Casualty Actuaries in Reinsurance
2012 Seminar
Solvency II Overview

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Agenda

- Solvency II Objectives and Pillars
- PC Technical Provisions and Accounting Changes
- Solvency Capital Requirement
  - Risk Categories
  - Risk Margin and Capital for Unpaid Loss
- Standard Formula
- Internal Model
  - One Year Reserve Risk Methods
  - Documentation G-2 and G-18
- Larger Perspectives
  - A Financial Parable
  - Possible evolution of internal models
  - Life vs P&C Risk
  - Accounting System Characteristics
  - Approaches to Regulation
- Issues and Opinions
  - Why the Controversy
  - Pros and Cons
  - US Regulators
- Reinsurance Opportunities and Pitfalls

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SOLVENCY II – OBJECTIVES AND PILLARS

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EIOPA Solvency II – Possible Objectives

- Achieve consistent solvency regulation of insurance and reinsurance companies across Euro zone
- Modernize solvency regulation
- Institute principles-based regulatory accounting
- Promulgate consistency between P&C and Life and between insurance and financial sector accounting methods and solvency regulations.
- Strengthen financial sector regulation to reduce likelihood of 2007 style financial meltdowns
- Protect policyholders and claimants

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Three Pillars

Pillar 1 Quantitative	Pillar 2 Qualitative	Pillar 3 Reporting, disclosure, and market discipline
Balance sheet (including Technical Provisions Min Capital Req'ment (MCR) Solvency Capital Req'ment (SCR)	Governance, risk management and required functions ORSA Supervisory review process	SFCR and RSR Disclosure Transparency Support of supervision through market mechanisms
Market –consistent valuation Risk-based requirements	Business governance Internal Control processes Risk-based supervision	Disclosure Transparent markets

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TECHNICAL PROVISIONS AND ACCOUNTING CHANGES

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PC Technical Provisions

- Technical Provisions (Liability)
  - TP= BE + RM
    - BE = Best Estimate
    - RM = Risk Margin
- Premium Provision (TP2.42-2.46)
  - Premium Provision - PV of future cash flows on policies already bound and on claims occurring after valuation date
  - Future Cash Flows = Anticipated Paid Loss&LAE on future occurring claims+ Expense – Premium
  - Could be negative (reducing the liabilities)
- Loss Provision (TP2.47-2.48)
  - Best Estimate is Discounted Mean of Scenarios
    - Need to "re-tune your mind" (Peter England)
  - Losses are discounted
  - Matched risk –free rates loaded with illiquidity premium

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Accounting Changes

- ‘Market-based’ Valuation
  - Mark to model
- Removal of prudential margins
- Explicit discounting
- Explicit Risk Margin
- Cash flow instead of accrual
  - No UEPR
- Up-front recognition - EPIFP
  - Expected Profits Included in Future Premiums
- Pre-up front = Contract boundary – date when obligation is made - different from UWY and AY

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P&C RISK- STANDARD FORMULA AND INTERNAL MODEL

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Non-Life Risk Categories

- Underwriting risk
  - Premium risk
  - Reserve risk
- Lapse risk
  - A new type of P&C risk
  - Risk pre-up front profits not realized
- CAT risk

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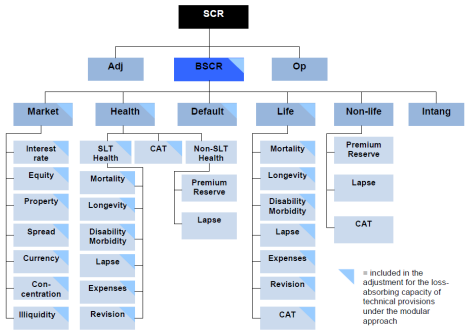

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Risk Margin for Loss Reserves

$$Risk\ Margin = \sum r_{COC} \cdot SCR_y \cdot v(y)^{y-1}$$

- Risk Margin = discounted Cost of Capital
- r = needed additional return = 6.0%
- SCR = Solvency Capital Requirement
- Cost of capital for each year of runoff
- Valuation intertwined with capital requirements!

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Solvency Capital Requirement for Unpaid Loss

- SCR = 99.5% Percentile excess above the mean
- One-year Risk
  - Retrospective look at Best Estimate

$$E[R(0)|t=1] = X(1) + E[R(1)|t=1]$$

  - R(t) = Unpaid loss at time t from start of runoff period.
  - X(y) = paid loss in year y (from runoff of Unpaid at t=0)

- Except for discounting, one-year risk would be measured by the change in estimated ultimate over one year

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One-year Risk

- Conceptual Drivers
  - Volatility of ultimate unpaid
  - Information obtained over one year
  - Reserving methodology
- Possible Data sources
  - Schedule P – One year Reserve Development Test
  - Reserve Ranges at Ultimate
- Concerns
  - Data unavailable- posted reserves not "Best Estimates"
  - One-year horizon too short for long-tailed lines

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Standard Formula – QIS5

- EIOPA 10 LOBs
- Lognormal CVs – One per LOB
- Premium and Reserve correlation
- LOB Correlation matrix
- Volume measures
  - Credit for geographic diversity
- Lognormal assumption for aggregation
  - Allocated back to LOBs on standalone basis
- CAT Capital
  - Factor based - factors applied to premium by country
  - Scenario based – factors applied to TIV by district

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Internal Model

- Can be used in lieu of Standard Formula if approved by regulator.
- Exact form or type of model not specified.
  - Many companies using giant simulation models.
- Requires significant amount of documentation
- Needs to satisfy "Use" test.
- Ability to split business into smaller units
  - Better model of actual business
  - Reduce capital requirement by reducing process risk

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Methods for Modeling One-Year Reserve Risk

Method	Author	Description
Variance of Chain Ladder estimates	Merz and Wutrich	Derived variance estimate of one-year claims development result assuming the distribution –free Chain Ladder algorithm is used to derive reserve estimates. Works off triangle of data.
Diagonal Simulation	Ohlsson and Lauzeningks	Simulate next diagonal and assume actuary-in-a- box sets reserves. Derive distribution of one- year claim development result.
Regression	Rehman and Klugman	Regression assuming lognormal distribution of ATA factors of estimated ultimate loss. Fitted parameters used to compute one year risk
Recognition Factor	???	Start with ultimate variability. Apply recognition factor to determine how much is recognized each year.

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IM Documentation – Use Test

- G-2 Use Test (decision making process)
  - " … provide evidence … your internal model is widely used and plays an important role in your decision-making processes (including the setting of the business and risk management strategy)…"
- Does anyone use such a model "widely" in P&C?
- Most IMs are too cumbersome to be used for anything other than showing compliance with SII capital requirements.

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IM Documentation – Stat Quality Standards

- G-4 Statistical quality standards
  - "…justify the assumptions for the selected probability distribution forecasts (PDFs) used in the internal model. This should include the techniques used(including details of how many points of the PDF you use to fit distributions) as well as confirmation that the methods are based upon current and credible information and realistic assumptions. Please explain how the methods are based on adequate, applicable and relevant actuarial and statistical techniques consistent with the methods used to calculate technical provisions. Please identify … differences in the actuarial … techniques used and the underlying assumptions made to calculate the PDF and technical provisions. "
- Why should methods (as opposed to parameters) be based on current information and realistic assumptions?
- How can actuarial techniques be different from the underlying assumptions?
- Is anyone fitting points of the PDF to distributions?

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LARGER PERSPECTIVES
ISSUES AND OPINIONS

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A Financial Parable

- In a galaxy far away, a financial crisis hit. Real estate lost value, stock prices fell, unemployment soared.
- Financially savvy investment banks were prepared because they had sophisticated risk models.
  - They had developed new financial products. The models showed these products were low-risk.
  - They received A+ ratings from rating agencies.
- P&C insurance and reinsurance companies were not so fortunate. They were regulated with fixed solvency benchmarks. Only a few sold the new financial products.
- When the crisis hit, P&C firms went bankrupt one after the other. They received huge tax-payer financed bail-outs. If only they had new financial products and big complex models, …

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Possible Evolution of Internal Models

IM calls for less capital than SF

Model too complex to be readily duplicated at low cost

- Model accepted by firm
- Model filed with regulator
- Regulators approve
- Modelers get bonuses

IM calls for more capital than SF

- Firm subtly rejects model
- Model not filed with regulator
- Firm finds another model and modeler

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Life vs PC Risk

Risk	Life	PC
Severity	Known	Highly variable depending on the LOB and coverage
Claim count	Known	Highly variable – subject to CAT, contagion, mass torts
Lapse rate risk	Important	Does not exist in US GAAP, STAT
Ultimate Risk	Low	High
One-year risk	Relatively large	Relatively small for long-tail lines

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Accounting System Characteristics

Characteristic	Solvency II
Understandability	Many of the concepts make sense and are understandable - but some, like one-year reserve risk, are new and hard to understand.
Relevance	Forward accounting contract boundary would in theory enhance relevance
Reliability	Too easy to manipulate the results – (booking profit before the deal is effective)
Consistency and Coherence	Difficult to compare different enterprises. Same business under different internal models could be valued differently
Lack of Bias	Designed to be market-based and unbiased in theory. In practice, results may be biased.
Cost-Benefit Effectiveness	Epic fail. Very costly.

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Approaches to Regulation

Constrained Free Market	Bureaucratic Regulatory State
Government intervention only in response to defined need or market failure.	Government should be planning or approving plans of private enterprises.
Firms are allowed to fail, but government may cushion impact on third parties.	Government should bail-out weak firms, especially those too big to fail.
Minimize bureaucracy. Minimize regulatory costs.	Develop well-staffed bureaucracy. Regulatory costs passed on to taxpayers or those subject to regulation.
Promulgate bright line rules so companies can readily comply	Rules become increasingly complex and compliance becomes difficult.
Regulator as umpire	Regulator as coach
Minimize opportunity to manipulate the system . Reduce corruption.	Regulators act to promote public interest. Strict guidelines prevent corruption.

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Why the Controversy?

- Accounting changes not popular with many PC actuaries
  - Up-front recognition and contract boundary issue
  - Discounting with illiquidity premium
  - Lapse risk and convergence with Life
- Immense cost in time and money
  - May lead to consolidations, and wave of M&A activity as small firms realize they do not have the resources to compete in the regulatory arena
- Internal Model approach to regulation
  - Too easy to bake in the result
  - Violation of equal protection principle
  - Concerns about security of proprietary information
- Fear of SII induced bankruptcies for long-tailed companies
  - One-year reserve risk may dramatically lower capital required
- How will the transition work??

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SII: Pros and Cons

Pros	Cons
Actuarial full employment act.	Costly
Moves solvency regulation into the modern age	Overly complex models too easy to manipulate.
Should increase CAT capital and solvency with respect to CAT risk	CAT calculation too complicated. Reduced capital for casualty.
Will replace a hodgepodge with a uniform system	Transition may lead to dislocation in the market
Makes PC accounting similar to Life and other financial sectors	Accounting changes make it more difficult to do valuation

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US Insurance Regulators

- NAIC
  - Testing ORSA for large groups in 2012
  - RBC may be enhanced with a CAT capital component
- No appetite for switching to SII accounting
- Stated top goal is to protect policyholders
- Continued support for key components of US system
  - liquidation approaches in STAT accounting
  - current US IRIS, RBC capital requirements
- Cite good performance of system in latest crisis

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US Regulator Comments

- CT Commissioner Leonardi: Aug 2011
  - "…adoption of well-intended but untested European regulatory changes, known as "Solvency II" … could weaken consumer protections …"
  - "Solvency II is a much-needed effort to modernize an …outmoded European regulatory regime, but it has been aggressively marketed by some as the 'be all and end all' of insurance regulation."
  - "…any equivalence process must respect the different legal and regulatory systems that exist around the globe."
- NAIC CEO Vaughn Nov 2011
  - " Our system is one that we're quite comfortable with… equivalence should be assessed on an outcomes basis. On that basis, we should be found equivalent."
- NAIC President McCarty Mar 2012
  - " We're not interested in taking our time-tested system in the US and putting it through the same kind of analysis as undertaken by… Switzerland, Bermuda and Japan"

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Reinsurance Opportunities and Pitfalls

- Implication of tight CAT capital and loose Casualty capital requirements
  - Potential for M&A, divestitures, joint ventures.
- Pre-up front booking of profit
  - Deals bound in December but not effective till months later.
  - A quick way for cedants to avoid booking CY losses.
  - Reinsurer may need to charge expense fee for deals that are bound, but never become effective.
- Devise strategy for alternate scenarios
  - Scenario 1: SII leads to collapse of European insurance industry
  - Scenario 2: SII leads to resurgence of European insurance industry
- Check everything with lawyers

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