ERM in Annuities

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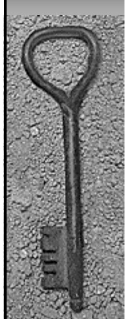
SOA ERM Symposium, Chicago, May 2-3, 2005



Overview

- Risks in Annuities
  - Variable Annuities
  - Equity Indexed Annuities
  - Fixed Annuities
- Risk Management Tools
- ERM Framework
  - Risk and Return Metrics
  - Constraints
  - Decision Criteria
  - Implementation at AIG

Risks in Variable Annuities

- Market risks:
  - Financial guarantees: GMDB, EEB, GMIB, GMAB and GMWB
  - Fee income
- Insurance risks:
  - Policyholder behavior: lapse, fund transfers, and withdrawals
  - Mortality
- Credit risks:
  - Reinsurance recoverables
  - Counter-party credit risk on OTC derivatives (hedges)

Risks in Equity Indexed Annuities

- Market risks:
  - Financial guarantees: PTP, high water mark, ratchet, other exotics derivatives attached to EIA's
  - G/A Investment: duration mismatch
- Insurance risks:
  - Policyholder behavior
  - Mortality
- Credit risks:
  - G/A Investment: assets with low ratings
  - Counter-party credit risk from OTC derivatives

Risks in Fixed Annuities

- Market risks:
  - G/A Investment: duration mismatch
  - Minimum crediting rates
- Insurance risks:
  - Policyholder behavior: lapse, dump-ins
  - Mortality
- Credit risks:
  - G/A Investment: assets with low ratings
  - Counter-party credit risk from OTC derivatives

Risk Management Tools

- Hedging: quasi-static and dynamic
- Reinsurance
- Product Design: examples include
  - MVA for FA
  - Fees charged as % of max(AV, Guar)
- Product Diversification: EIA & VA, Annuities in different currencies and countries.
- Asset Allocation: Match duration of the bond fund backing GMIB

Performance Metrics

- Returns
  - Fair Value (FV) or Economic Value
  - GAAP Earnings
- Risks
  - Economic Capital (EC)
  - GAAP Earnings-at-Risk (EaR)
- Constraints
  - Accounting
  - Regulatory and Rating Agency

Fair Value & Economic Capital

- **Fair Value:**

  Average present value of the net product cash flows under a consistent stochastic economic scenario set.

- **Economic Capital:**

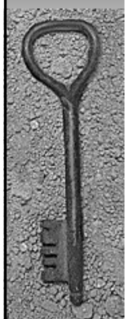
  Change in fair value calculated at a future time point using a conservative confidence interval (such as 99%).

ERM Decision Criteria

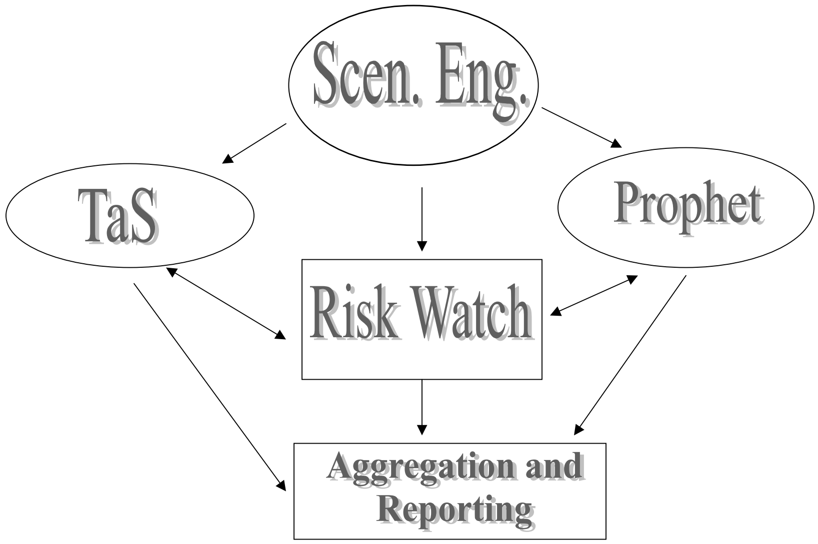
- Optimize risk adjusted return subject to constrains
  - *RAROC=(Expected Return)/EC*
  - *Achieve required GAAP Income and cap GAAP EaR*
- Supplemental profit measures:
  - *ROC*
  - *ROA*

Implementation Plan

- License the same actuarial systems currently used by the business units.
- Obtain ALM(CFT) models used by the business units.
- Make appropriate adjustments.
- Feed consistent economic scenarios to these systems and project scenario based cash flows.
- Aggregate the cash flows at the appropriate level for each scenario.
- Perform fair value and GAAP analysis.



Implementation: Building blocks.



Toomre Capital Markets LLC
Transforming Institutional Risk

ERM in Asset Management

3rd Annual ERM Symposium
Sheraton Chicago Hotel
May 3, 2005

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Toomre Capital Markets – Who We Are

Toomre Capital Markets ("TCM") is a premier financial engineering firm specializing in the converging world of asset, liability and liquidity markets for the select few who professionally and intellectually embrace the concept of Economic Value Added ("EVA"). In today's swiftly evolving and consolidating Capital Markets, information flows at heightened levels of insistence and intensity, and enterprise risk management is a key value driver.

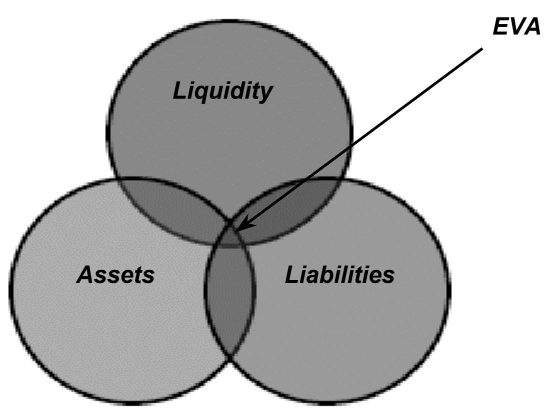
TCM and its clients constantly strive to transform raw data – people, securities, organizations, holdings, exposures, risks, prices, products and their inter-relationships – into knowledge. We must learn to drink from the proverbial "**spewing fire hydrant of information flow**"; then turn that **knowledge** into **VALUE**! Remember that this is a continuous process for all involved because the minute you think you know something cold, the markets have a befuddling habit of teaching you just how much more you have to learn.

The TCM Perspective on Convergence in Today's Capital Markets

Increased need to optimize Economic Value Added is causing the convergence of three primary capital markets sectors

- **Liquidity** – Liquefying risk (and resulting increased efficiency in pricing risk) is key to efficiently transferring risk from risk-sellers to risk-buyers
- **Assets** – Level and mix of assets must be continually managed to optimize risk adjusted returns over entire business cycle
- **Liabilities** – Require effective underwriting in order to allocate capital more efficiently, optimize risk adjusted return on capital and manage expected and unexpected losses

Only successful integration and management of ALL 3 areas optimizes enterprise value and EVA



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Keys to Long-Term Asset Success

- Gather (and Retain) Assets
- Consistent Asset Management Processes
  (goal: sustainable superior returns)
- Value of Compounding Excess Return
- Spread G & A over an increasing asset base
- Communicate the "Value Added" to stake holders

Example: High-Grade Fixed-Income Asset Management

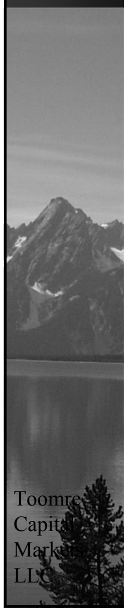
- "Boring" type of Asset Management
- Manage portfolio(s) thru high-grade bonds
- Typical portfolio returns T + approx 40 bp
- Evaluate results versus bond indicies
  (e.g. Lehman Intermediate Gov/Corp)
- Communicate results to stake holders, generally monthly or even quarterly

Key Drivers to Superior High-Grade Fixed-Income Returns

- Duration Choice
- Currency Exposure
- Sector Mixture
- Credit Quality Selection
- Optionality (that concept: **convexity**)
- Yield Curve Exposure
- Issue Selection

Key Risks for Example Asset Manager Ranked by Importance

- Operational Risk
- Compliance Risk
- Reputational Risk
- Duration Risk
- Currency Risk
- Market Risk
- Prepayment Risk
- Credit Risk

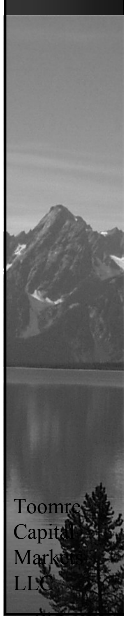


Example of Asset – Liability Convergence

- Portfolio Management produces T + 65 bp
- Lehman Int. Gov/Corp returns T + 40 bp

25 bp of excess – **Guarantee this Return???**

Thought: What should an actuary use to evaluate and determine the appropriate capital charge for guaranteeing the returns of an asset manager?

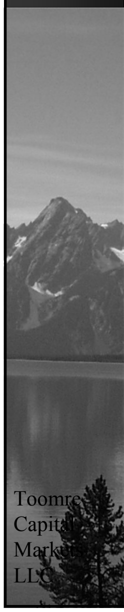


Example of Asset – Liquidity Convergence

- Portfolio Management produces T + 65 bp
- Lehman Int. Gov/Corp returns T + 40 bp
- TRR swap: Pay Lehman Int. G/C return and receive LIBOR minus 5 bp

Result: LIBOR + 20 bp return
(in tight spread environment)

Enterprise Risk and Toomre Capital Markets



Lars has served as the Enterprise Risk Management underwriter for Munich/American Re as well as running the structured products trading areas at Lehman, Smith Barney, and UBS and managing the long immunized portfolios at MetLife Investment Management. As a result, Lars is one of the few with true "**been there, done that**" risk management experience in all three sectors of financial services: assets, liabilities and liquidity.

In short, it is much the same problem with just a different language for each sector. Please feel free to ask questions and add comments

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