



# Variable Annuity Pricing Panel

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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