

A MILLIMAN GLOBAL FIRM



Milliman USA

Consultants and Actuaries

Life Insurance Industry Risk Management

David Ingram, FSA, PRM

Milliman USA

PRMIA NY April 21, 2003

Actuarial Risk Management

- Traditional Roles include:
 - Develop risk measurement and risk exposure reports
 - Develop risk limits
 - Develop risk control processes
 - Perform risk analysis of new products and investment opportunities
 - Analyze earnings volatility and develop reaction
 - Perform RAROC & risk adjusted financial reporting
 - Perform risk adjusted pricing
 - Perform merger due diligence risk
 - Develop and maintain economic capital calculations



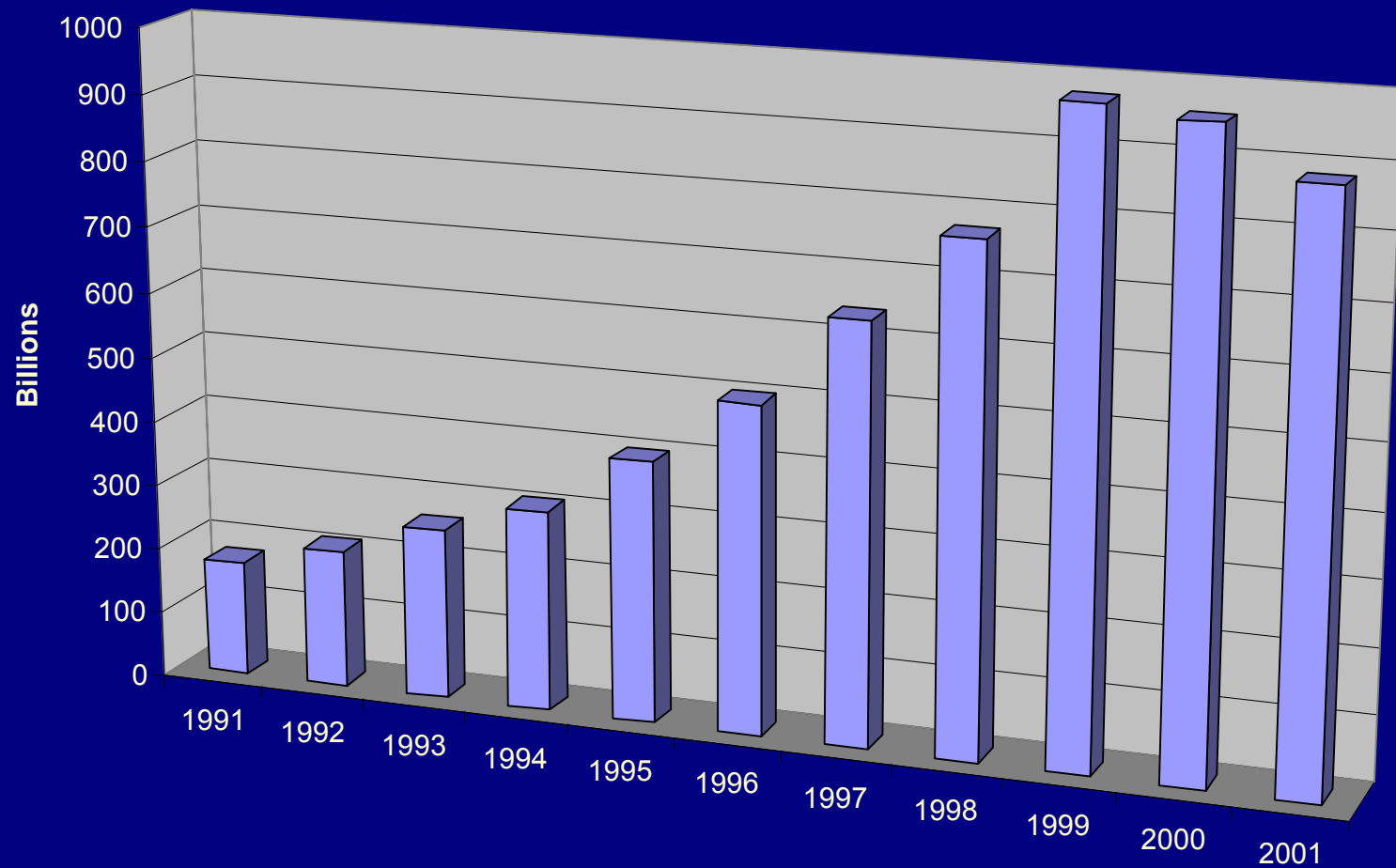
Agenda

1. A Case Study – Variable Annuities
2. Life Company Risk Management Best Practices
3. Society of Actuaries Risk Management Task Force



The Hot Product of the 1990's

Variable Annuity Assets Under Management



VA Product

- Institutional Mutual Funds
 - Multi Manager – up to 30 or more funds
- Deferred Annuity Contract Wrapper
 - Annuitization @ “maturity”
 - CDSL, M&E charges
 - Tax Deferral



VA Benefits

- Guaranteed Minimum **Death** Benefits
 - Return of Premium – Minimum floor 0% return
 - Roll-up – Minimum floor 5% to 7% return
 - Ratchet – High water mark – various reset
- Guaranteed Minimum Income Benefit
 - must elect annuitization
- Enhanced Death Benefit – 40% to pay income tax
- Guaranteed minimum earnings – 5,7,10 year



VA – Base Product Pricing

- RAROC Target
 - Using projected cashflows at the long term average for stock market returns
 - Capital Requirement
 - Customer takes asset risk so thought to be ~0
 - Conservative companies used 1/2% of AV
 - Very Conservative companies used 1% AV
- Using that method – zero cost for benefits



Benefit Pricing

– Alternate Method

- Using Stochastic Monte Carlo Model
 - Stock Returns assumed to be Normal
 - μ, σ from historical data
 - Price for benefits would be based on the average benefits paid over 100 – 1000 scenarios



Risk Management for benefits

- Reinsure
- Hedge
- Retain



Reinsurance Market

- Insurers were not generally confident that they got the benefit pricing right
- Reinsurers offered to take the risk for a price that was fairly close to calculated cost
- Strange market – reinsurers would enter the market and leave a year or two later
(often was treated as primarily mortality benefits. When equity exposure was discovered by “corporate” – plug pulled immediately)



Hedging VA Benefits

- Some got quotes from banks for custom hedges for the long term risks
 - Prices for those hedges were very high
- Some developed delta hedging programs
 - Contracts available did not begin to approach the duration needed
 - Complicated programs needed to minimize basis risk
 - Cost of hedging program depended on changing (and unknown future) market price of futures contracts



Retaining VA Benefit Risk

- Usually not a quantitatively reasoned position



Market Run-up Late 1990's

- Everyone was happy
- Sales kept growing
- Account values kept growing
- Fees Grew
- Benefits completely out of the money



Market Fall

- Revenues from M&E Charges Fell
- DAC Problems
- Reinsurer Problems
- Claims Costs
- Risk Based Capital Requirements
- Reserve Requirements
- Market Pricing



Revenues Fall

- One major writer – American Skandia
- Acquired by Prudential at 1% of assets
 - For business that was acquired by Skandia at a cost of 5% to 7% of assets



DAC Problems

- Insurance Companies defer acquisition costs
 - Annuity Contracts have CDSL to recover acquisition costs
 - Lower AV's mean lower CDSL recoveries
 - Many companies had to write off DAC



Reinsurer Problems

- Market for reinsurance dried up completely
 - New sales only
 - existing reinsurance couldn't be cancelled
- CIGNA adds \$1 billion in reserves for their reinsurance of this product



Claims Costs

- Started to hit in 2002
 - When AV's started to fall below guarantees
 - With DB 30% above AV
 - Mortality cost will be 13 bps at age 55
- On Ratchet benefits
 - Death benefit keeps growing
 - Market has to really shoot up to recover
 - With 7% ratchet market has to return 7% + 2-3% expense loads to stay even



Risk Based Capital (Regulatory Capital Requirement)

- RBC had been zero for this product
- New Requirement-
 - Stochastic Monte Carlo Model –
INTERNAL MODEL
 - Scenarios with tails more robust than normal distribution required
 - Contingent Tail Expectation – not VaR
 - 90% CTE is average of scenarios worse than 90% VaR
- Result is 2.5% to 10% of AV
 - More capital required if further underwater



Reserves

- Initially – No Reserves
- Intermediate – Simple Reserves
 - Based on Stress test type calculation or on simple accumulation of fees
- Ultimate – 60% or 65% CTE for reserves
- GAAP – Usually accumulation of fees less benefits
 - Currently, most GAAP reserves would be zero!
 - Some benefits get FAS 133 treatment (not related to death benefits)



Pricing of Benefits

- Common now for companies to price so that company can achieve hurdle rate on VA benefits at 80% VaR
 - Pricing then exceeds current Market Price for hedging
 - *What a concept!*
 - Once new capital requirements are in place pricing will probably be adjusted



Risk Management Best Practices for Life Insurance Companies

- Wish List of Risk Management Practices
 - Developed by US & UK actuaries
- Mostly taken from Banking materials
- Most insurance companies applying 6 or fewer of these

- UK Practice – Process Oriented (Turnbull)
- US Practice – Quant oriented & uneven



Risk Management Best Practices for Insurance Companies

UK

1. Board & Senior Management are Responsible for Risk Management

UK

2. Senior management understands all firm activities and understands the basis of the Risk Management system

UK

3. Authority and responsibility are clearly defined and risk measurement and management are independent from risk taking functions



All is
Rare

4. All material risks are identified and measured
Exposures are aggregated and management attends to largest exposures

Risk Management Best Practices for Insurance Companies

Some

5. There are risk limits for all material risks and a system for enforcing the limits that is part of an internal control system that is relevant to the risks of the firm

Rare

6. The firm has staff with sufficient expertise to perform the risk management functions and adequate systems support

US

7. Risk surplus is allocated to business units and products and is used for capital budgeting purposes



8. Stress testing is a part of the risk management process

US

Risk Management Best Practices for Insurance Companies

Yes

RAROC
(US)

Rare



9. New products and ventures trigger consideration of potential new risks and new risk management procedures
10. Financial reporting allows management to view the risk adjusted returns of business units, products and activities.
11. Product pricing and rate setting reflects the risk adjusted return.
12. The firm has a process for quickly resolving identified risk management weaknesses

New Product Review – Ideal

New Product Risk Management Review Questions:

1. What are the significant risks of this product:
 - a. Market Risks
 - b. Credit Risks
 - c. Insurance Risks
 - d. Operational Risks
 - e. Liquidity Risks
 - f. Group Risks
2. How will these risks be measured?
 - a. By whom and using what techniques and processes?
 - b. Where/how will the risk exposures be reported? What will the risk exposure reports look like?
3. What are the plans for managing those risks?
 - a. Product design, compensation design, control processes, reinsurance, hedging
 - b. Who will be responsible for the risk management?
4. What are the daily, weekly, monthly risk limits?
 - a. How are those limits policed?
 - b. What happens when a limit is exceeded?
5. What training is needed for the staff that will be doing the risk measurement and the risk management processes?
 - a. What training is needed for Senior Management to get a full understanding level on these risks?
6. Who in Senior Executive Team is personally responsible for this product?
7. What is the procedure for determining the Risk Surplus required for this product?
 - a. Demonstration this is consistent with the Risk Surplus for other company products.
8. Which of the existing company stress tests are expected to be most significant for this product?
 - a. Are any additional stress tests recommended?
9. Will the company's internal and external financial reporting processes capture the appropriate risk adjusted returns for this product consistently with existing products?
 - a. Are there risks for this product that have significantly different characteristics that special consideration is needed?
 - b. Are there any pending studies of financial reporting for this product that might change the accounting significantly when the studies are completed?
10. How does the product pricing reflect the risks of the product?
 - a. Is the product considered to be more or less risky than the average of the company's existing products?
 - b. If so, what adjustments have been made to the pricing to adjust for that risk differential?



New Product Review - Actual

- New Product Report
 - Detailed Product Specs
 - Projected unit and total profit
 - Expense projections
 - Economic Capital
 - Risk Analysis
 - Stress Testing
 - Risk Management
 - Reinsurance
 - ALM
 - Hedging



Society of Actuaries Risk Management Task Force

- Founded in 2001 – Goals:
 - to address the growing need for information on risk management
 - to make risk management a regular part of actuarial practice
 - to advance professional recognition and career opportunities for actuaries in the arena of risk management



Major Activities

1. promotion of actuarial expertise in areas of risk management,
2. promotion of opportunities for actuaries in the arena of risk management,
3. sponsorship of seminars on risk management, and
4. development of new risk management educational materials.



SOA RMTF

Sub Groups:

1. Economic Capital Calculation and Allocation
2. Enterprise Risk Management
3. Equity Modeling
4. Extreme Value Models
5. Health Risk Management
6. Policyholder Behavior in the Tail
7. Pricing for Risk
8. Risk Based Capital Covariance
9. Risk Management Future and Strategy
10. Risk Management Metrics



<http://www.soa.org/sections/rmtf/rmtf.html>

Seminars

- 5 -1.5 day seminars held 2001 & 2002
 - 50-60 average attendance per seminar



Economic Capital

- Survey of Practice – completed
 - 500 respondents
- Literature review – completed
- Specialty Guide – in process



Enterprise Risk Management

- Has Held 6 teleseminars with speakers from Casualty Actuarial Society, UK, rating agency, etc
- Literature survey – completed



Equity Modeling

- Guide to Scenario generators for beginners
 - In process



Extreme Value Models

- Guide to EVM for beginners
 - In process
- Application of Advanced EV techniques to Insurance Models



Health Risk Management

- Short Term Health Insurance Products
 - Indemnity insurance
- Long Term Health Insurance Products
 - Long Term Care
 - Disability Income
- Health Provider Risk Management



Policyholder Behavior in the Tails

- Collecting data for behavioral studies
 - Exercise of insurance product options
 - Surrendering a VA product when GMDB is in the money



Pricing for Risk

- Survey of current Practices – completing write-up of survey
- Developing new research projects



Risk Based Capital Covariance

- Have commissioned a research project to develop factors to be used in regulatory model for covariance of risks
 - (currently formula uses either 100% or 0%)



Risk Management Metrics

- Definitions of Metrics in use – several drafts have been completed and peer reviewed others in progress
- Descriptions of usage of Metrics
 - Risk Limitations – under development



Risk Management Strategy

- Planning group for the RMTF





A MILLIMAN GLOBAL FIRM



Milliman USA

Consultants and Actuaries

David Ingram, FSA, PRM

(212) 279 7166

david.ingram@milliman.com

