

# Practicalities of QIS3 - Life

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# Agenda

- QIS3 background & objectives
- Contents of QIS3 “pack”
- QIS3 framework
- What’s involved?



# Background & objectives

- This is the third Quantitative Impact Study for Solvency II
  - *“Participation in QIS1 or QIS2 is not a prerequisite for participating in QIS3”*
  - This is really the first full-blown QIS
- *“The goals of QIS3 are fourfold”*
  - Better understanding of practicality and suitability of calculations
  - Understanding impact on balance sheets (calibration)
  - Feedback on suitability of SCR and MCR calculations
  - Looking for information on effect on insurance groups



## QIS3 “pack”

- Available from CEIOPS website
  - Follow links “Consultations” -> “QIS”
  - Or <http://www.ceiops.org/content/view/118/124>
- Page may be updated from time to time with further clarifications etc.
  - e.g. Errata sheet and Q&A sheet recently added

Ceios - Quantitative Impact Studies - Microsoft Internet Explorer

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**Quantitative Impact Studies**

In this section you will find all public documents related to CEIOPS' Quantitative Studies in the Framework of the Solvency II project.

**Quantitative Impact Study 3**

A.	<i>Specifications, Spreadsheets, Guidance</i>	
1.	<a href="#">QIS3 Cover Note</a>	
2.	<a href="#">QIS3 Technical Specifications - Part 1</a>	Technical spec.
3.	<a href="#">QIS3 Technical Specifications - Part 2</a>	
4.	<a href="#">QIS3 Technical Specifications - Annexes</a>	
5.	<a href="#">QIS3 Calibration Papers</a>	Spreadsheet
6.	<a href="#">QIS3 Spreadsheet Instructions</a>	
7.	<a href="#">QIS3 Spreadsheet</a>	
8.	<a href="#">QIS3 Term Structures</a>	Questionnaire
9.	<a href="#">QIS3 Qualitative Questionnaire for Solo Undertakings</a>	
10.	<a href="#">QIS3 Qualitative Questionnaire for Groups</a>	
11.	<a href="#">QIS3 Guidance Paper</a>	
12.	<a href="#">Errata to the QIS3 Technical Specifications</a> (up dated: 24.04.2007)	
13.	<a href="#">QIS3 Calibration of the Credit Risk</a>	
B.	<i>Questions and Answers</i>	
	<a href="#">Questions and Answers</a>	
	<a href="#">List of Contact Persons for QIS 3</a>	

Print

Internet



# Where to start?

- Download the following:
  - QIS3 Guidance Paper (no. 11) - 8 pages
  - QIS3 Technical Specifications - Part 1 (no. 2) – 119 pages
    - But, strip out non-life and group sections and it falls to 70 pages
  - QIS3 Spreadsheet (no. 7)
  - QIS3 Spreadsheet Instructions
- Other items on list are useful...
  - ... but not strictly necessary

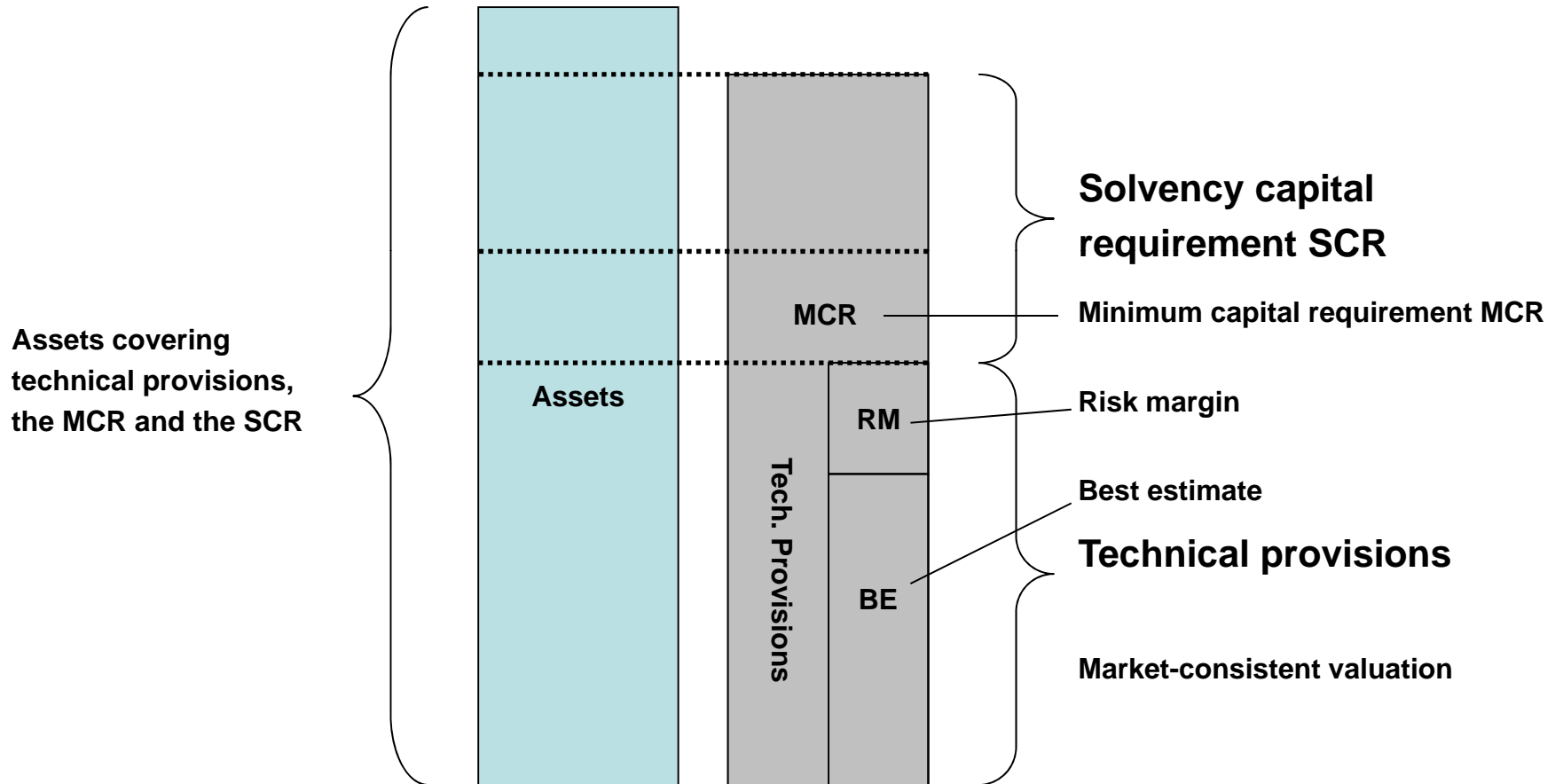


# QIS3 Framework

- Components of QIS3 balance sheet
  - Assets
  - Eligible capital
  - Technical Provisions
    - Best estimate
    - Risk margin
  - Solvency Capital Requirement (SCR)
    - Standard Formula
  - Minimum Capital Requirement (MCR)
- Graph on following slide illustrates interaction....



# QIS3 Framework







# Assets

- Valued at market value
  - If market value not available then valuation should be “*consistent with any relevant market information*”
  - Illiquid/non-tradable assets should “*be valued on prudent basis*”
    - Not higher than historic cost (depreciated)
  - Certain assets (intangibles, fixtures & fittings, computers etc.) to be given nil value



# Eligible capital

- Capital classified into three Tiers
- Tier 1
  - Excess of assets over technical provisions and other liabilities
  - Subordinated liabilities with certain characteristics
- Tier 2
  - Other subordinated liabilities meeting certain criteria
  - Certain forms of contingent capital
- Tier 3
  - Subordinated liabilities which do not meet the criteria for inclusion in Tiers 1 or 2
  - Contingent capital which does not meet the criteria for inclusion in Tier 2
- Only Tier 1 likely to be relevant for vast majority of Irish life companies



# Technical Provisions

- **Technical Provisions**
  - (Perfectly) Hedgeable risks valued at replicating value
  - Non-hedgeable at best estimate + risk margin
- **Best estimate**
  - Cashflow projection (market consistent)
  - Discount at risk free rate
- **Risk margin**
  - Determined using “Cost of Capital” approach
- **No artificial rules/constraints**
  - (e.g. SV floor, zeroising of negatives, net premium etc.)
  - For unit-linked: unit liability plus additional provision (likely to be negative)



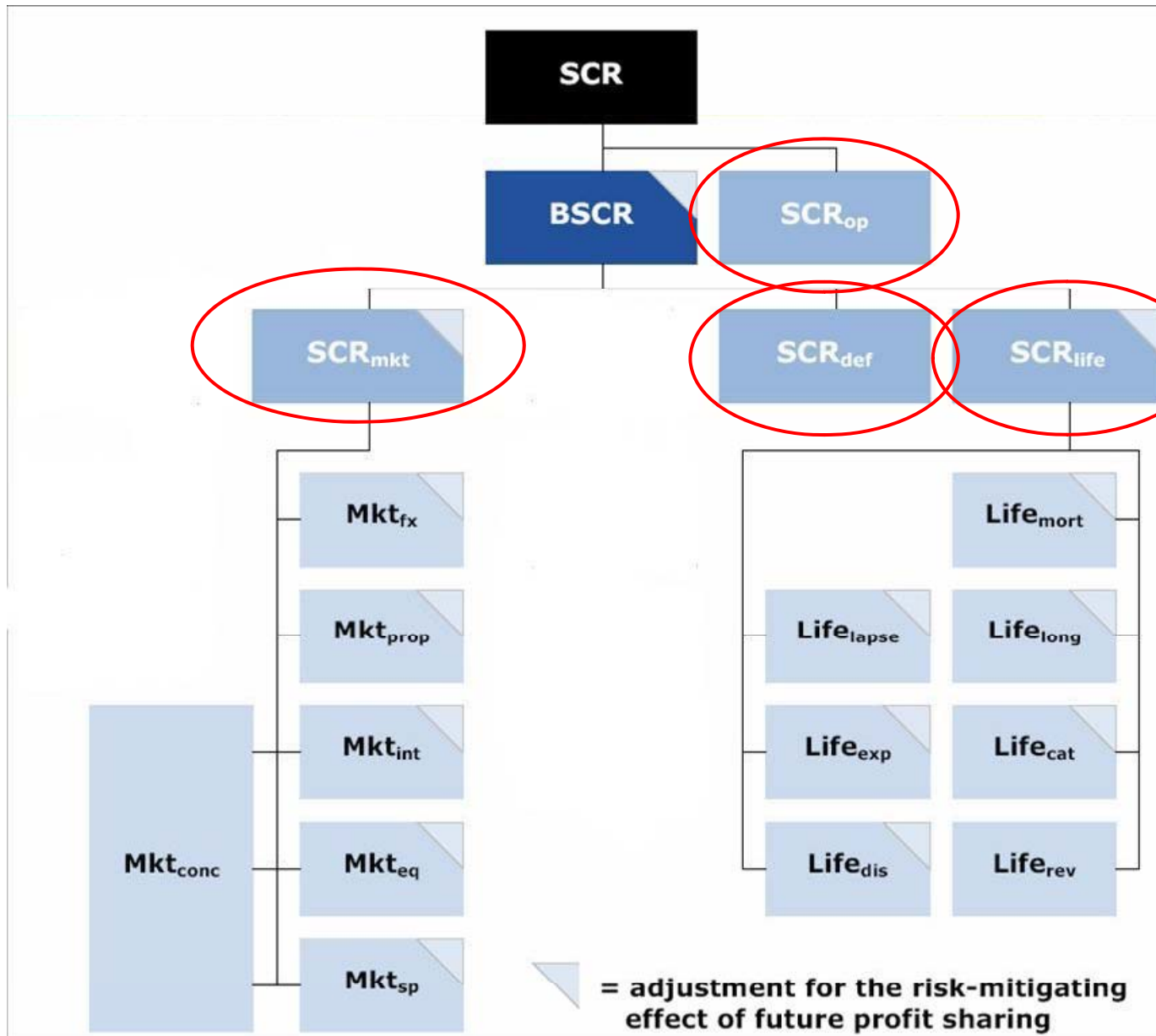
# Risk margin

- “Cost of capital” approach
  - The entity taking on the liabilities has to be compensated for the cost of providing the capital required during the run-off of the transferred portfolio
- Calculated by
  - 1. Projecting the run-off of required capital (simplified projection of future SCR<sub>t</sub>)
  - 2. Multiplying SCR<sub>t</sub> by (Risk-free rate + 6%)
  - 3. Discounting (risk-free rate) and summing



# Solvency Capital Requirement (SCR)

- SCR is a modular calculation
- Calculate various SCR components
  - Such as Market risk, Underwriting risk
- Each component can be further broken down into sub-components
  - E.g. Market risk includes sub-components for interest rate risk, equity market risk, f/x risk.....
- Bottom-up calculation
  - Stress tests on various factors
  - Alternative of simpler 'factor-based' formulae
- Combine components into overall SCR
  - Using (prescribed) correlation matrix





# Individual SCR components

$SCR_{mkt}$

**Market Risk**

- Interest rate
- Equity
- Property
- Currency
- Spread
- Concentration

$SCR_{def}$

**Default Risk**

- Counterparty default (reinsurance, financial instruments)

$SCR_{life}$

**Life Underwriting Risk**

- Mortality
- Longevity
- Disability
- Lapse
- Expense
- Catastrophe

$SCR_{op}$

**Operational Risk**

- Operational risk

- First calculate BSCR based on  $SCR_{mkt}$ ,  $SCR_{def}$  and  $SCR_{life}$
- Then,  $SCR = BSCR + SCR_{op}$



# Calculation of $SCR_{mkt}$

- Net change in assets and liabilities
- Sub-components include:
  - Interest rate
  - Equity
  - Property
  - F/x
- Prescribed stress tests
  - E.g. upward/downward shift in yield curve, equity market shock (32% for most equities)
- Brought together into overall  $SCR_{mkt}$  using (prescribed) correlation matrix





# Calculation of $SCR_{life}$

- Net change in assets & liabilities
- Sub-components include
  - Mortality: 10% increase in mortality rates
  - Longevity: 25% decrease in mortality rates
  - Lapse: 150% of central rates / +3 percent points
  - Expenses: 10% increase; inflation +1 pp
- Brought together into overall  $SCR_{life}$  using (prescribed) correlation matrix



# Calculation of BSCR

## Calculation

The BSCR is determined as follows:

$$BSCR = \sqrt{\sum_{rxc} CorrSCR_{r,c} \cdot SCR_r \cdot SCR_c} - \min(\sqrt{\sum_{rxc} CorrSCR_{r,c} \cdot KC_r \cdot KC_c}, FDB)$$

where

$CorrSCR_{r,c}$  = the cells of the correlation matrix CorrSCR

$SCR_r, SCR_c$  = capital charges for the individual SCR risks according to the rows and columns of the correlation matrix CorrSCR

$KC_r, KC_c$  = risk mitigation effects for the individual SCR risks<sup>15</sup>

and CorrSCR is defined as follows:

$CorrSCR =$	$SCR_{mkt}$	$SCR_{def}$	$SCR_{life}$	$SCR_{health}$	$SCR_{nl}$
$SCR_{mkt}$	1				
$SCR_{def}$	0.25	1			
$SCR_{life}$	0.25	0.25	1		
$SCR_{health}$	0.25	0.25	0.25	1	
$SCR_{nl}$	0.25	0.5	0	0	1



## Calculation of $SCR_{op}$

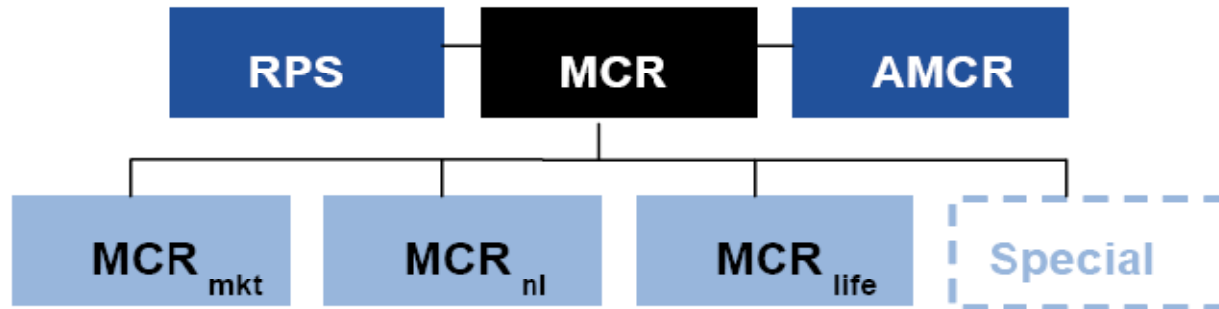
- $SCR_{op}$  calculated as greater of
  - 3% of gross premium income, and
  - 0.3% of gross technical provisions
- But then limited to 30% of BSCR
- However
  - “...this formula should not be viewed as the final proposal”
  - “CEIOPS considers that the suggested formula needs to be developed further to adequately reflect operational risk where an insurer writes unit-linked business”



# Calculation of MCR

## Overall MCR calculation

The MCR calculation is divided into components as follows:



- MCR should be less than SCR
- Detailed formulae for calculating MCR
- Calculated automatically by QIS3 spreadsheet
  - But requires lots of inputs



## Recap & summary

- Basic participation in QIS3 requires
  - Valuation of assets
  - Classification of eligible capital items
  - Calculation of best-estimate provisions
  - Calculation of risk margin for non-hedgeable risks
    - Involves projection of (simplified) SCR into the future
  - Calculation of SCR
  - Calculation of MCR
  - Completion of spreadsheet
- Further (optional) participation
  - Qualitative questionnaire
  - Info on internal model
  - Group information



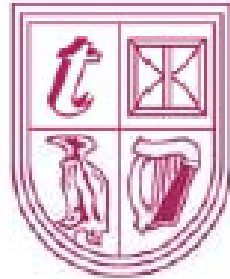
# Practical issues

- Completion of QIS3 spreadsheet
  - Looks daunting, but actually very well put together and well documented
    - Accompanying instruction book
    - Helper tabs
    - Colour coding etc.
  - Fill in the blanks and it takes care of the rest
- Calculations
  - Need cash flow projection software
  - Options and guarantees – choice of 4 approaches
  - Multiple runs (best estimate, various SCR stress tests)
  - Term structure of interest rates
  - Contract classification/segmentation



## Why participate?

- First chance to get some understanding of
  - practicality and suitability of calculations
  - impact on balance sheets
- Will allow early identification of any potentially serious problems
- There will be further QISs
  - Refinement of calibration etc.
- But much easier to participate in later QISs if you participate in QIS3



# Questions?

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