EMERGING BEST PRACTICES IN PRICING

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Topics for Discussion

- Environment
- Profit Measures and Stochastic Analysis
- Assumptions and Sensitivity Testing
- Market Consistent/Risk Neutral pricing

Environment

- Sarbanes Oxley compliance
- Institutional investors
- Tougher competitive environment
- Changing reserve and RBC requirements
- Enterprise risk management
- Consolidation/Acquisition Activity
- Products with more complexity

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Survey Says….

- Conducted an informal survey of consultants who work on product development and profitability reviews.
- Major themes cited include:
  - ➔More stochastic pricing (including non- variable products) and “stochastic on stochastic”
  - ➔Market consistent pricing
  - ➔More emphasis on GAAP analysis
  - ➔Greater corporate controls and consistency among lines of business
  - ➔Modeling of alternative capital solutions as part of pricing
  - ➔Increased “granularity” of pricing assumptions

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Profit Measures – Traditional vs. Emerging

- Traditional -
  - ➔Deterministic/single scenario
  - ➔Mainly Statutory basis
  - ➔Simple RBC formulae
  - ➔Basic sensitivities

- Emerging –
  - ➔Stochastic analysis
  - ➔Tail risk analysis
  - ➔Risk neutral analysis
  - ➔More GAAP analysis
  - ➔More sensitivities/ interacting sensitivities

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Assumptions

- Communication and buy-in with other areas of your company before and during pricing, rather than after pricing and design are complete, is becoming a “must do” for pricing actuaries.
- Areas to consult include:
  - ➔Underwriting
  - ➔Reinsurance
  - ➔Investment/hedging
  - ➔Finance/valuation
  - ➔Distribution

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Assumptions – Link with Underwriting

- ❑ Older age mortality/ underwriting criteria
- ❑ Preferred risk class criteria
- ❑ Simplified/guaranteed issue
- ❑ Tele-underwriting
- ❑ New testing techniques

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Assumptions – Links with Reinsurance

- ❑ Traditional coverage
- ❑ Rider coverage
- ❑ Capital solutions
- ❑ Partnership to create "win-win"

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Assumptions – Link with Investment/Hedging Areas

- Investment strategies
- Asset/liability analysis
- Fund selections
- Fees – revenue sharing and 12(b)-1
- Hedging assumptions

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Assumptions – Link with Finance/Valuation

- GAAP for riders and new features
- Reserving assumptions
- Capital solutions – potential offshore reinsurance, securitization
- Fund Limitations
- Linkages with Embedded Value, hedging and other corporate models

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Assumptions – Link with Distribution

- How will product be sold - disclosure and training
- Expected utilization rates for riders and policyholder options
- Expected mix of business and funding patterns
- Differences by distribution channel
- Risk/reward sharing

Sensitivities

- Mortality – future improvements, interaction with lapse rates
- Persistency – policy and premium; interaction with fund performance and rider utilization; partial withdrawals
- Premium funding patterns
- Benefit utilization
  - ➔ Riders
  - ➔ FA increases/decreases
  - ➔ Annuitization/settlement options
  - ➔ Loans
- Reserves
- Capital

Market Consistent/ Risk Neutral Pricing – Theory and Practice

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What is the Economic Value of a life insurer?

The "Economic Balance Sheet":

Assets		**Liabilities**	
MV tangible assets	XXX	MCV liabilities	XXX
LLPO	XXX	Cost of Double Taxation	XXX
Franchise Value	XXX	Agency Costs	XXX
		Cost of Financial Distress	XXX
		Economic Value	XXX
Total assets	XXX		XXX

Economic/Market Consistent Value

- What do we mean by Market Consistent Value ("MCV")?
  - ➔Consider an insurance liability as a financial instrument
  - ➔Value it consistently with how capital markets price other financial instruments
  - ➔The value of selling a contract is the market value of assets received less the MCV of the liability assumed
- Of course, selling insurance contracts within a corporate structure introduces other elements of value (e.g., cost of capital)
  - ➔These, too, are different when considered on an MCV context
  - ➔We refer to the MCV of assets less liabilities, less cost of capital, as the MCEV

An MCV View Might Change The IRR Hurdle Rate

Invest 100 in equities

	Day 1	One year on
Assets	100	107
Liabilities	(80)	(84)
Capital	20	23

15%

Invest 100 in bonds

	Day 1	One year on
Assets	100	105
Liabilities	(80)	(84)
Capital	20	21

5%

What is the MCV of an insurance liability?

- Liability cash flows are mean expected value (not most-likely)
- Discount rate is "market-consistent"
  - ➔Diversifiable risk is risk-free, unless cash flows are affected by the "market"
  - ➔"Limited liability put option", i.e., insurer credit risk, may be valued by increasing the discount rate (like valuing corporate debt)
  - ➔Some believe the swap curve is appropriate
- Options are valued consistently with market (risk neutral scenarios, implied volatility)
- Cost of capital, also called frictional costs of capital, may be subtracted from the value

The "cost of capital" adjustment reflects the frictional costs of holding capital

Double taxation	–	**Where additional tax arises because assets are held through a corporate structure rather than directly**
Agency costs	–	**Reflect the markdown which investors may apply because they do not have direct control over the use of the capital in the company**

- **Under traditional pricing techniques the "cost of capital" includes a further implicit allowance for risk**
- **Under MCEV market risk is allowed for explicitly in the valuation of the cash flows**

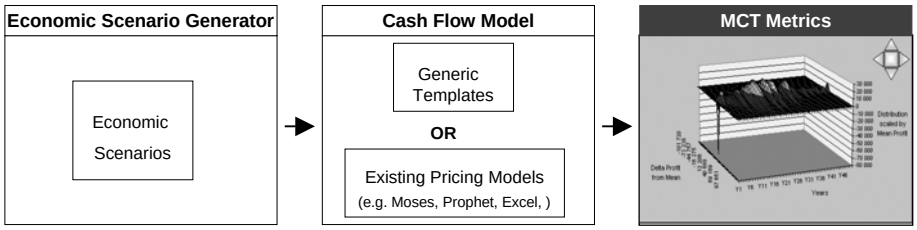
Market-consistent valuation means a new way of modeling in the U.S.

- MCV already in use for separate account (variable annuity) guarantees
  - ➔Companies hedging these in capital markets
  - ➔Also influenced by GAAP FAS 133
- But for "General Account" products, MCV is a foreign concept
  - ➔Companies are now starting to think about it, at least the potential for fair value accounting
  - ➔Are there any areas where companies are significantly mis-pricing products?

Market-consistent asset valuations give no "credit" to risk premiums until the risk premium is earned over time

- The statement is true for credit risk, prepayment risk and liquidity premiums, and is also true for asset/liability duration mismatch
- Traditional approaches assume the risk premiums are captured – these may or may not be offset by the discount rate and cost of capital
- Traditional approaches may overstate value for asset intensive products (SPDAs, SPIAs, GICs) that rely on high-risk assets for expected margins
- "Problem" may be lower than a couple years ago, because credit spreads have decreased. A steep yield curve still retains the possibility of traditional pricing giving higher expected return of assets longer than liabilities.
- A potential offset is if some/all of the of the asset risk can be passed on to the policyholder (may be true for SPDA, but not for SPIAs)

The MCT Toolkit - *General Structure*



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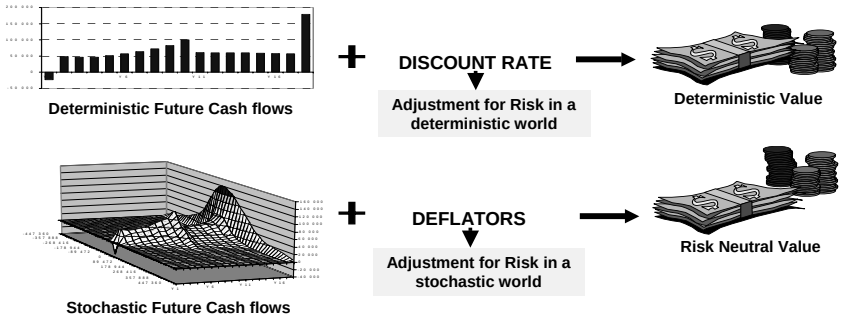
Risk Neutral Value - Calculation

- The risk neutral value of a product is assessed by ...
  - ➔ **projecting its cash flows in a very large number of scenarios,**
  - ➔ **and calculating a value for these based on Risk-Neutral techniques.**



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Risk Neutral Value – Properties in Valuing Insurance Products

- Risk neutral value of insurance products reflects the financial risk inherent in each product.
- Products with benefits not depending on financial markets will effectively be discounted at the risk free rate.
- Products with benefits that are correlated with financial markets will effectively be discounted at a rate higher than the risk free rate.
- The effective discount rate will be high for products with significant financial guarantees i.e. the risk neutral value will be lowest for these products.

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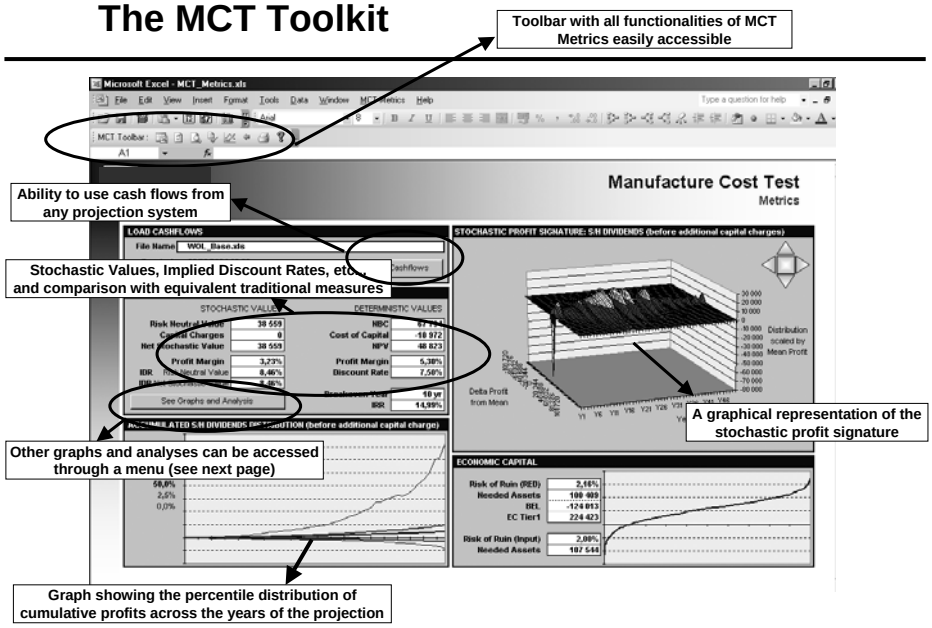
The MCT Toolkit



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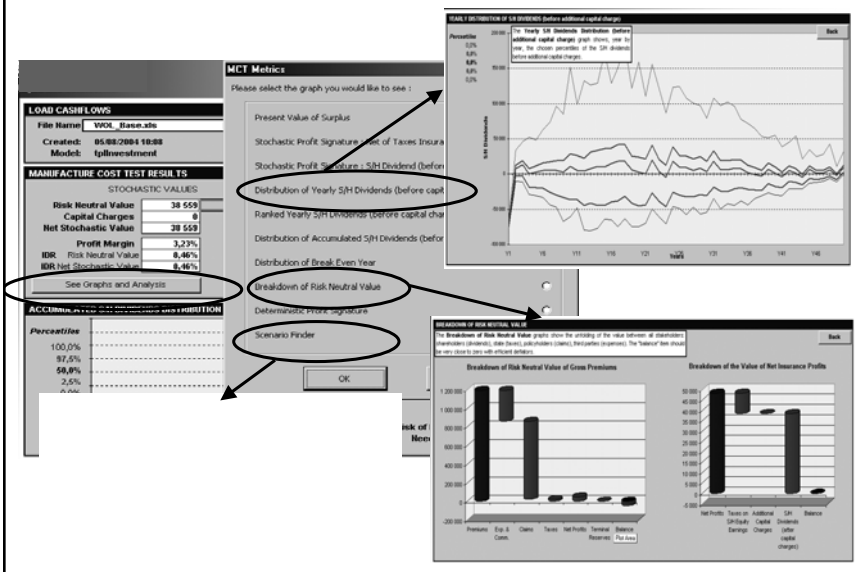
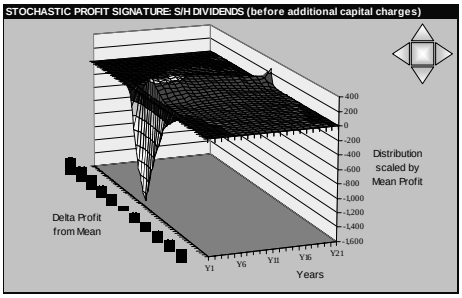
The MCT Toolkit



Risk Neutral Value – Pricing Example 1

- Sample MCT results for a protection product

MANUFACTURE COST TEST RESULTS			
	STOCHASTIC VALUES		DETERMINISTIC VALUES
Risk Neutral Value	988	NBC	569
Capital Charges	-272	Cost of Capital	-145
Net Stochastic Value	716	NPV	424
Profit Margin	13.38%	Profit Margin	7.09%
IDR Risk Neutral Value	4.46%	Discount Rate	8.00%
IDR Net Stochastic Value	5.96%		
See Graphs and Analysis		Breakeven Year	11 yr
		IRR	12.37%



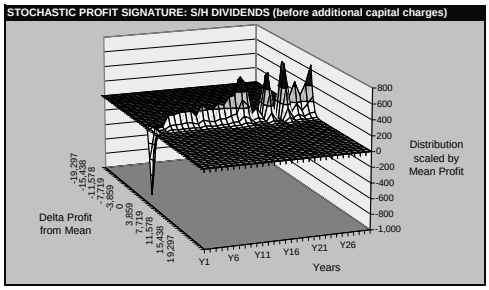
- **20 year level term contract (no return of premium rider)**
- **Mortality is key profit driver**
- **Profits are independent from financial markets**
- **Profits are therefore effectively discounted at close to risk free rate**
- **Therefore, risk neutral value is higher than deterministic NPV**

Risk Neutral Value – Pricing Example 2

- Sample MCT results for a guaranteed investment product

MANUFACTURE COST TEST RESULTS

	STOCHASTIC VALUES		DETERMINISTIC VALUES
Risk Neutral Value	217	NBC	1,409
Capital Charges	-78	Cost of Capital	-327
Net Stochastic Value	139	NPV	1,083
Profit Margin	1.45%	Profit Margin	7.76%
IDR Risk Neutral Value	15.31%	Discount Rate	7.50%
IDR Net Stochastic Value	16.83%		
		Breakeven Year	8 yr
		IRR	20.59%



- **Single premium investment contract with 2% annual guarantee, invested 50% in equity and 50% Govt bonds**
- **Investment margin and expense margins are key profit drivers**
- **Investment margin is highly dependent on the evolution of financial markets as well as the investment strategy, guarantee level and crediting rate strategy**
- **With a 50% equity allocation and 2% annual guarantee, this product is more risky**
- **Therefore we see a high effective discount rate and low risk neutral value compared to the NPV**