “in-the-moneyness” at future point in time
- Important to validate model against market inputs
Modeling Considerations (continued)

- Number of scenarios must be sufficient to minimize standard error
  - Several thousand under model cell approach
  - Several hundred under seriatim approach, regenerated for each policy
- Importance of controls
  - Small changes to models can have a material impact
  - Model risk is substantial

Operational/Model Issues

- Fair Value methodology
  - Design and approval
  - Documentation (Valuation technique a required disclosure item)
- Valuation models and tools
  - Development or acquisition
  - Implementation
  - Documentation
  - Validation
- Valuation process
  - Design and documentation of process and procedures
  - Production of F/S values and required disclosure items
  - Integration with overall Fair Value implementation project
Stay tuned…

- Continuation of discussion under FAS 157