GIRO 2010
James Orr & Wendy Hawes - FSA

One year volatility &
Risk Margins -
the Regulatory View

Aims

- This session will discuss why we all need to consider 1 year volatility under Solvency II

- And how this links with the estimation of Risk Margins under the Technical Provisions

- We will do this by highlighting the relevant directive text and guidance

- Offering some questions which we believe still need to be discussed, and…

- DISCUSSION

Level 1 Directive - Article 77

- The risk margin shall ensure the value of the technical provisions is sufficient to meet all obligations over the lifetime thereof.

- The risk margin and best estimate shall be valuated separately and is included within the technical provisions. However, if future cash flows can be replicated reliably using financial instruments where a market value is observable, technical provisions shall be determined using the market value. In this case the risk margin does not have to be valued separately.

- The Cost of Capital Rate used to determine the cost of providing eligible own funds shall be the same for all and will be reviewed periodically.

- The Cost of Capital rate shall be equal to the relevant risk free rate plus an additional rate. The additional rate will be equal to the rate that would be incurred if the undertaking held the capital necessary to support their lifetime obligations as eligible own funds.

Level 1 Directive - Article 86

- The firms must explain:

  - Whether their technical provisions were calculated as a whole or if the Best Estimate and Risk Margin were valued separately. If technical provisions are calculated as a whole, there must be an explanation of methods used (e.g. replicate method)

  - The methods and assumptions to be used in the calculation of the risk margin.

  - Any simplified methods and techniques used to calculate technical provisions

Level 2 Final Advice (CP42)

- Contains assumptions of the reference undertaking.

- The Cost-of-Capital rate should be calibrated in a manner consistent with the assumptions made for the reference undertaking.

- The risk margin valued using the Cost-of-Capital rate has to be a long-term average, reflecting both periods of stability and periods of stress.

- A Cost-of-Capital rate of at least 6 per cent is assumed to reflect the cost of holding an amount of eligible own funds at a 99.5% confidence interval over the one year time horizon for the SCR calculations.

Level 2 Final Advice (CP42)

- The assumptions regarding loss absorbing capacity of technical provisions to be taken into account in the SCR calculations per line of business, is consistent with the assumptions made for the overall portfolio.

- The overall risk margin will be the sum of all the risk margins as calculated for each line of business or each homogeneous group of risks.

- The risk margin as calculated per line of business should not be split between risk margins for premiums provisions and for provisions for claims outstanding.

Cost of Capital Methodology

$$\text{CoCM} = \Sigma_{\text{lob}}\{\text{CoC} \cdot \Sigma_{t \geq 0} \text{SCR}_{\text{RU,lob}}(t)/(1+r_{t+1})^{t+1}\} = \Sigma_{\text{lob}}\text{CoCM}_{\text{lob}}$$

where

$\text{SCR}_{\text{RU,lob}}(t)$ = the SCR for a given line of business (lob) for year t as calculated for the reference undertaking,

r_t = the risk-free rate for maturity t; and

CoC = the Cost-of-Capital rate.

The risk modules that need to be taken into account in the cost of capital calculations are operational risk, underwriting risk with respect to existing business and counterparty default risk with respect to ceded reinsurance and unavoidable market risk.

Level 2 Final Advice (CP76)

Simplifications

1. Make a full calculation of all future SCRs without using simplifications.

2. Approximate the individual risks or sub-risks within some or all sub modules to be used for the calculation of future SCRs.

3. Approximate the whole SCR for each future year, e.g. by using a proportional approach

4. Estimate all future SCRs "at once", e.g. by using an approximation based on the duration approach.

5. Approximate the risk margin by calculating it as a percentage of the best estimate.

Solvency II Balance Sheet
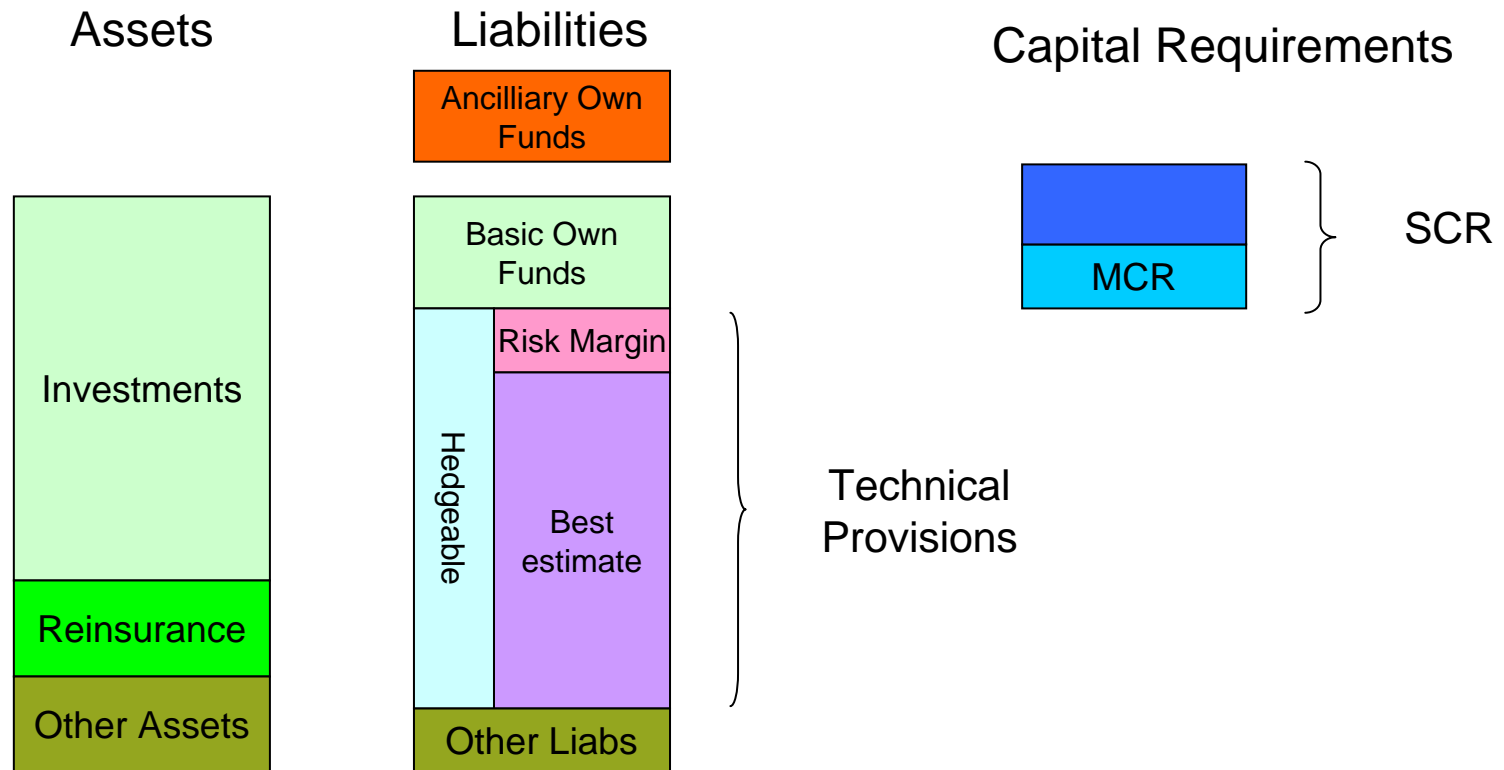
The changes to reserving
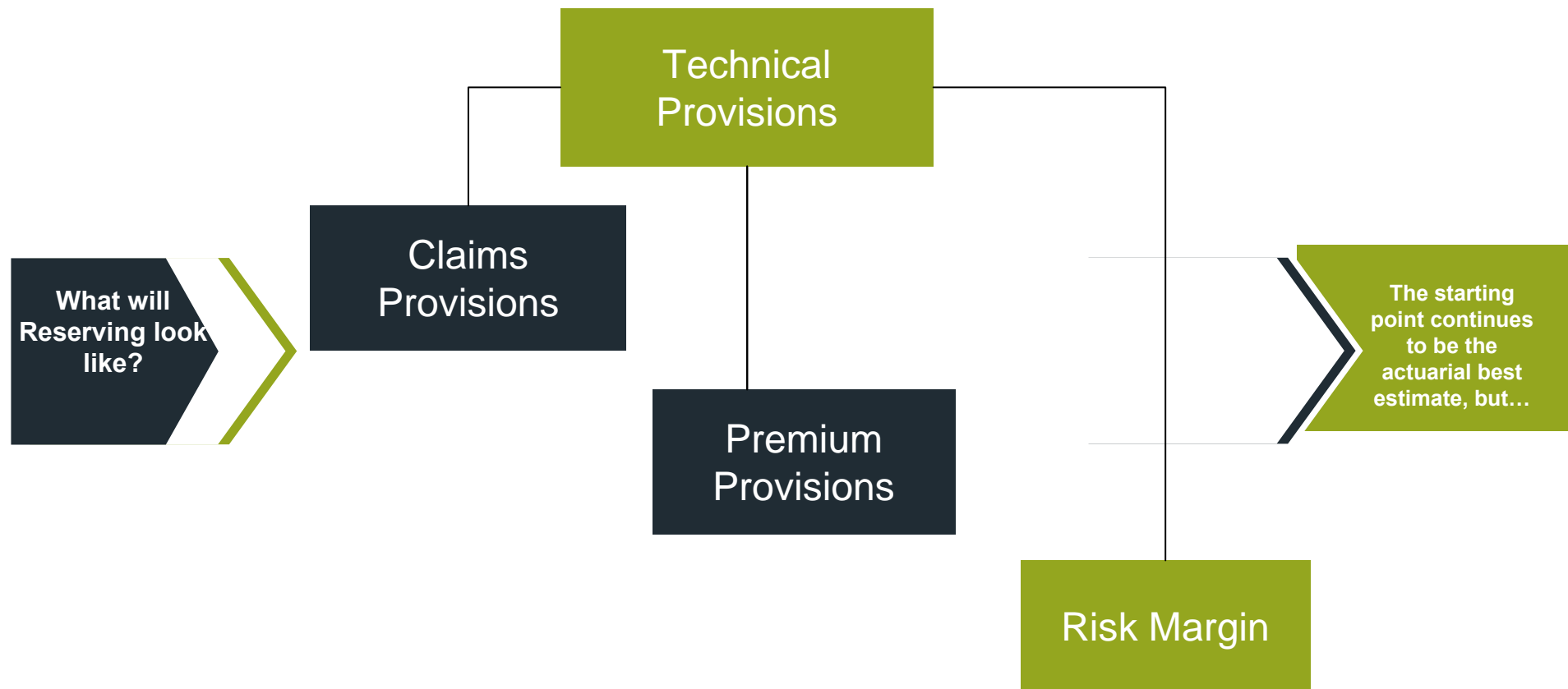
We will need to think more about uncertainty including, but not limited to binary events, and this will form part of the Risk Margin

Why do we need to consider 1 year volatility

- Solvency 2 is notionally projecting a balance sheet, and requires a distribution of "Net Assets" over a one year time horizon.

- Solvency 2 requires a view of the distribution of expected liabilities in one year

- For reserving risk, this requires a distribution of the profit/loss on reserves over one year

- This is different from the standard approach to reserving risk, which considers the distribution of the ultimate cost of claims (eg Mack 1993, England & Verrall 1999, 2002, 2006)

How do we consider 1 year volatility

- There has been no obvious methods emerging, but…

- Presentations at GIRO 2009 from EMB and E&Y suggested a method from an academic paper by Merz & Wuthrich (2008) which derived analytic formulae for the standard deviation of the claims development result after one year assuming:
  - The opening reserves were set using the pure chain ladder model (no tail)
  - Claims develop in the year according to the assumptions underlying Mack's model
  - Reserves are set after one year using the pure chain ladder model (no tail)
  - (The mathematics is quite challenging)

BUT!!!
- The M&W method is gaining popularity, but has limitations. For example, how do we decide on a tail factor to extrapolate into the future, it's based on Mack's model - what if another model is used instead, or if we want to use a different risk measure?

EMB's suggestion

1. Given the opening reserve triangle, simulate all future claim payments to ultimate using a bootstrap or Bayesian MCMC technique.
2. Now forget that we have already simulated what the future holds.
3. Move one year ahead. Augment the opening reserve triangle by one diagonal, that is, by the simulated payments from step 1 in the next calendar year only. An actuary only sees what emerges in the year.
4. For each simulation, estimate the outstanding liabilities, conditional only on what has emerged to date. (The future is still "unknown").
5. A reserving methodology is required for each simulation – EMB call this re-reserving.
6. For a one-year model, this will underestimate the true volatility at the end of that year (even if the mean across all simulations is correct).

An advantage of investigating the claims development result (using re-reserving) in a simulation environment is that the procedure can be generalised:
- Not just the chain ladder model
- Can include curve fitting and extrapolation for tail estimation
- Can incorporate a Bornhuetter-Ferguson step
- Can be extended beyond the 1 year horizon to look at multi-year forecasts
- Can be used to help calibrate Solvency 2 internal models

Lloyd's guidance

- In Section 7 of the Lloyd's guidance, Lloyd's give the same options for calculating the risk margin as those quoted in the final advice, as in Slides 4 to 7

- General points about overall approach:

    - All steps in the valuation process to be documented

    - A [managing agent] should be able to explain what methods are used and why specific methods are selected

    - Process of assessment of proportionality

        - Step 1: Assessment of nature, scale and complexity

        - Step 2: Assessment of the model error

        - Step 3: Back testing

Discussion points

- What realistically should we be doing?

- How does this fit with current systems/processes?

- What will the impact of the change be on how the "real market" would behave in terms of emergence of new claims data?

- How do you think the introduction of discounting across all books will impact GI books?

- What issues does this raise for the profession?

- What issues for the Regulator does this raise?

Questions or comments?