



Institute of Actuaries of Australia

4th Financial Services Forum

Innovation in Financial Markets

19 and 20 May 2008 – Melbourne

ALM in a Solvency II World

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Agenda

- Solvency II Background
- Implications of SII on ALM
- Case Study
- What it means for Australian Actuaries
- Questions/Discussion



Solvency II Background

- Pan-European risk-based regulatory capital regime
- Attempt to harmonise the prudential regulation of insurers and reinsurers across a number of disparate markets
- Move beyond quantitative measures to overall risk management
- 3 Pillar approach
- Solvency based on an aggregate (group) economic balance sheet approach
- Current timetable
 - Draft framework published
 - 4th Quantitative Impact Study commenced, results Nov 08
 - Implementing measures adopted 2010
 - Regime operating by 2012





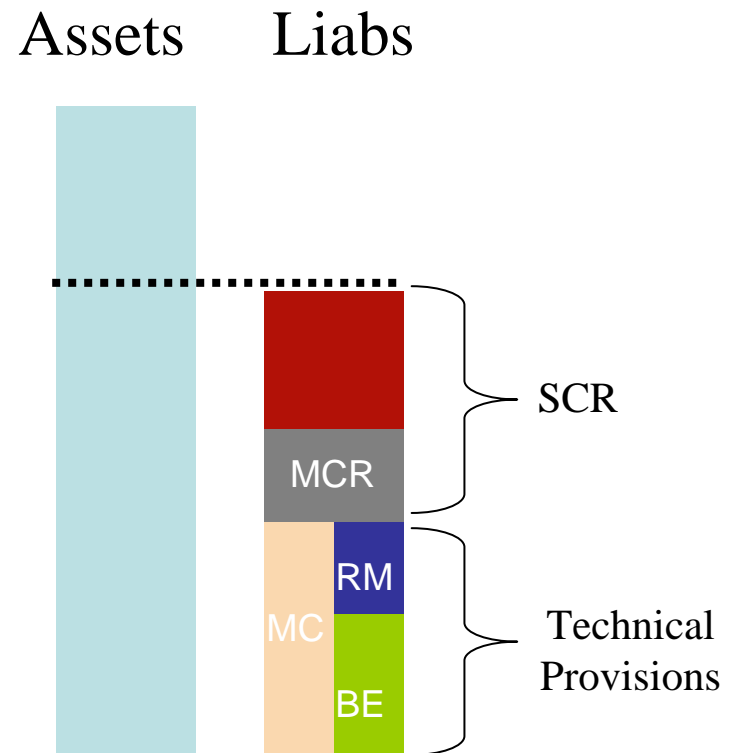
Why Solvency II?

- Current regime not particularly risk-based
- Improvements in Solvency methodology & best practice within member states
- Attempt to better align risk, usage of capital and shareholder returns



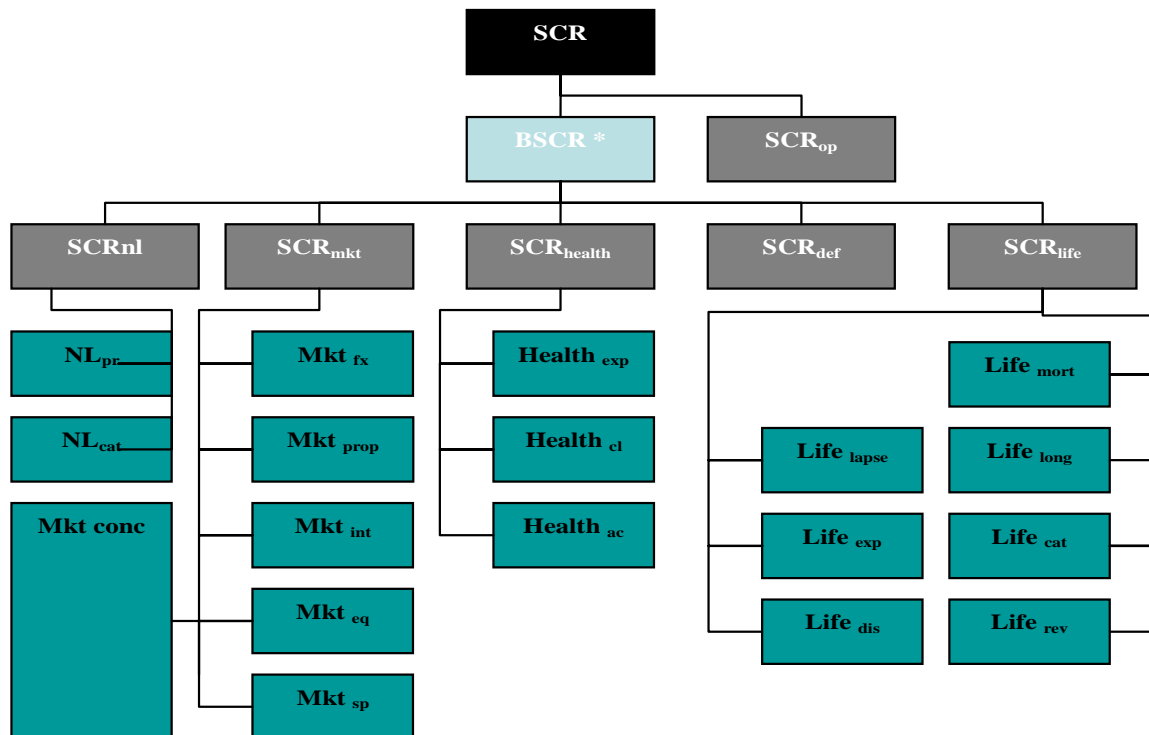
Overview of Solvency II

- Market consistent asset and liability definitions
- Liabilities measured on an “exit value” basis
- Two distinct liability valuation methods
 - Hedgeable risks
 - $TP = \text{Market Value}$
 - Non-hedgeable risks
 - $TP = \text{BE Value} + \text{Risk Margin}$
 - Note that BE liabilities are ALL liabilities, not just contractually guaranteed obligations
- Calculation of risk margin based on a cost-of-capital methodology
 - Project basic (non-market risk) SCR capital requirements for each future time
 - Risk Margin =
PV of frictional cost of capital
x future SCR requirements
- MCR breach is point of ultimate supervisory intervention
- SCR is trigger for closer regulatory action
 - Calculated either by standard formulae
 - Or via an internal model





Calculation of SCR – Standard Formulae



- Individual risk charges calculated for each risk on a policy-by-policy basis
- Combined via a simple linear correlation matrix approach
- Aggregate capital charge intended to be consistent with a 1 in 200 1-year probability of ruin / 99.5% VaR



Internal Models

- Insurers can use an internal model to set their SCR
- Models can be full or partial models
- Models will need to pass various tests & standards before they can be allowed for regulatory purposes
 - Use Test
 - Statistical Quality Test
 - Calibration standards
 - Documentation standards
- Net impact is that firms' will likely require large-scale, market-consistent stochastic asset-liability models to be able to justify use of internal model



Implications of SII on ALM

- Increased pace of development of large-scale stochastic asset-liability models
- Need for market-consistent valuation of all liabilities (including non-contractual options & guarantees)
 - Embedding of increasingly sophisticated stochastic valuation and risk management techniques in certain lines of business with significant non-linearity
- Projection models used to assess capital need to deal with valuing increasingly complex instruments & strategies
 - E.g. credit derivatives, MBS/ABS, commodities, alternative assets, etc
 - Plus need for basic calibration of real-world stochastic models which can (and should!) be subjective.
- Need for development of methodologies for real-world projection of uncertainty in mortality, lapse & expense assumptions



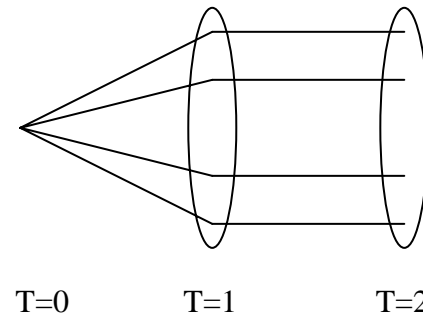
Implications of SII on ALM (2)

- Big increase required in verification of data quality and data management
- Significant effort to embed models into “the business”
- Modelling and usage of increasingly complex derivative assets, dynamic strategies & hedging programs
 - Increasing appreciation of exposure to Greeks, e.g. vega exposure appears on balance sheet



Implications of SII on ALM (3)

- Use of complex stochastic techniques necessarily much wider than previously
- Stochastic valuation of liabilities requires stochastic-on-stochastic simulation techniques and resulting complications
 - E.g. nested simulations, dynamic “on-the-fly” model re-calibrations, etc.





Case Studies

- Wish to consider the impact of Solvency II on capital of business over time, and impact on management of capital
- Two case study examples provided
 - Conventional Par Endowment contract
 - Unit linked contract
- Analysis via integrated stochastic asset-liability model
 - Projects SII capital requirements on standard formula, plus actual asset/liability position over multiple time periods
 - Economic scenarios produced by Barrie & Hibbert
 - Simple models for mortality experience & expectations, lapse & expense experience



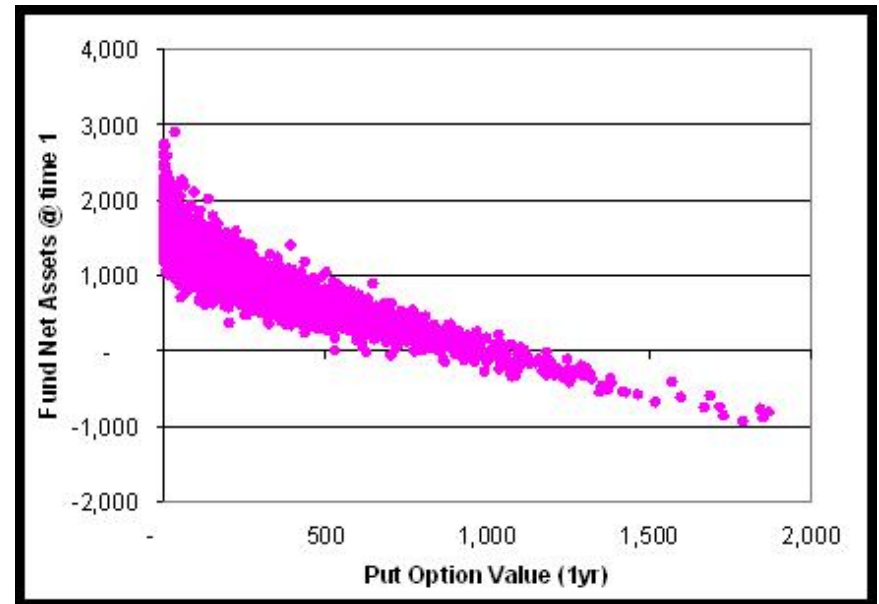
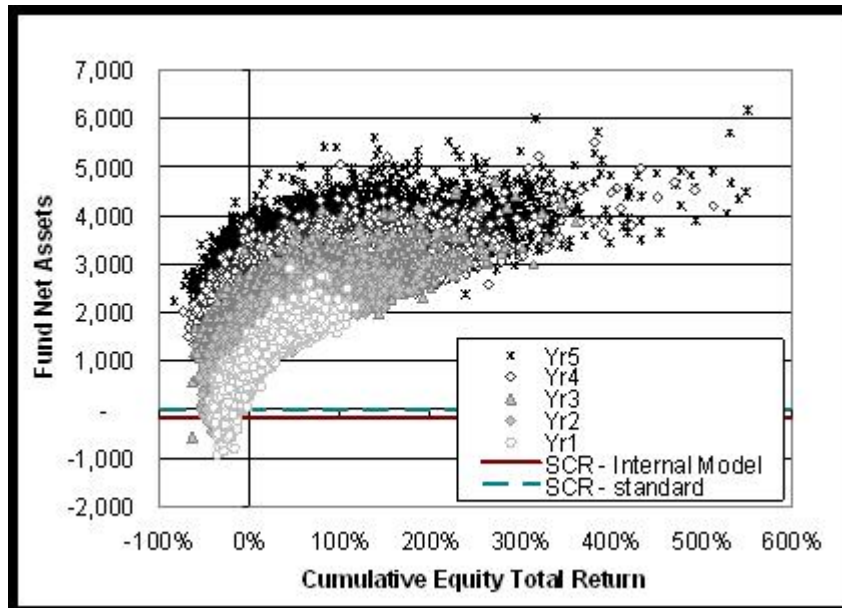
Case Study 1 - Endowment

- Single endowment, 5 year term
- Benefits \$30,000 SA + \$3,000 Bonus
- Asset share / VSA \$30,000
- Surrender value assumed to equal asset share
- Backing assets invested 30%/60%/10% in Eq/Bonds/Cash

Initial Balance Sheet		
<i>Solvency II</i>		
		\$
Assets	Asset Value	31,307
Liabilities	Asset Share	30,000
	Put Option Value	231
	Risk Margin	423
	Tech Provisions	30,653
	Net Assets	<u>653</u>
	SCR	653
	Free Capital	<u><u>0</u></u>



Case Study 1 - Analysis





Case Study 1 - Observations

- Cap Ad and Solvency II should in theory produce very similar results
 - Assuming close to a “market-consistent” interpretation of Cap Ad rules
- Capital requirements actually higher than Solvency II standard
 - Calibration differences
 - Lack of diversification allowed for in standard formulae
- Over time presence of risk premia alleviate some of shorter term capital requirements
- Risk margins are not significant contributors to capital movement (or management) over time
- Key risk remains asset-liability mismatch risk arising from writing put option
 - But heavily watered down by impact of lapses
- SII modelling limited by need to project capital requirements & use stochastic liability valuation method



Case Study 2 – Unit Linked

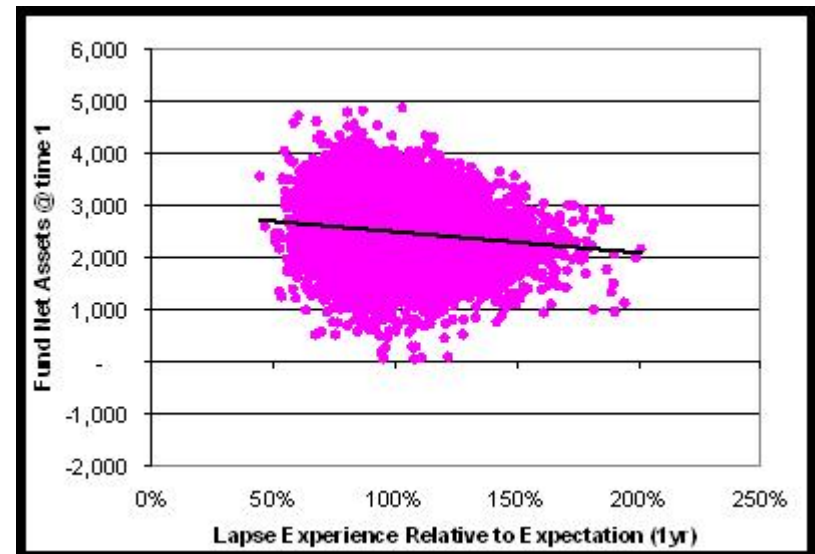
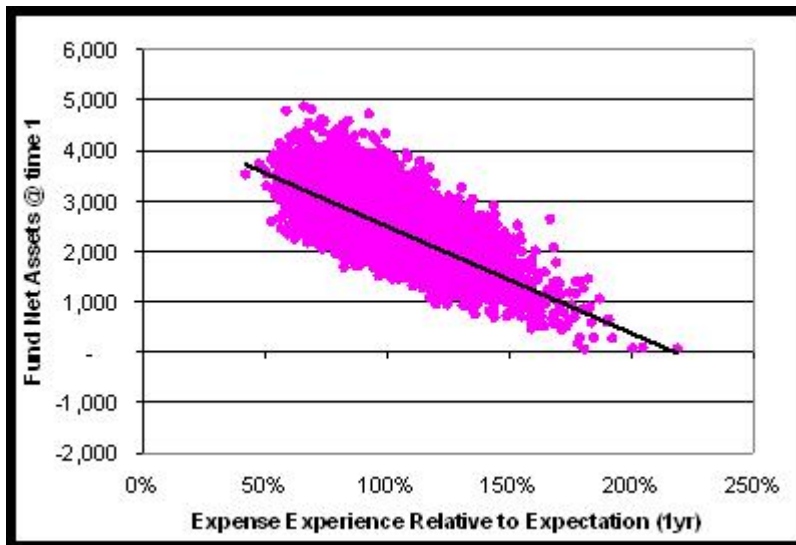
- \$100,000 unit fund
- Assets invested based on balanced fund style holdings
- Man Charge 1% pa
- Expenses 0.2% pa + \$500

Asset Type	Holding
Cash	5%
Equity	30%
Property	20%
Alternative Assets	15%
Overseas Equity	10%
Risk Free Nominal Bond	10%
AA Bond	10%

Initial Balance Sheet		
<i>Solvency II</i>		
		\$
Assets	Asset Value	100,922
Liabilities	BE Liability Value	98,577
	Risk Margin	160
	Tech Provisions	98,736
	Net Assets	<u>2,185</u>
	SCR	2,185
	Free Capital	<u><u>0</u></u>

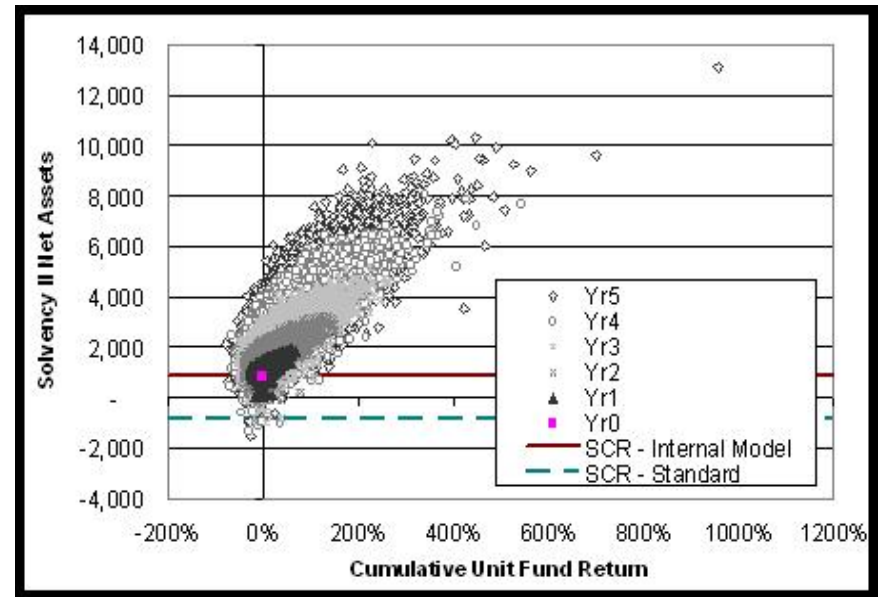
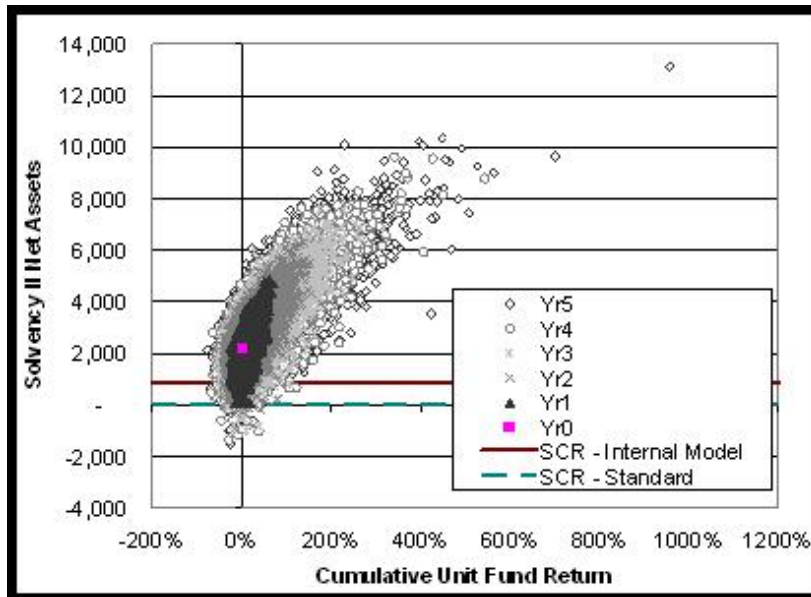


Case Study 2 - Analysis





Case Study 2 – Comparison with minimum of unit value





Case Study 2 - Observations

- Capital requirements lower under internal model
 - Strength of assumed lapsation charge and allowance for Op Risk in capital, not in model
- Once again, fundamentally similar capital behaviours to APRA rules
- Impact of excess of assets over charges on solvency balance sheet affects behaviour of solvency capital position
 - Initial assumed exposure to unit fund as these excess assets “invested” in fund
 - Over time strength of this watered down by other experience, e.g. lapse/expense experience.
 - Opposite effect witnessed where take no credit for these, and have a minimum of the unit fund liability
- Again, presence of minimum of unit fund holding impacts this effect on Australian capital requirements



What does it mean for Australian Actuaries?

- On the surface, not a lot
 - Current regime requires discretion and allowance for many of the issues raised in SII
 - No large-scale problem with complex guarantees & optionality in Australian products
- In practice, a fair bit more
 - Many Asian territories likely to adopt SII principles if not specific rules
 - Growing demand for global best practice in ALM
 - Trend towards more complex options & guarantees



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Questions / Discussion?