

# Variable Annuities

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# Variable Annuities Are Beneficial

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- **Beneficial to Stock Market & Economy**
- **Beneficial to Consumers**
  - Retirement Planning
  - Estate Planning
  - Financial Planning
- **Beneficial to Insurance Companies**
  - Reasonable Return
  - Manageable Risk
- **Beneficial to Distributors**
  - Agents
  - Banks
  - Securities Firms
- **Beneficial to Fund Managers**

# Consumer Value

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- **Opportunity For Superior Long-Term Investment Returns**
  - Historically low interest rate environment at this time
  - Equity returns typically beat fixed income returns over the long-term
- **Investment diversification is a recognized tool for managing risk**
- **Price Needs to Allow For Reasonable Net Return to the Consumer**
  - Initial capital investment key component to determining price
  - Reserve and solvency requirements need to cover risks in responsible way
  - Excessive application could cause an unacceptable (to consumers) increase in price

# Variable Annuity Product Description

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- **Single Premium**
- **Fund Choices**
  - Fixed Account, Domestic Equities, Foreign Equities, Domestic Bonds and Foreign Bonds
- **Asset-Based Fees**
  - Annuity M&E: 100-235 bps
  - Fund Expenses: 60-200 bps
- **Back-End Surrender Charges**
  - 7% Year 1, reducing to zero in Year 8
- **Policy Fees**
  - \$40 per year below threshold
- **Payout Annuity Guarantees (distribution)**
  - Mortality and interest in the US
  - None in Japan or UK

# Variable Annuity Guaranteed Benefits

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## Guaranteed Death Benefits (GMDBs)

- **Return of Premium (ROP)**
  - Upon death, pays greater of original premium deposit or account value (original deposit adjusted for partial withdrawals)
- **Highest Anniversary Value (HAV)**
  - Upon death, pays greater of highest anniversary value or account value (highest anniversary value adjusted for partial withdrawals)
- **Roll-up**
  - Upon death, pays greater of original premium deposit accumulated at specific % or account value (roll-up adjusted for partial withdrawals)

## Guaranteed Living Benefits: (GMAB, GMIB, GMWB)

- **Guaranteed Minimum Accumulation Benefit (GMAB)**
  - Pre-determined exercise date
  - Customer receives greater of guaranteed amount or account value
  - Payable in a lump sum

# Variable Annuity Guaranteed Benefits

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- **Guaranteed Living Benefits: (GMAB, GMIB, GMWB)**
- **Guaranteed Minimum Income Benefit (GMIB)**
  - Pre-determined exercise date
  - Customer receives greater of guaranteed amount or account value
  - Payable in an annuity
  - Special mortality and interest rates
  - Typically a roll-up type accumulation for guaranteed amount
  - Payout options over long horizon, at least 15-20 years to life
- In Japan, guaranteed amount is return of premium with payout over a shorter period (minimum of 5 years)
- **Guaranteed Minimum Withdrawal Benefit (GMWB)**
  - Flexible exercise date
  - Customer receives greater of return of premium or account value
  - Payable as systematic withdrawal over time
  - Longer payment period required for early exercise
  - Can include reset feature
  - Can stop and restart

# VA Key Financial Risks

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- **Revenue**
  - Volatility of fees
  - Volatility of expenses
- **Guaranteed Benefits**
  - Market performance
  - Currency changes
  - Customer behavior
- **Payout Guarantees**
  - Mortality improvement
  - Level of interest rates

# Variable Annuity Risk Management

- **Pre-Sale**

- **Product Design**

- Limit issue age
    - Diversify fund offerings
    - Limit stock allocation
    - Limit foreign fund allocation
    - Minimum accumulation period (years and/or age)
    - Restrict benefit election points
    - Require minimum payout period
    - Conservatively price guaranteed benefits
    - Base product excess profitability
    - Older age restrictions:
      - Cap benefit
      - Freeze benefit
      - Eliminate benefit
    - Business mix diversification

- **Reinsurance**

- 100% coverage available in past
    - Limited availability now

- **Post-Sale**

- **Monitor Exposure**

- Monthly determination

- **Statutory Reserves**

- Basic level of Account Value or Cash Surrender Value
    - Immediate drop and recover calculation (old US statutory)
    - Conditional tail expectation (CTE, new US statutory, stochastic modeling)
    - Option formula approach (Japan)

- **Statutory Capital**

- CTE approach (new US)
    - Factors (Japan)

- **Potential Hedging**

- Static
    - Dynamic
    - Combination



# US Variable Annuity Valuation

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- **US Statutory Valuation Approach (Current)**
  - Guaranteed death benefits use a drop and recover calculation
  - Guaranteed living benefits simply accumulate fees but also require an adequacy test
- **US Statutory Valuation Approach (Proposal)**
  - 2 years of study, open development w/product experts
  - Addresses basic reserves, guaranteed benefit reserves and solvency levels
- **New US Methodology**
  - Stochastic analysis
  - Projects realistic distribution of scenarios
  - Incorporates realistic actuarial assumptions
  - Valuation level uses conservative point on distribution
- **US Assumptions**
  - Historical fund performance (means & volatilities) over several economic cycles
  - Prudent best estimate assumptions (death & lapse)

# Japan Variable Annuity Valuation

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- **Japan Statutory Valuation Approach (Current)**
  - Basic reserve is account value
  - Guaranteed benefits reserve is accumulation of filed annual cost
- **Japan Statutory Valuation Approach (Proposal)**
  - Basic reserve is account value
  - Guaranteed benefits reserve uses option formula approach
  - Capital requirements use factors (not risk based)
  - Foreign companies concerned and proposing alternative similar to US
- **Japan Methodology**
  - Option formula inputs imply very conservative distribution of scenarios
  - Incorporates very conservative actuarial assumptions
  - Takes average of the distribution
- **Japan Assumptions**
  - Limited historical market performance
  - Very conservative actuarial assumptions (death & surrender)

# Hedging Guaranteed Benefits

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- **US GAAP Accounting Encourages Hedging**
  - Most guaranteed benefits considered embedded derivatives
  - Liability is a market-responsive calculation
  - Need market-responsive hedges to offset volatility of liability
- **Typically Expect a Reasonable Long-Term Economic Result**
  - Priced conservatively
  - Hedge at an “expected” level
- **Earnings Volatility**
  - Still exists for US GAAP accounting (no perfect hedge)
  - Can be large for statutory if reserve not market-responsive

# Hedging Program Steps

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- Identify tradable indices
- Map actual funds to tradable indices
- Determine actuarial assumptions
- Set market/economic assumptions & sensitivities
- Validate liability model
- Calculate “greeks”
  - Delta – sensitivity to changes in equity
  - Gamma – sensitivity to changes in delta
  - Rho – sensitivity to changes in interest rates
  - Vega – sensitivity to changes in volatility
  - Theta – sensitivity to changes in time

# Hedging Program Steps

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- Agree on objective
- Identify hedge assets
- Evaluate hedging strategies
  - Back-testing
  - Scenario analysis
  - Mock trading
- Recommend hedging strategy
- Put controls in place
- Implement hedging portfolios

# Hedging Program Benefits

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- Can adapt to changes in the market (dynamic hedging)
- Can modify for actuarial assumptions which emerge differently from original assumptions
- Can reduce exposure in the tail of the distribution
- Can reduce capital requirements

# Hedging Program Risks

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- “Cost” to hedging
  - Expense of options/futures
  - Operations
  - Ultimate cost not known at start date
- Model risk
  - Very complex
  - Difficult to validate
  - Need to be careful with inputs
- Volatility of results
- No perfect hedge (manage risk, cannot eliminate)
  - Basis risk
  - Assumptions risk
- Execution of transactions