Lincoln’s Actuarial Presence

- 150 actuaries
- 60 students

Hartford, CT
Life/Annuity Product Management
Executive Benefits
Product Management

Radnor & PHL, PA
Corporate Center
Equity Risk Management

Greensboro, NC
Life/Annuity Product Management
Product Risk and Liability Valuation

Fort Wayne, IN
Valuation
Management Reporting
Defined Contribution Product Management

Omaha, NE
Group Protection
Agenda

- Hedge program basics
- Performance throughout crisis
- Current issues
Hedge Program Basics
Variable Annuity Overview

- Variable annuity industry sales of $125B in 2009*
- Base contract provides tax preferred investment vehicle and annuitization option
- Majority of sales include additional benefit riders:
  - Guaranteed Minimum Death Benefits (GMDBs)
  - Guaranteed Living Benefits (GLBs)
    - Guaranteed Minimum Withdrawal Benefit (GMWB)
    - Guaranteed Minimum Income Benefit (GIB)
    - Guaranteed Minimum Accumulation Benefit (GMAB)
- GLBs and GMDBs guarantee certain performance or level of income regardless of market conditions

*Source: Morningstar MARC data as of Dec 31, 2009
Historically only hedge guarantees, not the base contract

Liability changes as market inputs change

Hedge programs limit financial impact of higher reserves/claims due to declining market conditions
Managing VA guarantees requires balancing cost and effectiveness.
“Greeks” measure sensitivity of liability to a given market condition

Lincoln actively manages impact of 3 market measures

<table>
<thead>
<tr>
<th>Market Measure</th>
<th>Market Condition</th>
<th>Liability Impact</th>
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<tbody>
<tr>
<td>Delta</td>
<td>Market Drop</td>
<td></td>
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<tr>
<td>Vega</td>
<td>Volatility Increase</td>
<td></td>
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<tr>
<td>Rho</td>
<td>Interest rate Decrease</td>
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Hedge Program Basics

Types of Hedge Instruments

- Derivative instruments are purchased to match the liability exposure to each of the Greeks

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Delta</th>
<th>Rho</th>
<th>Vega</th>
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<tbody>
<tr>
<td>Put Options</td>
<td>√</td>
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<tr>
<td>Interest Rate Swaps</td>
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<tr>
<td>Variance Swaps</td>
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<td>Interest Rate futures</td>
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<td>Equity Futures</td>
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Financial crisis put unprecedented stress on hedge programs:
- Huge daily market swings
- Extreme volatility = Higher Cost
- Interaction of market forces

So how did we do?
Not Perfect, but overall we did quite well

Hedge assets accumulated to offset our growing liability
Program was very effective but crisis highlighted weaknesses
Current Issues

- Reducing Breakage
- Capital Market Conditions/Hedging Cost
- Accounting Considerations
Current Issues
Second Order and Interaction Breakage

- Impact/Concerns
  - Largest source of breakage
  - Only explicitly hedge first order market movements
  - Difficult to capture the interdependency of the Greeks

- Preventative Actions
  - Exploring different hedge instruments
  - Consider macro hedge
Impact/Concerns
- Withdrawal and investment activity not tracked in real time
- May cause over or underhedged position

Preventative Actions
- Product design- restrictions on policyholder behavior
- Building experience to improve tracking and forecasting
Current Issues

Basis Risk Breakage

Impact/Concerns
- Has produced favorable breakage due to fund outperformance
- Derivative assets based on indices that try to mimic underlying policyholder investments

Preventative Actions
- Continue improving fund mapping
- Carefully evaluate funds in VA lineup
  - Avoid funds that are difficult to hedge
Current Issues
Capital Market Conditions

- Put options are very expensive in current environment
- May choose to not fully hedge liability Greeks
- Tradeoff between risk and profitability
Current Issues
Accounting Considerations

- Economic/capital markets view (i.e FAS 133)
  - Pure market consistent vs other approaches?
  - What is the impact of illiquidity?

- GAAP
  - Non performance risk (FAS 157) reduces liability.
  - GMDB and portion of GLB liability not market consistent (valued under SOP 03-1)

- Statutory (i.e VACARVM)
  - Measures tail risk via stochastic modeling
  - Stat liability behaves differently from GAAP or economic
Cannot simultaneously hedge to Economic vs GAAP vs STAT

Lincoln’s primary focus is economic liability

We are mindful of GAAP and STAT impacts

STAT reserves have higher market sensitivity but low rate and volatility sensitivity

Macro hedges could limit statutory capital impacts from falling markets but are expensive to implement
Summary

- Hedge Program Manages Impact of Guaranteed Benefits
- Program Performed Well During Crisis
- Refining Program to Meet Challenges
Opportunities at LFG

- Please go to the LFG home page for additional career opportunities

- www.LFG.com/careers

- Lincoln Financial Development Programs:
  - Actuarial Development Program
    - Contact: Actuarial@LFG.com
  - Leadership Preparation Program
    - Contact: LPP@LFG.com
Questions?