



Variable Annuity Pricing Panel

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Guillaume Briere-Giroux, FSA, MAAA, CFA

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Agenda

The goals of today's session are to...

- Offer tangible value and insights using...
 - Hard findings from the 2011 Towers Watson VA Pricing Survey
 - Experience in VA pricing and risk management
- Promote active audience participation
 - Panel format
 - Surveying the audience
 - Encourage questions throughout
- Provide a view of where VA pricing is headed

Topics covered

- Pricing metrics
- Assumptions
 - Economic
 - Non-economic (policyholder behavior, capital, etc.)
- Sensitivities
- Product development and pricing process
- Emerging trends
- Future state of VA pricing

Pricing Metrics

Pricing metrics definitions

- Metrics covered by the VA pricing survey (alphabetical order)
 - Market-consistent VNB
 - Tail measures
 - Required economic capital
 - Return on assets (ROA)
 - Return on equity (ROE)
 - Rider cost coverage (rider charge/hedge cost)
 - Statutory capital/earnings at risk
 - Statutory earning/capital strain
 - Statutory IRR on capital
 - Statutory VNB margins

What is the most prevalent pricing metric?

- Rider cost coverage (rider charge/hedge cost)
- Statutory IRR on capital
- Statutory VNB margins

Comments on pricing targets

- Rider cost coverage
- Statutory IRR on capital
- Market-consistent VNB
- GAAP ROE

Assumptions

The following economic assumption frameworks are used in the industry

- Real world pricing
- Real world pricing with explicit projection of hedging transactions
- Market-consistent risk-neutral hedge cost
- Non-market-consistent risk-neutral hedge cost
- Full market-consistent pricing

The frameworks utilized vary by benefit type

- Several companies use many methodologies for the same contract type
- Real world frameworks continue to dominate base contract pricing
- Use of market-consistent hedge costs (living benefits vs. death benefits)
- Few use non-market-consistent hedge costs
- There is increased use of real world scenarios with explicit hedge modeling

The choice of economic assumptions can significantly impact pricing

- Real world/real world with explicit hedging vs. risk-neutral for certain benefits
- Market-consistent risk-neutral assumptions vs. non-market-consistent risk-neutral assumptions
- There is a relatively wide range of real world and non-market-consistent risk-neutral assumptions.
 - Not surprisingly, the range of market-consistent assumptions is narrower

Properties of real world scenarios

- The results below are based on 14 responses

Real world scenario properties

| Property | Count |
|--|-------|
| Stochastic equity returns | 14 |
| Stochastic interest rates | 12 |
| With mean reversion | 10 |
| No mean reversion | 1 |
| Short rate impacts money market returns | 8 |
| Long rate impacts bond returns | 8 |
| Long rate impacts IB/WB payout phase earned rate | 5 |
| Bond fund credit spread/equity correlation | 3 |
| Short rate/equity correlation | 4 |
| Long rate/equity correlation | 5 |

Properties of risk-neutral scenarios

- The results below are based on 17 responses

Properties of risk-neutral scenarios

| Property | Count |
|--|-------|
| Stochastic equity returns | 17 |
| Stochastic interest rates | 12 |
| Short rate impacts path dependent discount rate | 11 |
| Short rate impacts equity return drift | 10 |
| Short rate impacts money market total returns | 10 |
| Long rate impacts bond fund total returns | 10 |
| Long rate impacts IB/WB payout phase earned rate | 6 |

Methods for setting risk-neutral assumptions (interest rates and implied volatilities)

- Current market conditions
- Current market conditions + sensitivities
- Market conditions consistent with cost of new business hedges
- Forecast of market conditions at point of sale
- Long term estimates (with or without margins)
- Start with current conditions and grade to long term estimates

Impact of hedging on use/nature of risk-neutral scenarios

- A few companies reported multiple methods, based on benefit types

Impact of hedging strategy on risk-neutral assumptions

| Method | Count |
|--|-------|
| No, the hedging strategy employed does not affect the calibration of risk-neutral scenarios used for pricing | 10 |
| Yes, we use market-consistent interest rates and volatilities to the extent that we trade derivative instruments and lock in the cost at issue | 4 |
| Yes, the hedging strategy drives whether real world pricing is performed or a risk-neutral valuation is performed | 3 |
| Yes, we use estimates of market-consistent interest rates and volatilities to proxy the cost of initial and future hedging purchases, consistent with the type and maturity of derivative instruments used | 3 |

Properties of dynamic lapse formulas

- Essentially, all companies reported using dynamic lapses for living benefit pricing
- Most companies reported using dynamic lapses for GMDB only contracts
- Most companies use either a floor lapse multiplier, a floor lapse rate or a combination of floor multiplier and floor lapse rate
- Two-sided vs. one-sided formulas

Other assumptions

- Expenses
- Capital
- Hedge effectiveness and basis risk

Sensitivities

Most companies indicated a variety of economic sensitivities are performed in pricing

Types of economic sensitivities

| Test Performed | Count |
|---|-------|
| Risk-neutral interest rates | 14 |
| Risk-neutral equity implied volatilities | 13 |
| Real world equity growth/assumed fund growth | 11 |
| Equity market shock after issue | 8 |
| Combinations of risk-neutral rates and volatility (“heatmap”) | 6 |
| Real world risk discount rate | 6 |
| Real world equity volatility/assumed fund volatility | 5 |
| Real world general account earned rates | 4 |
| Interest rate implied volatilities | 3 |
| Correlation sensitivities | 1 |
| Other | 1 |

All writers reported performing several policyholder behavior and business mix sensitivities

Types of policyholder behavior and business mix sensitivities

| Test Performed | Count |
|---|-------|
| Base lapse | 17 |
| Age distribution | 17 |
| Fund mix | 16 |
| Dynamic lapse assumption | 15 |
| Withdrawal utilization (timing) | 15 |
| Single/joint mix | 11 |
| Share class mix | 10 |
| Withdrawal utilization (% of maximum utilized) | 9 |
| Qualified/non-qualified mix | 7 |
| Gender mix | 7 |
| Distribution channel mix | 4 |
| Annuitization assumptions | 4 |
| Combination of policyholder, sales mix and economic | 3 |

Product Development and Pricing Process

Product development and pricing process

- Number/types of resources dedicated to VA product development
- Formal process
 - Milestones
 - Sign-off and responsibilities
 - Peer review requirements
- Pricing software

Emerging Trends and Future State

Emerging trends

- Pricing process becoming more formalized
- More analysis, more sensitivities
- Greater connection with hedging and risk analysis
- Significant increase in required capital for certain companies

Future state of VA pricing

- Pricing is risk management's first line of defense
 - Insights relevant for product design and strategy
 - High quality results (validation and sensitivities)
- Increasing use of comprehensive financial projections
 - Real world scenarios with on-the-fly calibration of risk-neutral scenarios
 - Explicit projection of hedging, fixed assets and management actions
 - Explicit projection of statutory, economic and GAAP results
 - How much profit, how, why and when?
 - What does the tail look like?
 - What are the pros and cons of a hedging strategy and / or design?

Future state of VA pricing (continued)

- Better policyholder behavior models
- We see room for improvement economic scenarios and return modeling
 - Stochastic rates and equities
 - Credit spreads
 - Implied volatilities
 - Correlations
 - Bond returns
 - General account assets
- Communication of results
 - Significant effort
 - Focus
 - Education