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Risk margins for life insurance liabilities

Hoa Bui / Briallen Cummings



Agenda

- Introduction
- The accounting context
- Cost of Capital method
- Quantile method
- The general insurance experience
- Conclusion



The accounting context

International Accounting Standard Board
Discussion paper May 2007 –

“Preliminary views on insurance Contracts”

- *Explicit, unbiased, market consistent, probability weighted and current estimates of the contractual cash flows;*
 - *Current market discount rate that adjusts the estimated future cash flows for the time value of money; and*
 - *An explicit and unbiased estimate of the risk margin that market participants require for bearing risk (a risk margin) and for providing other services if any (a service margin).*
-
- → Exit value model



International literature

- Measurement of liabilities for insurance contracts: current estimates and risk margins, Risk Margin working group (Feb 07, Mar 08)
- A market cost of capital approach to market value margins, CFO Forum 2006
- A global framework for insurer Solvency assessment, Insurer Solvency Assessment working committee
- The Swiss Experience with market consistent technical provisions – the Cost of Capital approach , Federal Office of Private Insurance , 2006



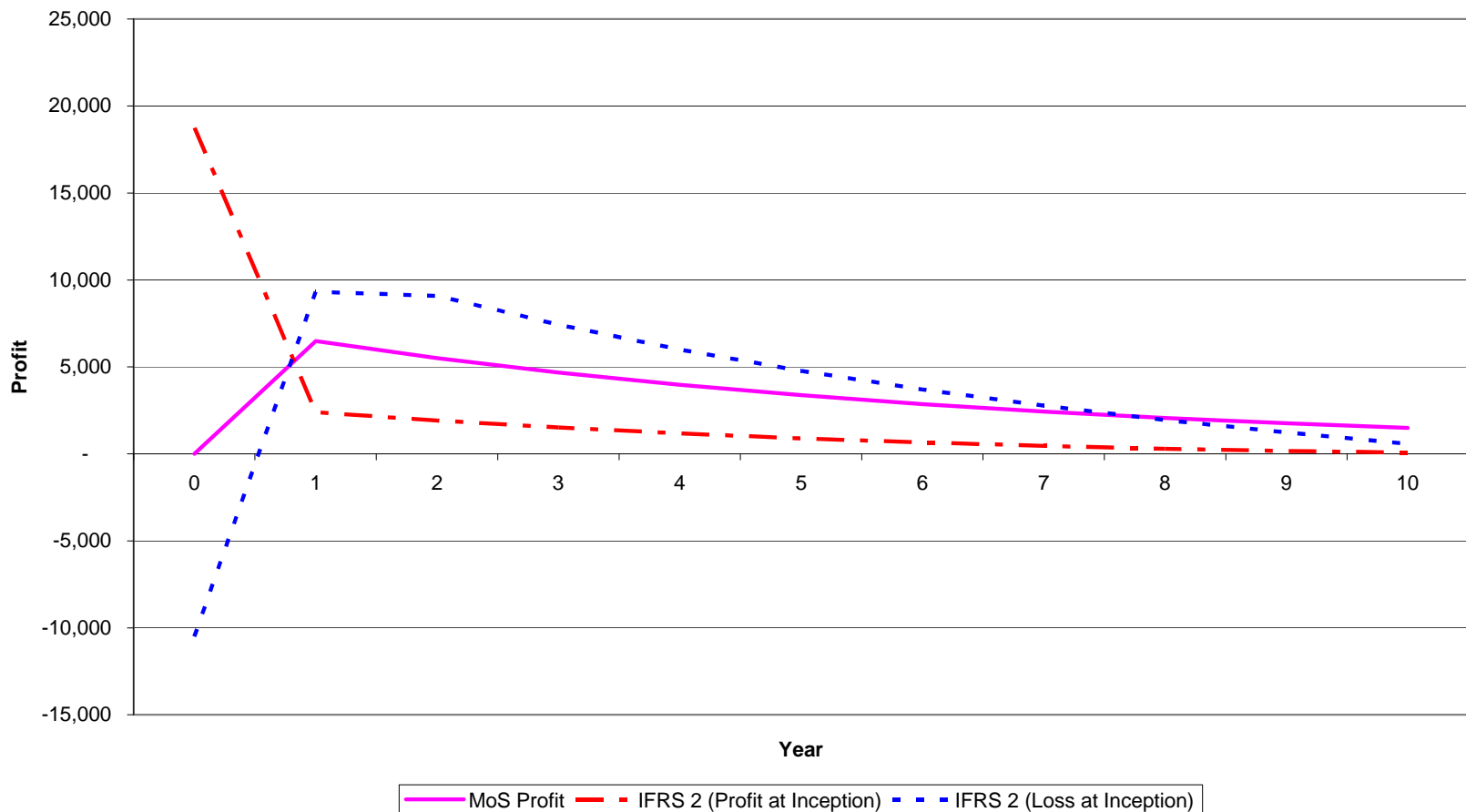
Key concepts

- Risk margin as compensation for bearing risk
 - *Purpose of risk margin is to convey decision-useful information about uncertainty associated with future cash flows, not to provide shock absorber nor to enhance solvency*
- Exit value, not entry value
- Reference company concept
- Unit of account : a portfolio, not a contract



Profit emergence Exit value model vs MoS

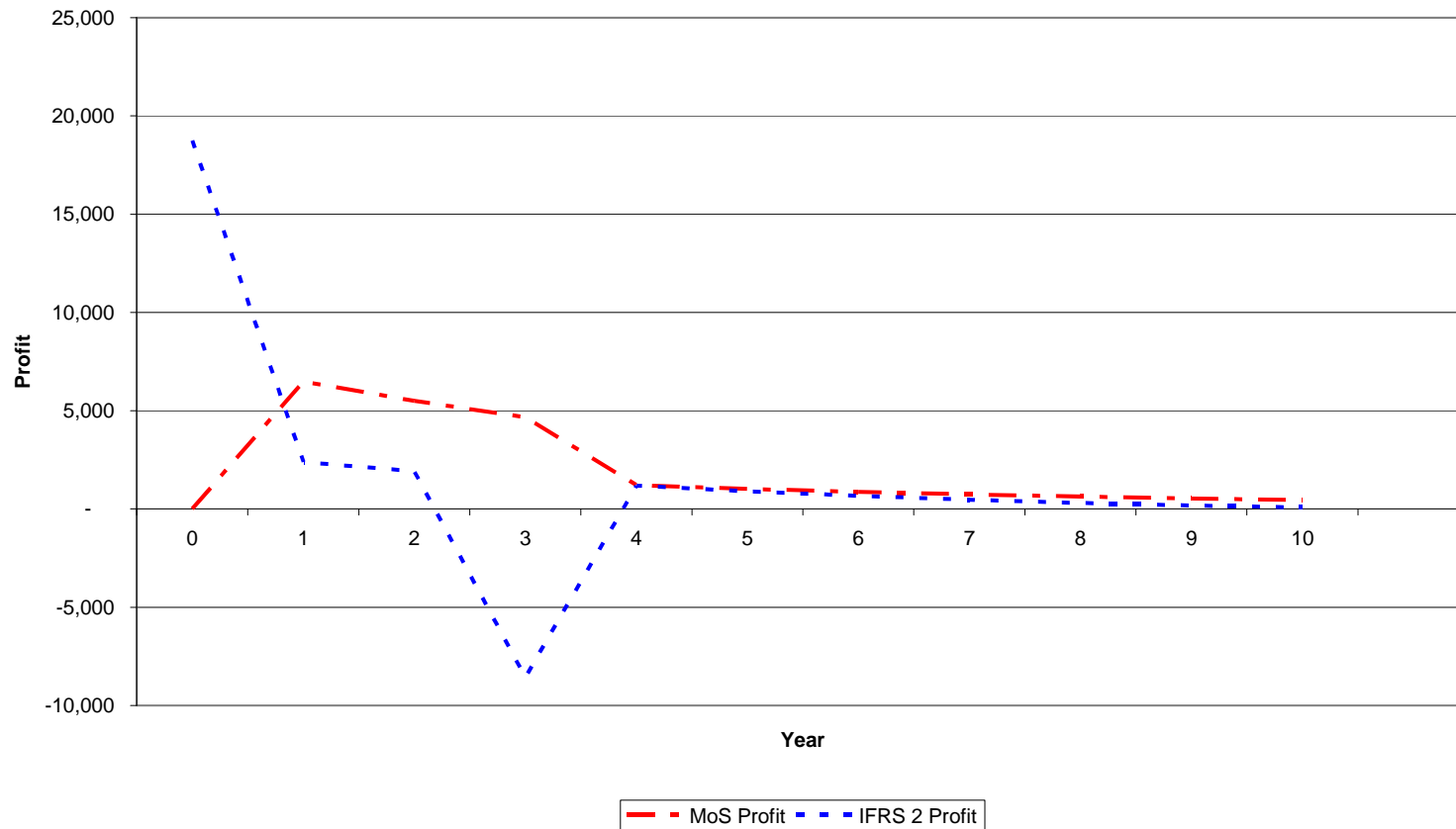
Profit Signature for Policies Sold at Inception





Profit signature when there is an assumption change under exit value

Profit Signature where there is an Assumption Change





Possible methodologies

- No prescribed method
- Current favourites
 - Cost of capital
 - Quantile method / Confidence interval
- Methods ruled out as unsuitable for determining risk margins under IFRS 2
 - USGAAP Provision for deviation
 - Implicit margin / conservative estimates

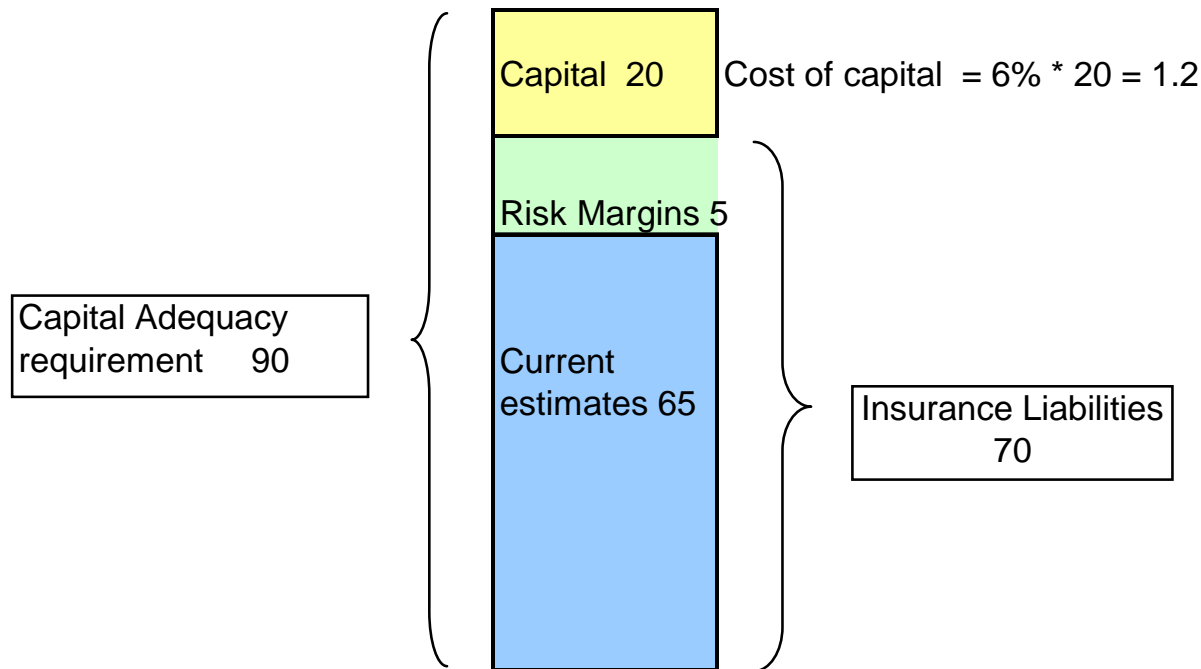


Cost of capital methodology

- Compensation for having to hold capital against this liability
- Cost of capital is the discounted value of the difference between what the purchasing company would require as the rate of return on capital and what it could earn at the risk free rate



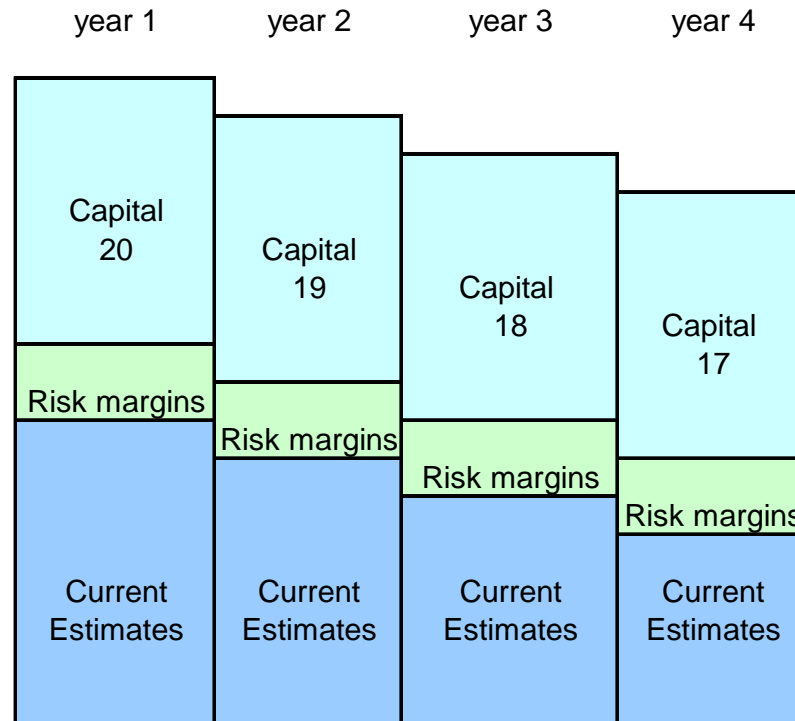
Cost of capital calculation



- Cost of capital in year $t = \text{Cost of capital rate (6\%)} * \text{excess of capital requirement over insurance liabilities}$



Calculating risk margin using the cost of capital method



Risk Margin at time 0

$$1.2 * v +$$

$$1.14 v^2 +$$

$$1.08 v^3 +$$

$$1.02 v^4$$

Cost of capital in year t

$$6% * 20$$

$$6% * 19$$

$$6% * 18$$

$$6% * 17$$

$$1.2$$

$$1.14$$

$$1.08$$

$$1.02$$



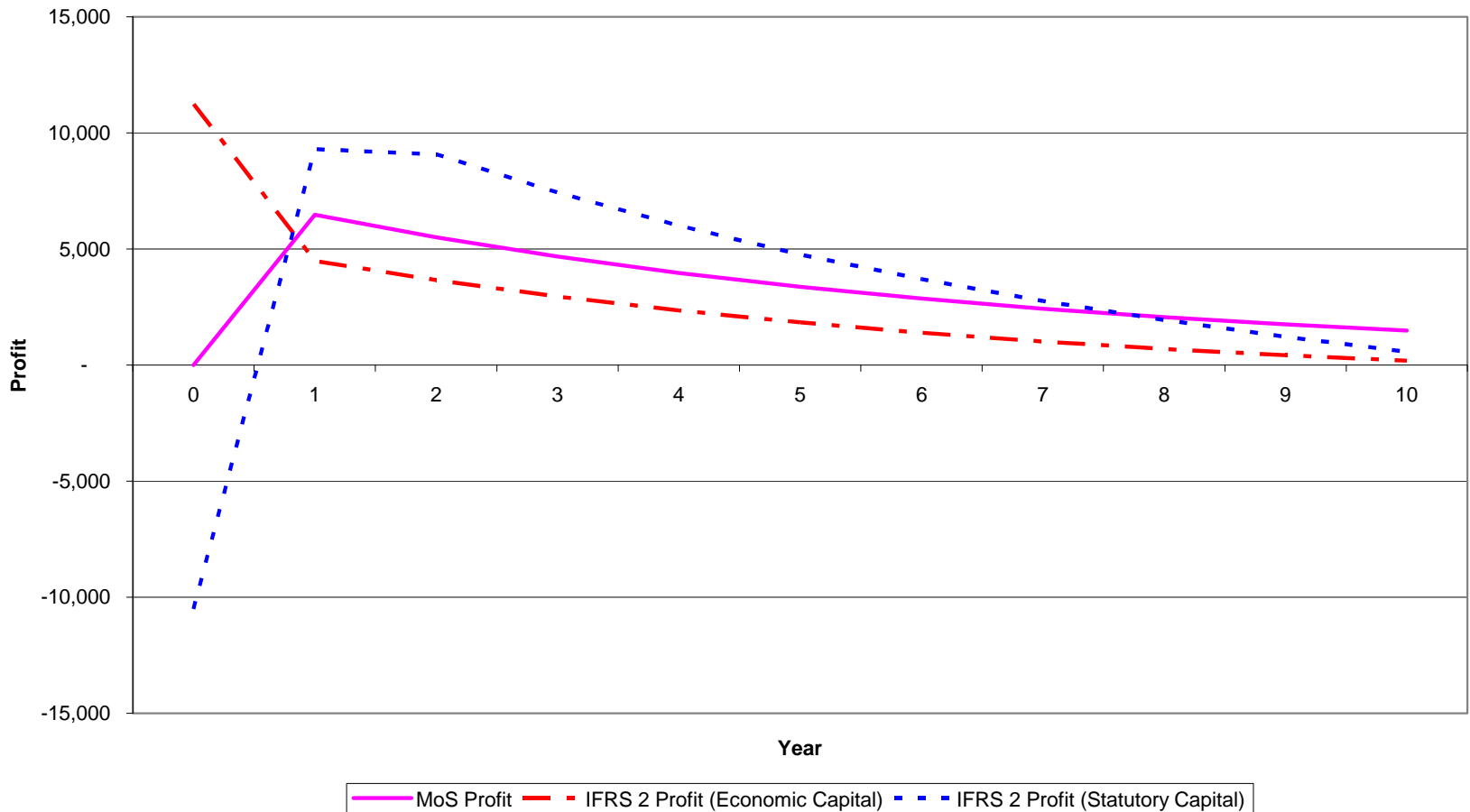
Comment on the Cost of capital method

- Relies on a risk based capital framework.
- Is it circular ?
 - It is an iterative process
- What to use as capital ?
 - Economic capital
 - Statutory capital
- What rate to use as cost of capital rate ?
 - Should this be the same rate for all company ?
 - Dynamic or stationary ?



Risk margin for a profitable YRT policy using current Australian capital requirement

Profit Signature for Policies Sold at Inception





Observations on cost of capital rate

- A flat 6% rate applied to current Australian statutory capital could make a profitable policy show a loss at inception.
 - Is this sensible ?
- Should the 6% be something lower for capital that is less at risk ?
 - 6% up to CAL
 - 2% CAL to CTV



Risk margin as % PV claims

	Economic capital	Statutory capital
Cost of capital 6%	3%- 4%	15%-20%
Cost of capital 6% to economic capital then 2% to CTV		7%-10%



The quantile method

- A bottom up approach
- The current estimates when taken together with the risk margin is expected to have a probability of sufficiency (PoS) of $x\%$
- For discussion, 75% PoS for profit reporting



Determining risk margins under the quantile method

- Identify the uncertainty involved
 - Mortality / morbidity
 - Lapses
 - Expenses etc
- Model uncertainty and determine risk margin either stochastically or using a probability distribution function
- Aggregating the risk
 - **Diversification benefits**
 - Correlation between risks



Risk margin for mortality risks

- Random volatility around the mean
 - Reference company
- Uncertainty around the level of central estimate
 - Portfolio / reporting entity
- Uncertainty around the trend
 - Portfolio / reporting entity



Risk margin for random volatility

Table 1- Risk margins on reserve for typical Australian portfolios

	Risk Margins (% present value of future claims)		Portfolio statistics		
	75% PoS	99.5% PoS	Size (no of lives)	Standard deviation	Skewness
Reference	1.3%	3.2%	365,400	9.91	3.58
Typical	2%	8%	121,800	9.91	3.58
Skewed Portfolio	4%	14%	60,900	44.03	7.48
Small	5%	20%	24,360	9.91	3.58



Assessing level uncertainty

- Level uncertainty : the actual portfolio, not the reference company
 - 1500 claims → 1.7% risk margin
 - 300 claims → 3.6% risk margin
- If the reporting entity uses industry or reinsurance statistics, there is an extra source of uncertainty which should be allowed for



Risk margin for trend uncertainty

- Consider how trends allowed for in the investigations based on past data may have been incorrect with hindsight.
- Example : Australian Population mortality
 - 3 years rolling average
 - Results at 75 percentile → risk margin of 7%

	75th Percentile
Male	107.20%
Female	106.38%
Total	106.87%



Risk margin Group Life IBNR

- First cut estimate of coefficient of variance using the Mack Method

Risk margin as % BEL

	CoV 15% all	CoV 15% for TPD and 25% death	Current Solvency risk margin requirement for Group risk	Capital Adequacy risk margin requirement
75% PoS	9%	11%	10%	
90% PoS	26%	25%		
99.5% PoS	40%	52%		10% to 40% (Mortality) 30% to 60% (Other insured events)



The general insurance experience

- Quantile approach
- GPS 310 risk margin : 75% PoS
- AASB 1023 : risk margin for uncertainty in the central estimates
- Some insurers use higher PoS for profit reporting than solvency
- GICP survey on methodology: combination of stochastic, deterministic quantitative analysis and research paper
- APRA survey : variations in risk margins exist



Issues to consider further

- Reference company
- Cost of capital method :
 - CoC
 - Capital
- Quantile method :
 - Diversification
 - how to model other products
 - other risks



Conclusions: Observations

- Conceptually both methods are attractive - CoC needs a risk based capital framework
- Ease of application of each method – quantile method much harder to apply in practice
- Magnitude of the risk margins from each method



Points of discussion

- Cost of capital method issues
- Quantile method issues
- Profit emergence pattern under exit value model
- Risk margin magnitude
- Reference company / portfolio
- Others ?