



Banks and Insurers: Separate Paths but a Common Destination

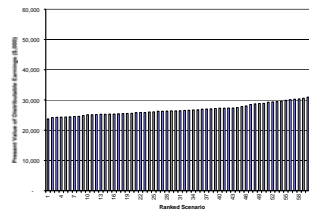
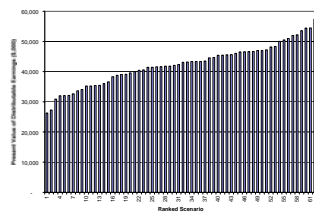
Practical Tools Shared Between Financial Service Industries

Session 2

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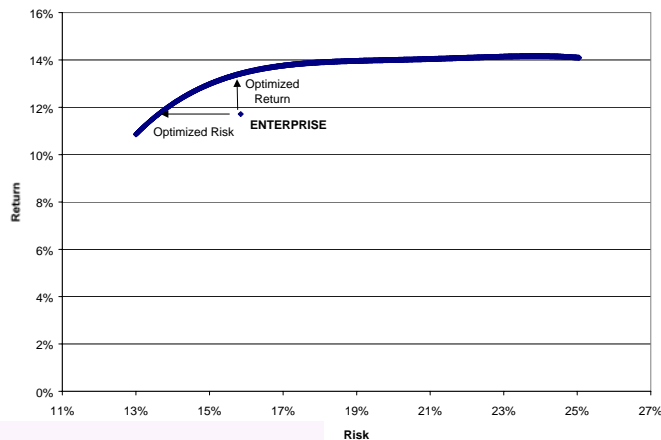
Risk/Return Profile



Insurance vs. Banks

- Time horizon
- Liability options
 - Deferred annuities: interest options
 - 30 year Level term: lapse supported
 - Universal life with secondary guarantees
 - Options AND lapse supported
 - Variable annuities: guaranteed returns


Risk/Return Optimization and the Efficient Frontier





Interest Rate Risk

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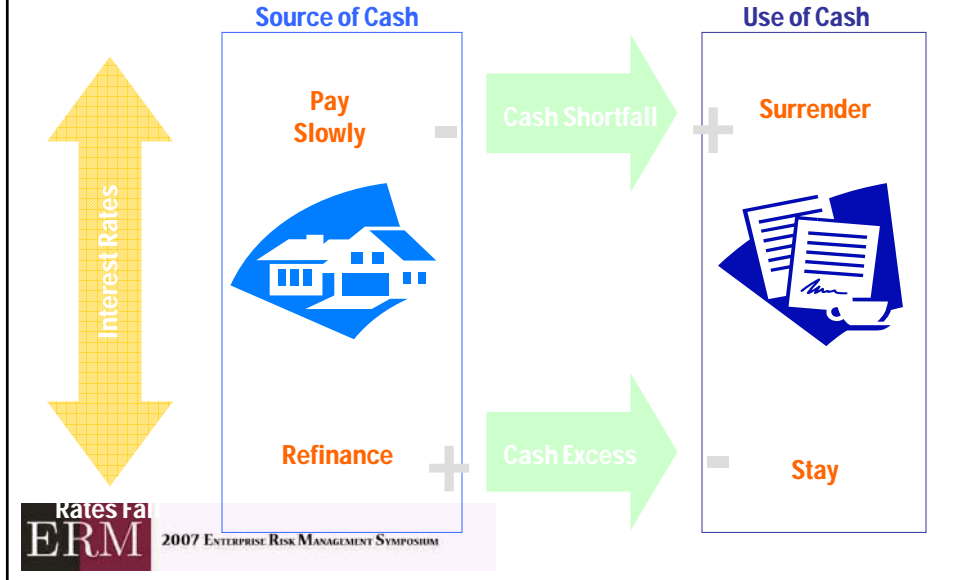


Economic Value

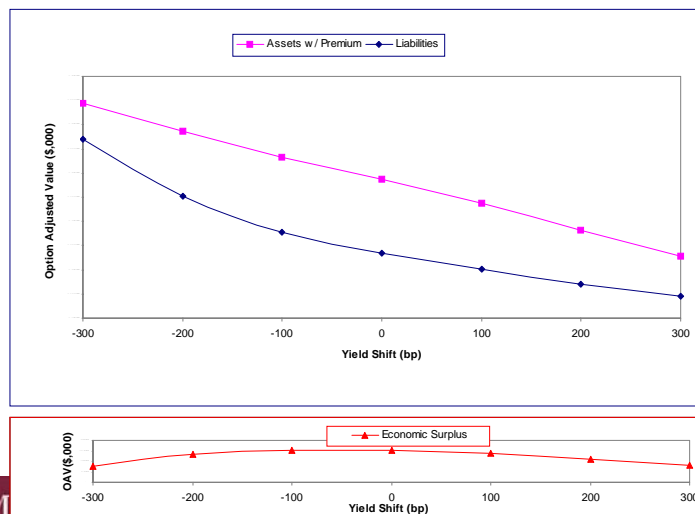
- Difference between the market value of future cash flows from assets (+), premiums (+) and liabilities (-)
- Often greater than GAAP equity (no conservatism in assumptions)
- Measures interest rate risk only
 - Assumes parallel interest rate shifts
- Fair value accounting: principles based
- In force business only

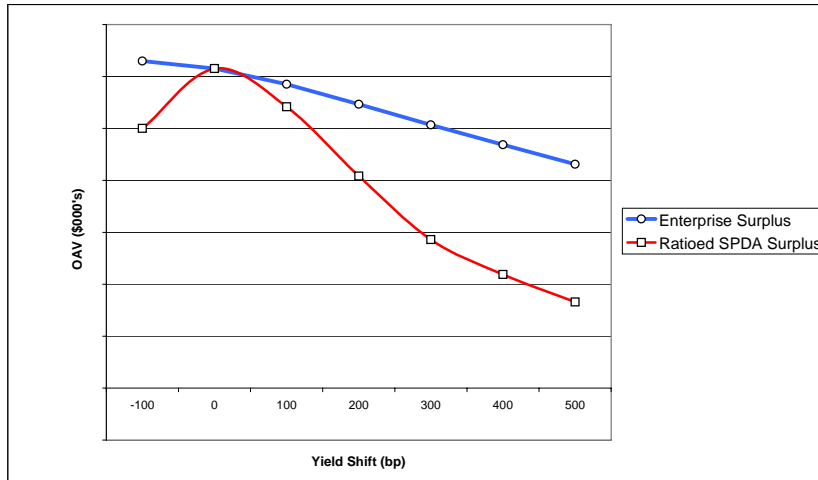
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Convexity Example



Price Behavior Curves





Duration

- Measures the change in value relative to the changes in interest rates (1st derivative/tangent)
- Duration of 3 means a 3% decrease in value for a 1% increase in interest rates
- Mismatch long is common
 - Especially when curve is not flat/inverted




Duration

- Effective (option adjusted) duration
 - Matching duration probably not optimal
- Define inflows and outflows
 - Cash inflows are split out from cash outflows
 - No ‘netting’ of premiums, liabilities

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Enterprise Duration

- $D_S = D_L + (D_A - D_L) * MV_A / MV_S$
 - D_S, D_A, D_L duration of surplus, assets, liabilities
 - MV_A market value of all company assets
 - MV_S economic surplus ($MV_A - MV_L$)
- Mismatch
 - $D_A - D_L$
- Leverage
 - MV_A / MV_S

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Mismatch / Leverage Examples

Liability Duration	Mismatch	Leverage	Surplus Duration
4	4	5	24
4	2	5	14
4	0	5	4
4	-2	5	-6
4	4	10	44
4	2	10	24
4	0	10	4
4	-2	10	-16

- Surplus duration = $D_L + \text{Mismatch} * \text{Leverage}$



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Capital



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Balance of Risks

- Balanced firm
- Concentrated firm



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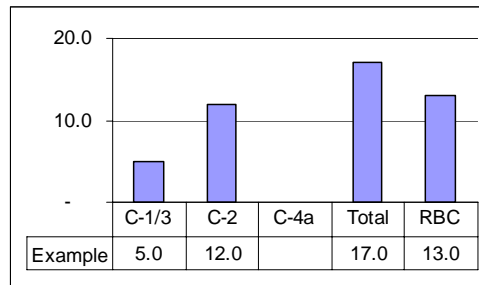
Case Study

- Assumes major risks are independent
 - Diversification benefit
- Example focuses on 2 risk categories
 - Asset risk (credit)/asset-liability mismatch risk
 - Insurance risk (mortality/morbidity)

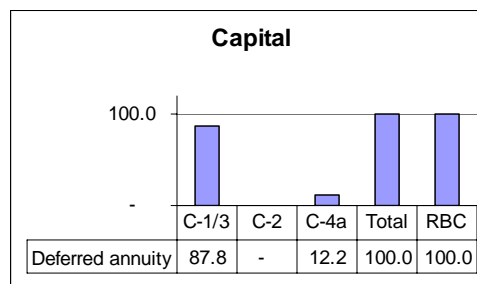
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Example Where $5+12=13$

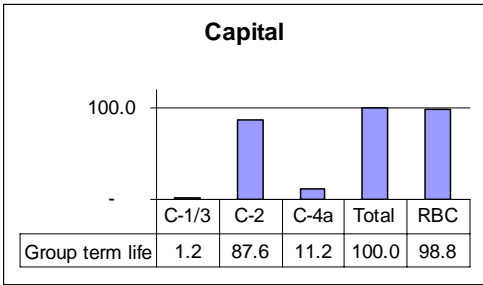


Product Line Impact



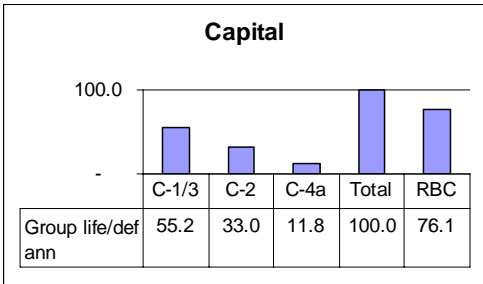
- No insurance risk reflected

Product Line Impact



- Primarily insurance (mortality) risk

Company Impact (with surplus)



- Strong diversifier – limit is 70.7 with 2 risks



Practical Uses

- Marginal impact
 - Organic growth
 - Project (aging) current product
 - Introduce new product
 - Reinsurance (with and without)
 - Asset mix
 - Acquisition



Principles-Based Approaches and Enterprise Risk Management

- ...Use the same tools
- ...Leverage existing models
- ...Use stochastic results (sort/graph)
 - Pick a level of conservatism
 - Conditional Tail Expectation (CTE/TVaR)
- ...Are built off cash flows
- ...Allow firms to choose risks to exploit



Scenario Planning

- Deterministic scenarios
 - Worried about specific event
 - What if once per century hurricane or pandemic
 - Modeling constraint
 - I don't know how to do it
 - Time constraint
 - I can't do it based on lengthy run time



Typical Insurance Scenarios

- Higher/lower
 - New money rates/Claims/Lapses/Sales
- Higher
 - Defaults/Expenses
- No reinsurance



Scenario - Event Risk

- Tail risk/Catastrophic risk
- Example – Influenza pandemic
 - 25% morbidity, 0.6% mortality in OECD
- Risk to life insurer
 - Business continuity
 - Claims
 - Liquidity (assets down/claims up)
 - Counterparty (reinsurer solvency)



Don't reinvent the wheel!!!

- Leverage off of existing models
- Weigh run time vs. time spent to explain differences in the models
- Automate - spend time on analysis
- Control cycle - iterative improvement
- Consistency between pricing, projections, reporting



Thank you!

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